DEPARTMENT OF COMPUTER SCIENCE AND RESEARCH CENTRE

Vision

Empowering the students to adept with the modern technologies, moral values, leadership and entrepreneurial skills with latest pedagogy and research environment to compete at the global level

Mission

- Strengthening the core competency by using latest tools and technologies
- Imparting value based quality education to promote students as renowned professionals
- Strengthening the research to advocate global technology

Programme Educational Objectives (PEO)

PEO1: To create and strengthen women leaders through disciplinary knowledge, professional skills and ethical sensitivity

PEO2: To transform students as successful entrepreneurs to face the modern challenges

PEO3: To nurture the students to invent, innovate and create solutions for current moral, ecological and economic issues

Programme Outcomes (PO)

On completion of Post Graduate and Under Graduate programmers, student will be enabled with

PO1: Disciplinary Knowledge: Acquiring knowledge of different dimensions in the related areas of study and identifying the assumptions that frame thinking and actions

PO2: Effective Communication: Ability to share thoughts, ideas and applied ski11s of communications in its various perspectives through LSRW

PO3: Research Skill and Critical Thinking: Ability to plan, execute and report the results of an experiment and to draw conclusions from evidences and the capability to apply analytical thought by following scientific approach to knowledge development

PO4: Moral Ethical Awareness/ Reasoning: Ability to embrace moral/ethical values in conducting one's life, about an ethical issues from multiple perspectives, and use ethical practices in all works and appreciating environmental and sustainability issues; and adopting unbiased and truthful actions in all aspects of work

PO5: Information /Digital Literacy: Capability to use ICT in case of need and the ability to access, evaluate and use the relevant information

PO6: Problem Solving: Ability to apply their competence to solve non-familiar everyday problems in real life situations

PO7: Self-directed and Lifelong Learning: Acquire the ability to engage in independent and lifelong learning through self-paced and self-directed learning to meet out the change in life

XX ACADEMIC COUNCIL

MASTER OF COMPUTER APPLICATIONS (MCA)

(Two Years Regular Programme)
(For Students Admitted from 2024-25)

Program Outcomes (PO):

In completion of Master of Computer Applications (MCA) Degree programme, the students will be enabled with:

1. **Computational Knowledge:** Apply knowledge of computing fundamentals, computing specialisation, mathematics, and domain knowledge appropriate for the computing specialisation to the abstraction and conceptualisation of computing models from defined problems and requirements
2. **Problem Analysis:** Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
3. **Design /Development of Solutions:** Design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations
4. **Conduct investigations of complex computing problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
5. **Modern Tool Usage:** Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations
6. **Professional Ethics:** Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices
7. **Life-long Learning:** Recognise the need, and have the ability, to engage in independent learning for continual development as a computing professional
8. **Project management and finance:** Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
9. **Communication Efficacy:** Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions
10. **Societal and Environmental Concern:** Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices
11. **Individual and Team Work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments
12. **Innovation and Entrepreneurship:** Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large

ACADEMIC COUNCIL

Program Specific Outcomes (PSO):

PSO1: Utilize strong technical aptitude and domain knowledge to develop smart software solutions for the upliftment of society

PSO2: Apply research and entrepreneurial skills augmented with a rich set of communication teamwork and leadership skills to excel in their profession

PSO3: Show continuous improvement in their professional career through life-long learning, appreciating human values and ethics

PSO4: Apply the knowledge of computer application areas in modelling software applications for the industries appropriately

PSO5: Apply the knowledge of latest computing techniques with mathematical foundation to compete with real world problems

PSO6: Ability to understand and align with the prevailing cross cultural, societal, professional, legal and ethical matters in industry

PSO7: Ability to face the changing trends and career opportunities in computer application

PREAMBLE

The Board of Studies of Computer Science revamped the curriculum with the following changes

Core Papers

- Reduced the syllabus for the course Java Programming, Software Development Framework and Software Project Management
- Web Technology course has been removed , Cyber Security course has been introduced

Discipline Specific Elective

- Digital Image Processing and Organization Behavior syllabus has been reduced
- Cryptography & Network Security course has been removed, Digital Marketing course has been introduced

PROGRAMME STRUCTURE – PROGRAM CODE: PCA

Sem	Subject Code	Course	Subject Title	Hours / Week	Credit	CIA	ESE	Total Marks
I	IMCAC112	Core I	○ **Java Programming**	5	5	25	75	100
	IMCAC121	Core II	Data Structures and Algorithms	5	5	25	75	100
	IMCAC131	Core III	RDBMS	5	5	25	75	100
	IMCAC14	Core IV	Optimization Techniques	5	5	25	75	100
	IMCAC151 P	Core V	Java Programming Lab	5	3	25	75	100

KAACADEMIC COUNCIL

	IMCAC16P	Core VI	Data Structures and Algorithms with Python Lab	5	3	25	75	100
	IMCAX1P/ IMCAX1O	Extra Credit I	RDBMS Lab / *Online Course	-	2	-	100	100
			Total	**30**	**26+2**	**150**	**450+ 100**	**600+ 100**
II	IMCAC211	Core VII	**Cyber Security**	6 (T-4, P-2)	4	25	75	100
	IMCAC22	Core VIII	Computer Organization	5	5	25	75	100
	IMCAC23P	Core IX	# Web Designing Lab	4	3	25	75	100
	IMCAC24P	Core X	Data Analytics Lab	4	3	25	75	100
	IMCAE2A/ IMCAE2B/ IMCAE21C	DSE I	a. Cloud and Distributed Computing b. Probability and Applied Statistics c. Data Analytics	6	5	25	75	100
	IMCAE2D/ IMCAE22E / IMCAE2F	DSE II	a. Compiler Design b. **Digital Marketing** b. Blockchain Technologies	5	4	25	75	100
	IMCAX2P/ IMCAX2O	Extra Credit II	#Internship / *Online Course	-	2	-	100	100
			Total	**30**	**24+2**	**150**	**450+ 100**	**600+ 100**
III	IMCAC311	Core XI	**Software Development Framework**	5	5	25	75	100

XX ACADEMIC COUNCIL

	IMCAC32	Core XII	Data Mining and Warehousing	5	5	25	75	100
	IMCAC33P	Core XIII	Software Development Framework Lab	5	3	25	75	100
	IMCAC34P	Core XIV	Data Mining Lab	5	3	25	75	100
	IMCAE3A/ IMCAE31B / IMCAE31C	DSE III	a. Artificial Intelligence and Expert Systems **b. Digital Image Processing** **c. Organization Behavior**	5	4	25	75	100
	IMCAE3D/ IMCAE3E/ IMCAE3F	DSE IV	a. Operating Systems b. Open Source Technologies c. Internet of Things	5	4	25	75	100
	IMCAX3/ IMCAX3O	Extra Credit III	Employability Skills / *Online Course	-	2	100	-	100
			Total	**30**	**24+2**	**150+ 100**	**450**	**600+ 100**
IV	IMCAC412	Core XV	**Software Project Management**	5	5	25	75	100
	IMCAC42	Core XVI	○ Machine Learning	5	5	25	75	100
	IMCAC43PW	Core XVII	Project	18	6	100	100	200
	IMCAX4P/ IMCAX4O	Extra Credit IV	Document Preparation Lab (LATEX) / *Online Course	-	2	-	100	100
			Library/Browsing	1				
			Remedial/Games	1				

KE ACADEMIC COUNCIL

			Total	**30**	**16+2**	**150**	**350+ 100**	**400 + 100**
			Grand Total	**120**	**90 + 8**	**600+ 100**	**1700 + 300**	**2200+ 400**

***** For Online Course credit alone will be assigned on submission of certificate obtained by appearing for online examination from EdX, Spoken Tutorial, NPTEL or Coursera etc.
#For internship course, refer www.internshala.com or any online internship course.
- For online course integration, syllabus will be taken from spoken tutorial.

DSE – Discipline Specific Elective

Core I – Java Programming

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 5**
Subject Code: IMCAC112 **Credit: 5**

Course Objectives:

1. To learn the basic concepts of Java to increase the ability of students in web application development using AWT and Swing
2. To develop programming knowledge to create dynamic web applications using server side technology with Java database connectivity

Unit I **(15 hours)**

Fundamentals of Object Oriented Programming: Introduction, object oriented paradigm –basic concepts of oops – benefits of oops – applications of OOPs. **Java Language Basics:** Java Program Structure – Basic Building Blocks – Variables - Data Types – Operators – Typecasting - Keyword Final – **Control Structures – Loops – Functions:** Functions in Java – Recursive Functions – Parameter Passing – Method swap – In-built Methods or Library Methods .

Unit II **(15 hours)**

Arrays: Arrays in Java – Creating an Array – Array Index Checking – Multi-Dimensional Arrays. **Introducing Classes:** Class Fundamentals – Declaring and Creating Objects – Accessing Members – Access Control Parameters: Public and Private – Introducing Methods – Methods with Parameter – Methods Returning a Value – Constructors – Default Constructor – Keyword this – The finalize() Method – Overloading Methods and Constructors – Using Objects as Parameters – Keyword static – **Inheritance:** Inheritance Basics – Member Access and Inheritance – Keyword super – Creating a Multi-Level Hierarchy – Method Overriding – Using final in Inheritance – Introducing Interface – Abstract Methods and Classes .

ACADEMIC COUNCIL

Unit III **(15 hours)**

Multi-Threaded Programming: Introduction of Threads – Reason for using Threads – Creating and Running a Thread – Creating Multiple Threads – Life Cycle of a Thread – Implementing Runnable Interface – Thread Priority and Thread Scheduling Policy – Synchronization – **Exception Handling:** Use of Exception Handling – Types of Exceptions – Checked and Unchecked Exceptions – Exception Handling Constructs – Keyword finally – Throw Statement – Multiple Catch Blocks.

Unit IV **(15 hours)**

Java Applets: Applet Basics – The Applet Class – Applet Architecture - Applet Life Cycle - Comparison of Applet and Applications – Setting Font and Changing Style, Size, Type, Foreground and Background Colour - Using Graphics Methods in Applets- Images and Sounds in Applets – Applet Tag - **Event Handling and AWT - Introduction to Swing:** JFrame – JOptionPane – Class JButton- Class JLabel- JCheckBox – Introduction to JRadioButton – Class JTextField – JTextArea- JMenu - JComboBox - **JDBC:** JDBC Architecture – SQL-Primer – Create DB in SQL – Creating JDBC Application – JDBC Driver – Connecting to the ODBC Data Source – Database Connections – Statements – The PreparedStatement Objects – The CallableStatement Objects – ResultSet.

Unit V **(15 hours)**

Servlets: Architecture – Life cycle – First program – Client HTTP request – Server HTTP response – HTTP status code – Writing filters – Exception handling – Cookies handling – Session tracking – Database access – File uploading – Handling date – Servlets-page redirection – Sample program – Servlets-packaging.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the concepts of Java Basics, Control Structures, Loops, Functions, Arrays, Classes, Inheritance, Thread, Applet, Swing, Servlet and JSP.
CO2: Utilize the techniques of AWT and Swing to create various fields.
CO3: Examine an implementation of Applet with Java for setting up fonts and its style.
CO4: Evaluate different types of JDBC drivers, connectivity and exceptions.
CO5: Design the web application using swing, servlet, and JDBC.

Text Books:

1. E. Balaguruswamy, Programming with JAVA - A Primer, McGraw Hill Professional, 2019.
2. Hortsmann & Cornell, "CORE JAVA 2 ADVANCED FEATURES, VOL II", Pearson Education, 2002.

Reference Books:

1. Paul Deitel, Harvey Deitel, *Java How to Program (Early Objects)*, Pearson Education, Tenth Edition, 2016.
2. DT Editorial Services, *Java 8 Programming Black Book*, Dreamtech Press, 2015.

E - Resources:

1. https://www.youtube.com/watch?v=Ae-r8hsbPUo

AUTONOMOUS COLLEGE

2. https://www.learnvern.com/course/advanced-java-tutorial
3. https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=English

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	3	3	1	9	9	3	1	9	3	68
CO2	9	9	9	3	3	1	9	9	3	1	9	3	68
CO3	9	9	9	3	3	1	9	9	3	1	9	3	68
CO4	9	9	9	3	3	1	9	9	3	1	9	3	68
CO5	9	9	9	9	9	1	9	9	9	1	9	9	92
Total	45	45	45	21	21	5	45	45	21	5	45	21	364

Low-1 Medium-3 High-9

Core II - Data Structures and Algorithms

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 5**
Subject Code: IMCAC121 **Credit: 5**

Course Objectives:

1. To understand data structures and algorithms in computer science perspectives, algorithms analysis procedure, space and time complexity of various algorithms
2. To apply data structures and algorithms to solve real world problems

Unit I **(15 hours)**

Computational Complexity: Computer Architecture-Big oh Notation-other asymptotic notations for complexity of algorithms-More asymptotic notations

Introduction: History of Algorithm-Data structures and Algorithms-Data structure-Definition and Classification

Stacks: Introduction-stack Operation-Application. **Queues:** Introduction-Operation-circular Queues-Other Types of Queues-Application

Unit II **(15 hours)**

Linked Lists: Introduction-Singly Linked Lists-Circularly Linked List-Doubly Linked List-Multiply Linked List-Application. **Linked Stacks and Linked Queues:** Introduction-Operation on Linked Stacks and Linked Queues-Dynamic Memory Management and Linked Stacks-Implementation of Linked Representations-Applications. **Trees and Binary Tress:** Introduction-Trees: Definition and Basic Terminologies-Representation of Trees-Binary Tree Traversals-Threaded Binary Trees-Applications.

KK ACADEMIC COUNCIL

Unit III **(15 hours)**

Graphs: Introduction-Definitions and Basic Terminologies-Representations of Graphs-Graph Traversals-Single-source & All pairs shortest paths problem- Minimum cost spanning trees. **Binary Search Trees and AVL Trees:** introduction-Binary Search Trees: Definition and Operations-AVL Trees: Definition and Operations-Applications.

Unit IV **(15 hours)**

B Trees and Tries: Introduction to m-way search Trees: Definition and Operations-B Trees: Definition and Operations-Tries: Definition and Operations-Applications. **Red-Black Trees and Splay Trees:** Red-Black Trees-Splay Trees-Applications. **Hash Tables:** Introduction-Hash Table Structure-Hash Functions-Linear Open Addressing-Chaining-Applications.

Unit V **(15 hours)**

Searching: Introduction-Linear Search- Transpose Sequential Search-Interpolation Search- Binary Search-Fibonacci Search-Other Search Techniques. **Internal Sorting:** Introduction-Bubble Sort-Insertion Sort-Selection Sort0-Merge Sort-Shell Sort-Quick Sort-Heap Sort-Radix Sort. **External Sorting:** Introduction-External Storage Devices- Sorting with Tapes :Balanced Merge-Sorting with Disks :Balanced Merge-Polyphase Merge sort-Cascade Merge Sort.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the concepts of data structures and its classification, Linked lists, Graphs and B Trees

CO2: Apply data structures and its algorithms in real time applications

CO3: Analyze the efficiency of graphs and searching algorithms

CO4: Compare different sorting algorithms

CO5: Develop different algorithm design techniques

Text Books:

1. Kent D. Lee, Steve Hubbard, *Data Structures and Algorithms with Python*, Springer International Publishing Switzerland, 2015
2. G A Vijayalakshmi Pai, *Data structures and Algorithms, Concepts, Techniques and Application*,Tata McGraw Hill Education Private Limited,New Delhi, 2008

Reference Books:

1. Ellis Horowitz, Sartaj Sahni, *Fundamentals of Data Structures*, Galgotia Book Source, Second Edition, 2004
2. Alfred V.Aho Johne, Hopcroft, *Data Structures and Algorithm*, Addison-Wesley, Third Edition, 2012
3. Mark Allen Weiss, *Data Structures and Algorithm Analysis in C++*, Pearson Education, Fourth Edition, 2014

E-Resources:

1. http://www.dave-reed.com/csc427.F04/
2. http://www.math.tau.ac.il/~matias/ds03.html
3. https://onlinecourses.nptel.ac.in/noc20_cs70/preview

EX ACADEMIC COUNCIL

4. https://www.tutorialspoint.com/python_data_structure/python_data_structure_tutorial.pdf
5. https://nptel.ac.in/courses/106/106/106106145/

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	3	3	9	1	9	3	3	1	3	3	56
CO2	9	9	3	3	9	1	9	3	3	1	3	3	56
CO3	9	9	3	3	9	1	9	3	3	1	3	3	56
CO4	9	9	3	3	9	1	9	3	3	1	3	3	56
CO5	9	9	3	3	9	1	9	3	3	1	3	3	56
Total	45	45	15	15	45	5	45	15	15	5	15	15	280

Low-1 Medium-3 High-9

Core III - RDBMS

(For Students Admitted from 2024-25)

Semester: I **Hours/Week: 5**
Subject Code: IMCAC131 **Credit: 5**

Course Objectives:

1. To understand the basic concepts, applications of database systems, relational database design principles and SQL queries
2. To understand the different issues involved in the design and implementation of a database system,security, integrity and concurrency

Unit I **(15 hours)**

Introduction: Database System Applications-Purpose of Database System-View of Data-Database Design- **Data Storage and Querying**-Transaction Management-Database Architecture. **Relational Databases:** Introduction to the Relational Model-Introduction to SQL-Intermediate SQL: Join Expressions-Views- Transactions-Integrity constraints-Schemas-Authorization

Unit II **(15 hours)**

Database Design: Database design and E-R Model: Overview -ER-Model-Constraints- ER-Diagrams- Reduction to Relational Schemas – Design Issues-.Relational database model: Logical view of data- keys- integrity rules. **Relational Database design:** Features of good relational database design- Atomic domain and Normalization (1NF- 2NF- 3NF- BCNF).Database-Design Process-Modeling Temporal Data

Unit III **(15 hours)**

Data Storage and Querying: Storage and File Structure: Overview of Physical Storage-Magnetic Disk and Floppy Disk-RAID- Organization of Records in Files-**Indexing and Hashing:** Basic

XX-ACADEMIC COUNCIL

Concepts-Ordered Indices-Multiple Key Access-Static Hashing-Dynamic Hashing-Bit Map Indices. **Query Processing**: Overview-Selection Operation-Sorting-Join Operation.

Unit IV **(15 hours)**

Transaction Management: Transaction: Transaction Concept-Simple Transaction Model-Storage Structure- Transaction Atomicity and Durability-Transaction Isolation-Serializability-**Concurrency Control:** Lock- Based Protocols-Deadlock Handling. **Recovery System:** Failure Classification-Recovery and Atomicity-Recovery Algorithm-Failure Management.

Unit V **(15 hours)**

System Architecture: Database –System Architecture Centralized and Client-Server Architecture-Server System Architecture-Parallel System-Distributed System - Distributed System-Network Types. **Advanced Topics, Advanced Application Development:** Performance Tuning-Performance Benchmarks-Standardization.

Course Outcomes:

After successful completion of this course, the student will be able to

CO1: Explore about DBMS architecture, database designs, database modeling
CO2: Extend about ER-Diagram and UML, Relational Algebra and Relational Calculus
CO3: Distinguish the normalization theory (1NF- 2NF- 3NF- BCNF)
CO4: Apply Structured query language (SQL) and Constraints
CO5: Evaluate various transaction processing, concurrency control mechanisms and database protection mechanisms

Text Book:

1. A Silberschatz , H Korth, S Sudarshan, *Database System and Concepts*, Mc Graw- Hill, Sixth Edition,2019

Reference Books:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems (3/e)*, McGraw Hill, 2003
2. Atul Kahate, *Introduction to Database Management Systems*, Pearson Education, Tenth Impression, 2012
3. C.J Date, *An Introduction to Database System*, Addison- Wesley Publishing, Third Edition, 1998

E-Resources:

1. https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
2. https://www.coursera.org/projects/introduction-to-relational-database-and-sql
3. https://onlinecourses.nptel.ac.in/noc21_cs04/preview

XII ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	3	1	9	1	9	3	3	1	3	1	52
CO2	9	9	3	1	9	1	9	3	3	1	3	1	52
CO3	9	9	3	1	9	1	9	3	3	1	3	1	52
CO4	9	9	3	1	9	1	9	3	3	1	3	1	52
CO5	9	9	3	1	9	1	9	3	3	1	3	1	52
Total	45	45	15	5	45	5	45	15	15	5	15	5	260

Low-1 Medium-3 High-9

Core IV – Optimization Techniques

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 5**
Subject Code: IMCAC14 **Credit: 5**

Course Objectives:

1. To impart knowledge in concepts and tools of Operations Research(OR)
2. To apply OR techniques constructively to make effective business decisions

Unit I **(15 hours)**

Basics of Operations Research: Development of OR – Definition-Characteristics-Scientific Method-Necessity of OR-Scope-OR and Decision-Making-Scope of OR in Management, Financial management-Applications of various OR Techniques-Objectives –Phases-Models-Classification Schemes of Models-Role of Computers in OR – Difficulties in OR - Limitations of OR.**Linear Programing:** Introduction-Requirements for a Linear Programming Problem - Assumptions in Linear Programming Models – Applications of LP method- Formulation of LPP-Advantages – Limitations – Graphical Method of Solutions – Some Exceptional Cases.

Unit II **(15 hours)**

General LPP-Canonical and standard Forms of LPP-Theory of Simplex Method – Some Important Definitions –Analytical Method or Trial and Error Method – Simplex Method – Artificial Variables Techniques – Special cases in Simplex Method Applications – Solution of Simultaneous Equations by Simplex Method – Some Additional Points – Computational Efficiency of the Simplex Technique.

Unit III **(15 hours)**

Transportation Model: Introduction to the Model – Assumptions in Transportation Model – Definition – Matrix Terminology – Formulation and Solution – Variants in Transportation Problems – Additional Problems –Least-Time Transportation Problems – Post Optimality Analysis in Transportations – Trans-Shipment Problem – Dual of the Transportation Problem.

EX ACADEMIC COUNCIL

Unit IV **(15 hours)**

Assignment Model: Definition of Assignment Model – Mathematical Representation – Comparison with the Transportation Model – Solution of Assignment Models – Hungarian Method for Solution of Assignment Problems – Formulation and Solution of Assignment Models – Variations – Additional Problems- Sensitivity Analysis in Assignment Problem – Travelling Salesman Problem.

Unit V **(15 hours)**

Advanced Topics in LP: Duality in LP – Dual Simplex Method – Revised Simplex Method – Bounded Variable Problem.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain characteristics of Operational Research, Computational Efficiency of the Simplex Technique, Transportation Problems, Assignment problem and Duality

CO2: Apply Graphical, Simplex methods, Assignment Problem, Transportation Problem and Dual Simplex Method methods to get optimal solution for Linear Programming

CO3: Analyse the optimal solutions of different Linear Programming methods such as Graphical, Simplex method, Assignment Problem and Transportation Problem and Dual Simplex methods for making effective business decisions

CO4: Compare Solutions of as Graphical, Simplex and Dual Simplex method

CO5: Generate dual of LPP and dual of Transportation Problem

Text Book:

1. Er. Prem Kumar Gupta, Dr D S Hira, *Operations Research*, S Chand Publisher, Revised Edition, 2017

Reference Books:

1. V.K.Kapoor, *Operations Research*, Sultan Chand & Sons Publishers, Fourth Edition, 2001
2. Hamdy A.Taha, *Operations Research*, Prentice Hall of India, Seventh Edition, 2005
3. J K Sharma, *Operations Research Theory and Applications*, Macmillan Publishers India Limited, Fifth Edition, 2013
4. Kanti Swarup , P.K. Gupta and Man Mohan, *Operations Research*, Sultan Chand & Sons Publishers,Thirteenth Edition, 2004

E-Resources:

1. https://nptel.ac.in/courses/110/106/110106062/
2. https://onlinecourses.swayam2.ac.in/cec20_ma10/preview
3. https://www.bbau.ac.in/dept/UIET/EMER-601%20Operation%20Research%20Queuing%20theory.pdf

ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	3	3	1	3	9	1	3	1	3	1	46
CO2	9	9	9	3	1	3	9	1	3	1	3	1	52
CO3	9	9	9	3	1	3	9	1	3	1	3	1	52
CO4	9	9	9	3	1	3	9	1	3	1	3	1	52
CO5	9	9	9	3	1	9	9	1	3	1	3	1	58
Total	45	45	39	15	5	21	45	5	15	5	15	5	260

Low-1 Medium-3 High-9

Core V – Java Programming Lab

(For Students Admitted from 2024-25)

Semester: I **Hours/Week: 5**
Subject Code: IMCAC151P **Credit: 3**

Course Objectives:

1. To apply the concepts of Abstract Windowing Toolkit (AWT) and swing to design and develop GUI applications
2. To create dynamic web applications using JSP, Servlet and Java Data Base Connectivity (JDBC)

List of Programs

Formula Substitution

1. To find binomial coefficient

Array

2. To arrange numbers and names in order
3. To perform matrix multiplication & transpose
4. To perform Linear search and Binary search

OOPs Concept

5. To implement Inheritance
6. To implement Exception Handling
7. To implement multithreading

Applet

8. To handle Keyboard events
9. To handle Mouse events
10. To simulate a calculator (arithmetic operations) using GUI components

ACADEMIC COUNCIL

11. To implement Free hand drawing
12. To implement menus

Swing

13. To display current date & time in different format.
14. To set a foreground and background color for label

JDBC

15. To prepare a student's details with Roll-No, Name, Mark1, Mark2, Mark3, Total, Average and Grade to perform insert, update, delete and display of student information
16. To prepare an Electricity Bill to perform insert, update, delete and display Electricity bill of a particular user

Servlet

17. To display Simple Message
18. To use cookies to store the number of times a user has visited the servlet
19. To generate Random Numbers
20. Create a login page, if the username and password is correct then prints message "Hello username" else" login failed"

21. Create Student Information System to view the details of the students

Note: - Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Demonstrate the concepts such as OOPs, Array to implement Java code
CO2: Apply an event handling using swing and AWT components
CO3: Illustrate the concept of Applets in Java program
CO4: Discover the database access through Java code using JDBC connectivity
CO5: Create dynamic web pages using Servlet and JSP

Course Outcomes	Programme Outcomes												
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**Total**
CO1	9	9	9	3	3	1	9	9	3	1	3	1	**60**
CO2	9	9	9	3	3	1	9	9	3	1	3	1	**60**
CO3	9	9	9	3	3	1	9	9	3	1	3	1	**60**
CO4	9	9	9	3	3	1	9	9	9	1	9	1	**72**
CO5	9	9	9	3	9	1	9	9	9	1	9	1	**78**
Total	**45**	**45**	**45**	**15**	**21**	**5**	**45**	**45**	**27**	**5**	**27**	**5**	**330**

Low-1 Medium-3 High-9

XII ACADEMIC COUNCIL

Core VI - Data Structures and Algorithms with Python Lab

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 5**
Subject Code: IMCAC16P **Credit: 3**

Course Objectives:

1. To identify and apply the suitable data structure for the given real world problem
2. To gain knowledge in practical applications of data structures using python

List of Programs

Display Text

1. To develop a simple calculator
2. To check given year is leap year or not

Formula Substitution

3. To find the factorial of the given number
4. To compute the GCD of two numbers.
5. To find the Distance between Two Points
6. To evaluate the Fibonacci series for n terms
7. To find given number is odd or even.
8. To find the square root of a number (Newton's method)
9. To find Exponentiation (power of a number)
10. To find the maximum of a list of numbers.
11. To find First n prime numbers
12. To Find Given Number is Armstrong Number or not

Algorithm substitution

13. To perform Linear search and Binary search
14. To perform Selection sort
15. Write a Python program to perform Insertion sort
16. To perform Merge sort
17. To perform Bubble Sort Algorithm

Array

18. To multiply matrices
19. To use command line arguments for counting words (word count)

File

20. To find the most frequent words in a text read from a file

Note: - Questions for internal and external examination will be based on concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe the Python language syntax including control statements, loops and functions to write programs for a wide variety problem in mathematics.

KA ACADEMIC COUNCIL

CO2: Examine the core data structures in python to store, process and sort the data.
CO3: Basic knowledge of condition checking
CO4: Implement the structure of algorithm
CO5: Examine the file and array concept

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	3	9	1	9	3	3	1	1	1	58
CO2	9	9	9	3	9	1	9	3	3	1	1	1	58
CO3	9	9	9	3	9	1	9	3	3	1	1	1	58
CO4	9	9	9	3	9	1	9	3	3	1	1	1	58
CO5	9	9	9	3	9	1	9	3	3	1	1	1	58
Total	45	45	45	15	45	5	45	15	15	5	5	5	290

Low-1 Medium-3 High-9

Core VII – Cyber Security

(For Students Admitted from 2024-25)

Semester: II **Hours/Week: 6 (T-4 & P-2)**
Subject Code: IMCAC211 **Credit: 4**

Course Objective:

1. To practice with an expertise in academics to design and implement security solutions in Organizations.
2. To understand key terms and concepts in Cryptography, Rootkit, Cryptology

Unit I **(12 hours)**

Introduction to Cyber security: Computer security-threats-Harm-Vulnerabilities-Control-Authentication- Access Control-Cryptography-Malicious Code-Malware-Countermeasures-The web-User side-Browser Attacks-Email Attacks.

Unit II **(12 hours)**

Security In Operating System & Networks: Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network security attack- Threats to Network Communications - Wireless Network Security -Denial of Service - Distributed Denial-of-Service.

Unit III **(12 hours)**

Database Security: Introduction of Databases-Security Requirements in Databases-Reliability and Integrity- Database Disclosure-Data Mining and Big Data-Cloud Computing: Cloud Computing Concepts-Cloud Securitytools and techniques-Securing IaaS.

EXA ACADEMIC COUNCIL

Unit IV **(12 hours)**

Security Planning: Security Planning-Business Continuity Planning-Handling Incidents-Risk Analysis - Legal Issues and Ethics: Protecting Programs and Data-Information and the Law-Rights of Employees and Employers-Computer Crime-Ethical Issues in Computer Security.

Unit V **(12 hours)**

Cryptography: Cryptology-Symmetric Encryption Algorithms-Message Digests-Quantum Cryptography- Emerging Topics: The Internet of Things-Economics-E-Voting-Cyber Warfare.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Classify the concept of threat, risks and security planning.
CO2: Apply theoretical concepts in different security phases.
CO3: Analyze security concepts needs in cloud and database.
CO4: Examine the concepts and do security in database and organization.
CO5: Develop policies and procedures for database and cloud security and design security architecture for an organization.

Text Book:

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies, *Security in Computing*, Pearson Education, Fifth Edition, 2015

Reference Books:

1. Martti Lehto, Pekka Neittaanmäki, *Cyber Security: Analytics, Technology and Automation*, Springer International Publishing, 2015
2. Nelson Phillips, Enfinger Steuart, *Computer Forensics and Investigations*, Cengage Learning, 2009

E-Resources:

1. https://www.springboard.com/resources/learning-paths/cybersecurity-foundations/
2. https://www.edx.org/course/cyber-security-basics-a-hands-on-approach

Cyber Security (Lab)

Hours/Week: 2

List of Programs:

Console Application

1. Stop User from viewing certain URLs or Websites
2. To Protect Systems from Malicious Software
3. Signature Based Detection
4. Behavior-Based Detection
5. To Prevent Threats from Getting on the Network using Sandboxing
6. Web Application Firewall
7. Website Scraper
8. Log Analyzer

Note: Questions for the internal examination will be based on the concepts learnt

EXACADEMIC COUNCIL

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Build applications for cyber security solutions.
CO2: Perform Malware attacks.
CO3: Demonstrate corrective measures for computer security breaches.
CO4: Illustrate security threats and methodologies.
CO5: Develop firewall and web related issues.

Course Outcomes	Programme Outcomes												
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**Total**
CO1	9	9	9	3	3	1	9	9	3	1	9	3	**68**
CO2	9	9	9	3	3	1	9	9	3	1	9	3	**68**
CO3	9	9	9	3	3	1	9	9	3	1	9	3	**68**
CO4	9	9	9	3	3	1	9	9	3	1	9	3	**68**
CO5	9	9	9	9	9	1	9	9	9	1	9	9	**92**
Total	**45**	**45**	**45**	**21**	**21**	**5**	**45**	**45**	**21**	**5**	**45**	**21**	**364**

Low-1 Medium-3 High-9

Core VIII - Computer Organization

(For Students Admitted from 2024-25)

Semester: II **Hours/Week: 5**
Subject Code: IMCAC22 **Credit: 5**

Course Objectives:

1. To understand the structure, function and characteristics of computer systems and understand the design of the various functional units and components of computers
2. To identify the elements of modern instructions sets and their impact on processor design

Unit I **(15 hours)**

Basic Computer Organization and Design: Instruction Codes-Computer Registers- Computer Instructions-Timing and Control-Instruction Cycle-Memory Reference Instructions -Input-Output and Interrupts.

Unit II **(15 hours)**

Micro programmed Control: Control Memory- Address Sequencing- Micro program Examples-Design of Control Unit.

XI ACADEMIC COUNCIL

Unit III **(15 hours)**

Central Processing Unit: Introduction- General Register Organization - Instruction Formats - Addressing Modes-Data Transfer and Manipulation-Program Control-**RISC Pipeline and Vector Processing:** Parallel Processing-Pipeline-Arithmetic Pipeline-Instruction Pipeline-Vector Processing.

Unit IV **(15 hours)**

Input-Output Organization: Peripheral Devices- /O interface-Asynchronous Data Transfer - Modes of Transfer -Direct Memory Access- Input Output Processor (Excluding IBM and Intel IOPs).

Unit V **(15 hours)**

Memory Organization: Memory-Main Memory- Auxiliary Memory -Associative Memory- Cache Memory -Virtual Memory-Memory Management Hardware.

Course Outcomes:

After successful completion of this course, students will be able to

CO 1: Define the fundamental organization of a computer system
CO 2: Explain the concept of sequencing, designing, pipeline and vector processing methods
CO 3: Examine the function of input-output organization
CO 4: Compare various pipeline concepts
CO 5: Distinguish the organization of various parts of a system memory hierarchy

Text Book:

1. Morris Mano M, *Computer System Architecture*, Prentice Hall of India ,2011

Reference Books:

1. William Stallings, *Computer Organization and Architecture*, Pearson Publication, Eighth Edition, 2010
2. Morris Mano, *Digital Login and Computer Design*, Prentice Hall of India, 2001

E-Resources:

1. NPTEL: https://nptel.ac.in/courses/106/105/106105163/

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	9	9	1	9	3	3	1	3	1	66
CO2	9	9	9	9	9	1	9	3	3	1	3	1	66
CO3	9	9	9	9	9	1	9	3	3	1	3	1	66
CO4	9	9	9	9	9	1	9	3	3	1	3	1	66
CO5	9	9	9	9	9	1	9	3	3	1	3	1	66
Total	45	45	45	45	45	5	45	15	15	5	15	5	330

Low-1 Medium-3 High-9

AC ACADEMIC COUNCIL

Core IX - Web Designing Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 4**
Subject Code: IMCAC23P **Credit: 3**

Course Objectives:

1. To analyze a web page and identify its elements and attributes and create web pages using XHTML and Cascading Style Sheets
2. To build dynamic web pages using JavaScript (Client side programming) and create XML documents and Schemas

List of Programs

HTML

1. To illustrate all basic tags
2. To display study time table for end semester examination
3. To display a menu list for bakery
4. To use all style sheets
5. To demonstrate frame
6. To use hyperlink for both text and image
7. To demonstrate forms

Java Script

8. Leap year checking
9. To convert temperature from Fahrenheit to Celsius
10. To create login form
11. Create a HTML page to demonstrate validation for gmail registration
12. Build college website
13. Build website for online shopping

Note: Questions for the internal examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Explain the basics of all HTML tags to create the static web page
CO2: Apply the concepts of table and list in HTML
CO3: Examine the use of style sheets, frames and hyperlinks
CO4: Evaluate the concept of validation using JavaScript
CO5: Create a dynamic website

ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	3	9	3	9	9	9	1	9	9	9	1	80
CO2	9	9	9	9	9	9	9	1	9	9	9	1	92
CO3	9	9	9	9	9	9	9	1	9	3	9	1	86
CO4	9	9	9	9	9	9	9	1	9	9	9	1	92
CO5	9	9	9	9	9	9	9	1	9	9	9	1	92
Total	45	39	45	39	45	45	45	5	45	39	45	5	442

Low-1 Medium-3 High-9

Core X - Data Analytics Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 4**
Subject Code: IMCAC24P **Credit: 3**

Course Objectives:

1. To know the modern quantitative tools to data analysis in a business context and identify datasets and explain how they are organized and manipulate data
2. To apply the tools to transform the data into useful information and use functions for data visualization

List of Programs

Using Spread sheet

1. Perform Basic Functions in Spread sheets
2. Perform Formatting and Proofing
3. Perform Mathematical & Text Functions
4. Implement Date and Time Functions
5. Implement Sorting & Filtering Techniques
6. Perform Logical Functions
7. To perform Data Validation
8. Display Pivot Tables
9. Display Charts and Slicers
10. Perform Lookup Functions

Using R

11. Get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND)

ACADEMIC COUNCIL

12. Perform data import/export (.CSV, .XLS, .TXT) operations using data frames
13. Get the input matrix from user and perform Matrix addition, subtraction, multiplication, inverse transpose and division operations using vector concept
14. Perform statistical operations (Mean, Median, Mode and Standard deviation)
15. Perform data pre-processing operations i) Handling Missing data ii) Min-Max normalization
16. Perform Simple Linear Regression
17. Perform K-Means clustering operation and visualize for iris data set

Using SciLab

18. Develop a program to implement the basic matrix operations
19. Develop a program to find the Eigenvalues and eigenvectors
20. Develop a program to solve equations by Gauss elimination, Gauss Jordan Method and Gauss Seidel
21. Develop a program to find the reduced row echelon form of a matrix

Note: - Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Outline Excel functions to solve mathematical, text, date and time operations, R functions for numerical operations and Scilab functions for matrix operations

CO2: Demonstrate the concepts of sorting, filtering using Excel

CO3: Illustrate statistical operations using R

CO4 Evaluate the Regression and Clustering

CO5: Develop programs to solve equations by Gauss elimination, Gauss Jordan Method and Gauss Seidel

Course Outcomes	**Programme Outcomes**												
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**Total**
CO1	9	9	9	9	9	1	9	9	3	3	3	1	**74**
CO2	9	9	9	9	9	1	9	9	3	3	3	1	**74**
CO3	9	9	9	9	9	1	9	9	3	3	3	1	**74**
CO4	9	9	9	9	9	1	9	9	3	3	3	1	**74**
CO5	9	9	9	9	9	1	9	9	3	3	3	1	**74**
Total	**45**	**45**	**45**	**45**	**45**	**5**	**45**	**45**	**15**	**15**	**15**	**5**	**370**

Low-1 Medium-3 High-9

ACADEMIC COUNCIL

DSE I - a) Cloud and Distributed Computing

(For Students Admitted from 2024-25)

Semester: II **Hours / Week: 6**
Subject code: IMCAE2A **Credit: 5**

Course Objectives:

1. To identify the technical foundations of cloud systems architectures and analyse the problems and solutions to cloud application problems
2. To apply principles of best practice in cloud application design and management and identify and define technical challenges for cloud applications and assess their importance

Unit I **(18 hours)**

Introduction to Cloud, Virtualization, and Virtual Machine: Introduction to Cloud Computing - Features of Today's Cloud - Introduction to Virtualization - Mitigation Techniques for VM Migration. **Network Virtualization and Geo-Distributed Clouds:** Introduction - Cloud Computing and Server Virtualization - Networking of Virtual Machines Inside the Hypervisor – Docker - Software-Defined Network - Network Virtualization in Multi-Tenant Data Centers: VL2 - Network Virtualization in Multi-Tenant Data Centers: NVP - Geo-Distributed Cloud Data Centers.

Unit II **(18 hours)**

Leader Election in Cloud, Distributed Systems, and Industry Systems: Introduction - Leader Election in Rings (Classical Distributed Algorithms) - Ring Leader Election and Bully Leader Election Algorithms - Classical Algorithm: Ring Election Algorithm - Classical Algorithm: Bully Election - Industry Systems: Google Chubby and Apache ZooKeeper - Design of ZooKeeper. **Cloud-Native Computing:** Introduction – Micro services – Docker – Kubernetes - Introduction to Edge Computing - Classification of Edge Computing.

Unit III **(18 hours)**

Cloud Asset Management and Protection: Differences from Traditional IT - Types of Cloud Assets - Compute Assets - Storage Assets - Network Assets - Asset Management Pipeline - Procurement Leaks - Processing Leaks - Tooling Leaks - Findings Leaks - Tagging Cloud Assets. **Software-Defined Networking and Network Function Virtualization:** Introduction - Software-Defined Networking - Applications and Use Cases - Software-Defined NFV - Network Slicing - Ongoing Research Opportunities.

Unit IV **(18 hours)**

Cloud Storage: Key-Value Stores/NoSQL Stores and HBase: Design of Key-Value Stores - Design of HBase. **Identity and Access Management:** Differences from Traditional IT - Life Cycle for Identity and Access - Request - Approve - Create, Delete, Grant, or Revoke - Authentication - Cloud IAM Identities - Business-to-Consumer and Business-to-Employee - Multi-Factor Authentication - Passwords and API Keys - Shared IDs - Federated Identity - Single Sign-On - Instance Metadata and Identity Documents - Secrets Management - Authorization - Centralized Authorization - Roles - Revalidate - Putting It All Together in the Sample Application.

AC ACADEMIC COUNCIL

Unit V **(18 hours)**

Classical Distributed Algorithms and the Industry Systems: Introduction - Time and Clock Synchronization in Cloud Data Center - Key Challenges - Clock Synchronization - Algorithms for Recording Global State and Snapshot - Mutual Exclusion Algorithms for Distributed Systems. **Cloud Applications:** MapReduce, Spark, and Apache Kafka – MapReduce – Spark – Kafka.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Identify the features of Cloud Computing and Virtualization

CO2 Demonstrate the leader election and cloud native computing

CO3: Classify types of cloud assets, Software-Defined Networking and Network Function Virtualization

CO4: Justify cloud storage, Identity and Access Management

CO5: Generate the Classical Distributed Algorithms, the Industry Systems and Cloud applications

Text Books:

1. Rajiv Misra and Yashwant Singh Patel, *Cloud and Distributed Computing: Algorithms and Systems*, Wiley Emerging Technology Series, 2020.
2. Chris Dotson, *Practical Cloud Security: A Guide for Secure Design and Deployment*, O'Reilly Media, First Edition, 2019.

Reference Books:

1. Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi, *Mastering Cloud Computing*, Tata McGraw Hill, 2017.
2. Rajkumar Buyya, James Broberg, Andrzej Goscinski, *Cloud Computing Principles and Paradigms*, John Wiley & Sons Limited, 2011.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, *Cloud Computing-A Practical Approach*, Tata McGraw Hill, 2010.

E - Resources:

1. https://nptel.ac.in/courses/106/104/106104182/
2. https://www.amazon.in/Cloud-Distributed-Computing-Algorithms-Systems/dp/8126520272?asin=B086V7Q2KW&revisionId=&format=4&depth=1

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	3	1	1	1	9	9	9	9	3	9	3	9	66
CO2	9	1	3	9	3	3	3	9	9	3	3	3	58
CO3	3	9	3	1	9	9	9	9	9	9	9	9	88
CO4	1	1	9	3	3	3	9	9	9	9	9	9	74
CO5	9	3	9	9	9	9	9	9	9	9	9	9	102
Total	25	15	25	23	33	33	39	45	39	39	33	39	388

Low-1 Medium-3 High-9

VV ACADEMIC COUNCIL

DSE I – c) Data Analytics

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6**
Subject Code: IMCAE21C **Credit: 5**

Course Objectives:

1. To understand the Big Data Platform and its Use cases and Map Reduce Jobs
2. To provide an overview of Apache Hadoop, HDFS Concepts and Interfacing with HDFS and Apply analytics on Structured, Unstructured Data

Unit I **(18 hours)**

Introduction to Big Data: Classification of Digital Data, Structured and Unstructured Data - Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data -Why Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop Environment Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments – Basically Available Soft State Eventual Consistency - Top Analytics Tools

Unit II **(18 hours)**

Technology Landscape: NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop -Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

Unit III **(18 hours)**

Mongodb and Mapreduce programming: MongoDB: Why Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language Map Reduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression

Unit IV **(18 hours)**

Hive and pig Hive: Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements –Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having – RCFile Implementation - Hive User Defined Function - Serialization and Deserialization. Pig: Introduction -Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types -Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function -Complex Data Types - Piggy Bank - User-Defined Functions - Parameter Substitution – Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive

Unit V **(18 hours)**

Introduction to Data Analytics with R- Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Machine Learning Algorithms: Regression Model, Clustering, Collaborative Filtering, Associate Rule Making, Decision Tree, Big Data Analytics with BigR.

XAC ACADEMIC COUNCIL

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Describe Data sources, generations, data formats, Data Evolution, Data from various domains
CO2: Determine Big Data Characteristics, Frameworks, components and Limitation of traditional approaches and map Big Vs to Data Domains
CO3: Analyse various domains of Data Characteristics, Platform, Programming Model and Design Data Analytic ecosystem, and data processing framework
CO4: Evaluate the Concepts of Data Analytics Phases and Techniques
CO5: Formulate Data Analytics Techniques practically using R environment

Text Books:
1. Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", Wiley Publications, First Edition, 2015
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman , *Big Data for Dummies*, Wiley India Private Limited, 2014

Reference Books:
1. Boris lublinsky, Kevin T. Smith, Alexey Yakubovich, *Professional Hadoop Solutions*, Wiley, India Private Limited, 2015
2. Chris Eaton, Dirk deroos, Understanding *Big data*, McGraw Hill, 2012
3. Tom White, *HADOOP: The definitive Guide*, O Reilly, 2012
4. Tom Plunkett, Brian Macdonald, Oracle *Big Data Handbook*, Oracle Press, 2014
5. JyLiebowitz, *Big Data and Business analytics*, CRC press, 2013
6. VigneshPrajapati, *Big Data Analytics with R and Hadoop*, Packet Publishing, 2013

E-Resources:
1. https://onlinecourses.nptel.ac.in/noc20_cs92/preview
2. https://nptel.ac.in/courses/110/106/110106072/

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	9	9	1	9	9	3	3	3	1	74
CO2	9	9	9	9	9	1	9	9	3	3	3	1	74
CO3	9	9	9	9	9	1	9	9	3	3	3	1	74
CO4	9	9	9	9	9	1	9	9	3	3	3	1	74
CO5	9	9	9	9	9	1	9	9	3	3	3	1	74
Total	45	45	45	45	45	5	45	45	15	15	15	5	370

Low-1 Medium-3 High-9

VV ACADEMIC COUNCIL

DSE II – a) Compiler Design

(For Students Admitted from 2024-25)

Semester: II **Hours/ Week: 5**
Subject code: IMCAE2D **Credit: 4**

Course Objectives:

1. To provide an understanding of the fundamental principles in compiler design
2. To learn the process of translating a modern high-level language to executable code required for compiler construction

Unit I **(15 hours)**

Introduction: The structure of a compiler –Evolution of programming languages-Applications of compiler technology-A Simple Syntax Directed Translator: Syntax definition-syntax-directed translation.

Unit II **(15 hours)**

Parsing: Lexical Analysis-Symbol Tables-Lexical Analysis: The role of the lexical analyser-Input Buffering- Specification of Tokens-Recognition of tokens-The lexical analyser generator Lex-Finite Automata.

Unit III **(15 hours)**

Design of lexical analyser generator: DFA for lexical analyser - Important states of an NFA, Converting a regular expression directly to a DFA-Minimizing the number of states of a DFA-**Syntax Analysis:** Syntax error handling-error recovery strategies-Context free grammars-Top down parsing: FIRST and FOLLOW –LL(1) Grammars-Bottom Up Parsing.

Unit IV **(15 hours)**

LR Parsing: More Powerful LR Parsers-Using Ambiguous Grammars-Parser Generators-Syntax-Directed Translation: Evaluation orders for SDD's – application of SDT-Syntax Directed Translation Schemes- Intermediate Code Generation: Variants of Syntax Trees-Three address code.

Unit V **(15 hours)**

Run time environment: Heap Management- Code Generation: The target language-Address in the Target Code-A Simple code generator-Peephole Optimization-Optimal Code generation for Expression-Dynamic Programming code-Generation-Machine-Independent Optimization: Semantics preserving Transformations-Copy Propagation-Dead –Code Elimination-Code Motion.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Define common forms of parsers

CO2: Illustrate compiler construction tools and describes the Functionality of each stage of compilation process

MX ACADEMIC COUNCIL

CO3: Construct Grammars for Natural Languages and find the Syntactical errors/Semantic errors during the compilations using parsing techniques
CO4: Analyze different representations of intermediate code
CO5: Design to construct new compiler for new languages

Text Book:

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman, *Compiler Principles, Techniques & Tools*, Pearson Addison Wesley, Second Edition, 2007

Reference Books:

1. Alfred V. Aho, Jeffrey D. Ullman, *Principles of compiler design*, Pearson Education, Indian student Edition, 2001
2. Kenneth C. Louden, *Compiler Construction– Principles and Practice*, PWS Publishing, First edition, 1997
3. K. L. P Mishra, N. Chandrashekaran, *Theory of computer science- Automata Languages and Computation*, Prentice Hall of India, Second edition, 2003
4. Andrew W. Appel, *Modern Compiler Implementation C*, Cambridge University Press, 2004

E- Resources:

1. https://www.geeksforgeeks.org/compiler-design-tutorials/
2. https://nptel.ac.in/courses/106/108/106108113/

Course Outcomes	Programme Outcomes												
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**Total**
CO1	9	9	3	9	9	1	9	3	9	3	9	3	**76**
CO2	9	9	3	9	9	1	9	3	9	3	9	3	**76**
CO3	9	9	3	9	9	1	9	3	9	3	9	3	**76**
CO4	9	9	3	9	9	1	9	3	9	3	9	3	**76**
CO5	9	9	3	9	9	1	9	3	9	3	9	3	**76**
Total	**45**	**45**	**15**	**45**	**45**	**5**	**45**	**15**	**45**	**15**	**45**	**15**	**380**

Low-1 Medium-3 High-9

DSE II – Digital Marketing

(For Students Admitted from 2024-25)

Semester: II **Hours/Week: 5**
Subject Code: IMCAE22E **Credit: 4**

Course Objective:

1. To understand internet, digital and social marketing
2. To analyse the social media strategy

KL ACADEMIC COUNCIL

Unit I **(15 hours)**

Introduction to Digital Marketing - Evolution of Digital Marketing from traditional to modern era- Role of Internet; Current trends - Info-graphics - implications for business & society - Emergence of digital marketing as a tool - Drivers of the new marketing environment - Digital marketing strategy; P.O.E.M. framework-Digital landscape- Digital marketing plan- Digital marketing models.

Unit II **(15 hours)**

Internet Marketing and Digital Marketing Mix: Internet Marketing - opportunities and challenges - Digital marketing framework - Digital Marketing mix - Impact of digital channels on IMC. **Search Engine Advertising:** Pay for Search Advertisements - Ad Placement - Ad Rank s- Creating Ad Campaigns - Campaign Report Generation Display marketing: Types of Display Ads - Buying Models - Programmable Digital Marketing - Analytical Tools - YouTube marketing.

Unit III **(15 hours)**

Social Media Marketing : Understanding Social Media Marketing – Social Networking- Role of Influencer Marketing-Modes of Social Media Marketing- Tools & Plan– Introduction to social media platforms, penetration & characteristics; Building a successful social media marketing strategy Facebook Marketing: - Business through Facebook Marketing, Creating Advertising Campaigns, Adverts-E mail Marketing plan- Facebook Marketing Tools LinkedIn Marketing: - Introduction and Importance of LinkedIn Marketing, Framing LinkedIn Strategy, Lead Generation through LinkedIn, Content Strategy, Analytics and Targeting Twitter Marketing: Introduction to Twitter Marketing, how twitter Marketing is different than other forms of digital marketing, framing content strategy, Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics Introduction to social media metrics.

Unit IV **(15 hours)**

Introduction to SEO: SEM - Web Analytics - Mobile Marketing - Trends in Digital Advertising - Introduction and need for SEO- How to use internet & search engines; search engine and its working pattern: On-page and off-page optimization, SEO Tactics - Introduction to SEM Web Analytics: Google Analytics & Google AdWords - data collection for web analytics- multichannel attribution- Universal analytics- Tracking code Trends in digital advertising.

Unit V **(15 hours)**

Social Media Channels: Introduction - Key terms and concepts - Traditional media vs Social media - Social networking - Content creation - Bookmarking & aggregating and Location & social media - Tracking social media campaigns **Social Media Strategy:** Introduction - Key terms and concepts - Using social media to solve business challenges - Step-by-step guide to creating a social media strategy - Documents and processes - Dealing with opportunities and threats - Step-by-step guide for recovering from an online brand attack - Social media risks and challenges

Text Book:

1. Seema Gupta, *Digital Marketing*, Mc-Graw Hill 1st Edition, 2017.

XXACADEMIC COUNCIL

Reference Books:

1. Ryan, D, *Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation*, Kogan Page Limited, 2014.
2. Puneet Singh Bhatia, *Fundamentals of Digital Marketing*, Pearson Education 1st Edition, 2017.

E-Resources:

1. https://onlinecourses.swayam2.ac.in/ugc19_hs26/preview
2. https://nptel.ac.in/courses/110104070
3. https://www.shiksha.com/online-courses/basics-of-digital-marketing-by-nptel-course-nptel43

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	3	3	1	9	9	3	1	9	3	**68**
CO2	9	9	9	3	3	1	9	9	3	1	9	3	**68**
CO3	9	9	9	3	3	1	9	9	3	1	9	3	**68**
CO4	9	9	9	3	3	1	9	9	3	1	9	3	**68**
CO5	9	9	9	9	9	1	9	9	9	1	9	9	**92**
Total	**45**	**45**	**45**	**21**	**21**	**5**	**45**	**45**	**21**	**5**	**45**	**21**	**364**

Low-1 Medium-3 High-9

DSE II – c) Blockchain Technologies

(For Students Admitted from 2024-25)

Semester: II **Hours/ week: 5**
Subject Code: IMCAE2F **Credits: 4**

Course Objectives:

1. To assess block chain applications in a structured manner and impart knowledge in block chain techniques and able to present the concepts clearly and structured
2. To get familiarity with future currencies and to create own crypto token

Unit I **(15 hours)**

Introduction of Block chain: Blockchain 101-Distributed Systems-Consensus-The history of blockchain-Introduction of blockchain-Features of blockchain-Applications of blockchain technology-Tiers of Blockchain technology-Consensus in blockchain-CAP theorem and block chain-Benefits and limitations of Blockchain. **Decentralization:** Introduction of Decentralization using blockchain-Methods of Decentralization-Routes of Decentralization-Blockchain and full ecosystem decentralization-Decentralization Organizations.

XX ACADEMIC COUNCIL

Unit II **(15 hours)**

Cryptography and Technical Foundations: Introduction- Mathematics- Cryptography- Confidentiality- Integrity - Authentication - Non repudiation -Accountability-Block Ciphers-DES-AES- Public and Private keys- RSA- hash Functions- Secure hash algorithms -Merkle trees-Patricia trees- DHT- ECDSA-Financial markets and trading-Trading-Exchanging.

Unit III **(15 hours)**

Bitcoin: Bitcoin-Bitcoin definitions-transactions-types of transactions-What is UTXO-Block chain-The genesis of Block-The bitcoin network-wallets. **Alternative coins:** Theoretical Foundations-Alternatives of Proof of Work-Proof of stake-Name coin- Bitcoin- Prime coin-Zcash.

Unit IV **(15 hours)**

Ethereum101: Introduction-Ethereum Block chain-The consensus mechanism-The world state-the account state-Transactions-Contract creation transaction-Message call transaction-Elements of ethereum block chain-EVM-Execution Environment-Opcodes and their meaning-Accounts-Block-Block header-The genesis block-Transaction receipts-Transaction validation and execution-Block validation mechanism-Block finalization-Ether-Gas-Mining-Ethash-CPU Mining.

Unit V **(15 hours)**

Block Chain – Outside of Currencies: Internet of things-IoT Block chain experiment-Government-Health-Finance-Scalability and other Challenges: Scalability-Proof of Stake-Privacy-**Emerging Trends:** ABC's-Enterprise-grade bloc kchains-Private Block chains-startups-standardization-Enhancements-Real world Implementations-Consortia-Education in block chain technologies-Employment-Crypto Economics

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Illustrate the Fundamental Concepts of Block chain and uses of Bitcoin
CO2: Apply Cryptography Algorithms in block chain
CO3: Classify a transactions in Bitcoin
CO4: Explain the concept Decentralization, BitCoin, Ethereum in Block chain
CO5: Develop Private block chain environment and smart contracts in recent trends by using Ethereum

Text Book:

1. Imran Bashir, *Mastering Block chain: Deeper insights into Decentralization, Cryptography, Bitcoin and Popular Block chain Frameworks*, Packt Publishing, 2017.

Reference Books:

1. Andreas Antonopoulos, Satoshi Nakamoto, *Mastering Bitcoin*, O'Reilly, 2014.
2. Roger Wattenhofer, *The Science of the Block chain*, Create Space Independent Publishing, 2016.

TEXACADEMIC COUNCIL

3. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, *Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction*, Princeton University Press, 2016.

E-Resources:

1. https://nptel.ac.in/courses/106/104/106104220/#
2. https://www.udemy.com/course/build-your-blockchain-az/

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	3	9	9	1	9	3	3	3	9	9	76
CO2	9	9	3	9	9	1	9	3	3	3	9	9	76
CO3	9	3	3	9	9	1	9	3	3	3	9	9	70
CO4	9	3	3	9	9	1	9	3	3	3	9	9	70
CO5	9	3	3	9	9	1	9	3	3	3	9	9	70
Total	45	27	15	45	45	5	45	15	15	15	45	45	362

Low-1 Medium-3 High-9

Core XI - Software Development Framework

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 5**
Subject Code: IMCAC311 **Credit: 5**

Course Objectives:

1. To understand code solutions and compile C# projects within the .NET Framework
2. To design and develop professional console and window-based .NET Application

Unit I **(15 hours)**

The .NET Framework: .Net programming Framework-VB.NET,C#.NET and the .NET Languages-The Common Language Runtime-The .NET Class Library-ASP.NET-Visual Studio .NET. **Learning the .NET Languages:** The .NET Languages-Data Types-Declaring Variables-Scope and Accessibility-Variable Operations-Object-Based Manipulation-Conditional Structures-Loop Structures-Functions and Subroutines. Types, **Objects and Namespaces:** The Basics about classes –Value Types and Reference Types-Advanced Class Programming.

Unit II **(15 hours)**

ASP.NET Applications: ASP.NET Applications-Code-Behind-The Global.asax Application File-Understanding ASP.NET Classes-ASP.NET Configuration. **Web Form Fundamentals:** A Simple Page Applet-A Deeper Look at HTML Control Classes-The Page Class-Accessing HTML Server Controls. Web Controls: Stepping Up to Web Controls-Web control Classes-AutoPostBack and Web Control Events.

XX ACADEMIC COUNCIL

Unit III **(15 hours)**

Using Visual Studio .NET: The promise of Visual Studio.NET-Starting a Visual Studio.Net Project – The Web form Designer-Writing Code-Visual Studio.NET Debugging-Working Without Visual Studio.NET. **Validation and Rich Controls:** Validation-A simple Validation Example-Understanding Regular Expressions-A Validated Customer Form-Other Rich Controls. State Management: The Problem of State-View state-Transferring Information.

Unit IV **(15 hours)**

Tracing, Logging and Error Handling: Common Errors-The .NET Exception Object-Handling exceptions-Logging Exceptions-Error Pages-Page Tracing. **Overview of ADO.NET:** Introducing ADO.NET and Data Management-Characteristics of ADO.Net-The ADO.NET Object Model. ADO.NET Data Access: About the ADO.NET Examples-SQL Basics-The SQL Select Statement-Update-Insert-Delete-Accessing Data the Easy Way-Creating a connection-Defining a Select Command-Using a Command with a Data Reader-Updating Data-Accessing Disconnected Data-Selecting Multiple Tables.

Unit V **(15 hours)**

Data Binding Introduction-Single-Value Data Binding-Repeated-Value Data Binding-Data Binding with Databases. The Data List, Data Grid and Repeater: Introducing Templates-Using Templates with the Data List-Data Binding with Multiple Templates-Comparing the Template Controls-Selecting Items-Editing Items- **Sorting with the DataGrid Using XML:** XML's Hidden Role in .NET-XML Explained- The XML Classes-XML Validation-XML Display and Transforms-XML in ADO.NET.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Interpret the basic concepts of .NET, Problem of the state, data, Management Validation and Rich controls

CO2: Determine types, objects and namespaces, Enumerators and Iterators and Error Handling

CO3: Illustrate Table Controls, ASP.Net Applications and the Web Server, Interfaces and Structures

CO4: Evaluate on Exception Handling, Serializing objects, Direct Data Access

CO5: Develop XML classes and XML Validation, web forms and use web controls

Text Book:

1. Matthew MacDonald, *The Complete Reference ASP.NET*, Tata McGraw-Hill Publishing, 2017.

Reference Books:

1. Dino Esposito, *Programming Microsoft ASP.NET*, Tata McGraw Hill, 2003
2. Chris Ullman , John Kauffman, Chris Hart, David Sussman, *Beginning ASP.Net 1.1 with VB.NET*, Wiley Publishing, First Edition, 2003
3. Elliotte Rusty Harold, *XML 1.1 Bible*, Wesley Publications, Third Edition, 2004

KK ACADEMIC COUNCIL

E-Resources:

1. https://nptel.ac.in/courses/106/104/106104220/#
2. https://nptel.ac.in/courses/110/105/110105033/

Course Outcomes	Programme Outcomes												
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**Total**
CO1	9	9	9	3	3	1	9	9	1	1	3	1	**58**
CO2	9	9	9	3	3	1	9	9	3	1	3	1	**60**
CO3	9	9	9	3	3	1	9	9	3	1	3	1	**60**
CO4	9	9	9	3	3	1	9	9	3	1	9	1	**66**
CO5	9	9	9	9	9	1	9	9	9	1	9	1	**84**
Total	**45**	**45**	**45**	**21**	**21**	**5**	**45**	**45**	**19**	**5**	**27**	**5**	**328**

Low-1 Medium-3 High-9

Core XII - Data Mining and Warehousing

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 5**
Subject Code: IMCAC32 **Credit: 5**

Course Objectives:

1. To understand and implement classical models and algorithms in data warehouses and data mining
2. To understand data mining techniques in various applications like social, scientific and environmental context and Develop skill in selecting the appropriate data mining algorithm for solving practical problems

Unit I **(15 hours)**

Data Mining: Data Mining-Kinds of Data-Kind of Patterns can be mined-Technologies used-Kinds of Application Targeted-Major Issues in Data Mining - **Data Preprocessing:** Data Cleaning-Data Integration -Data Reduction – Data Transformation and Data Discretization.

Unit II **(15 hours)**

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse: Basic Concepts-A Multidimensional Data Modelling: Data Cube and OLAP Data Warehouse Implementation. **Data Cube Technology:** Data Cube Computation: Preliminary Concepts- Data Cube Computation Methods-Mining Frequent Patterns- **Associations and Correlations:** Basic Concepts-Frequent

KX ACADEMIC COUNCIL

Itemset Mining Methods-Advanced Pattern Mining- Pattern Mining Multilevel, Multidimensional Space Various Kinds of Association Rules-From Association Mining to Correlation Analysis.

Unit III **(15 hours)**

Classification and Prediction: Issues Regarding Classification and Prediction-Classification by Decision Tree Induction-Bayesian Classification-Classification by Backpropagation–Support Vector Machines-**Associative Classification**: Classification by Association Rule Analysis-Other Classification Methods-Prediction- Accuracy and Error Measures.

Unit IV **(15 hours)**

Cluster Analysis: Basic Concepts, Methods and Advanced Cluster Analysis: What is Cluster Analysis-Types of data in Cluster Analysis-A Categorization of Major Clustering Methods-Partitioning Methods-Hierarchical Methods-Density based Methods-Grid based Methods-**Evaluation of Clustering-** Methods-Clustering high dimensional data-Clustering Graph and Network Data-Clustering with Constraints.

Unit V **(15 hours)**

Outlier Detection: Outlier and Outlier analysis-Outlier Detection Methods-Statistical Approaches-Proximity Based Approaches-Outlier Detection in high-Dimensional Data - **Data Mining Trends and Research Frontiers:** Mining Complex Data Types-Other Methodologies of Data Mining-Data Mining Applications-Data Mining Applications.

Course Outcomes:

After Successful completion of the course, student will be able to

CO1: Explore the Basic Concepts of Data Mining
CO2: Analyze the Classification algorithm and Error Prediction
CO3: Improve the knowledge about Types of Classification Methods in Data Mining
CO4: Determine the types of Data clustering methods and Types of Data Mining
CO5: Evaluate Data Mining Application with Latest Trends

Text Book:

1. Jiawei Han, Micheline Kamber, *Data Mining: Concept and Technique*, Morgan Kaufmann Publishers, Third Edition, 2013.

Reference Books:

1. Pieter Adriaans, Dolf Zantinge, *Data Mining*, Pearson Education, Ninth Indian Reprint, 2003.
2. Anand Rajaraman, Jeffrey David Ullman, *Mining of Massive Datasets*, Cambridge University Press, 2012.
3. Pete Warden, *Big Data Glossary*, O'Reilly, 2011.

Journals:

1. ACM SIGKDD International Conference on Knowledge Discovery & Data Mining
2. ACM International Conference on Web Search and Data Mining

XI ACADEMIC COUNCIL

E-Resources:

1. https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing
2. https://onlinecourses.nptel.ac.in/noc21_cs06/preview

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	1	1	1	1	1	1	3	1	3	3	1	26
CO2	9	3	3	1	3	1	1	3	1	3	3	3	34
CO3	9	3	1	3	3	1	1	1	9	9	3	3	46
CO4	9	1	1	3	3	3	1	3	9	9	1	9	52
CO5	9	3	3	3	3	3	1	3	3	9	3	9	52
Total	45	11	9	11	13	9	5	13	23	33	13	25	210

Low-1 Medium-3 High-9

Core XIII - Software Development Framework Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 5**
Subject Code: IMCAC33P **Credit: 3**

Course Objectives:

1. To introduce to .Net IDE Component Framework and programming concepts in .Net Framework
2. To create website using ASP.Net Controls

List of Programs

Console Application

1. Develop a program to calculate the area of a floor given its length and width
2. Develop a program to calculate the factorial of a number N, assuming the number is more than zero
3. Develop a program to check the given numbers (prime, perfect, Armstrong etc.)
4. Develop a program to generate the numbers (prime, perfect, Armstrong etc.)
5. Develop a program to calculate age for a person using properties
6. Develop a program to sort a given list of numbers and find out the average of a list of numbers.
7. Develop a program to display how many days are in a given month(check for leap years also)
8. Develop a program to demonstrate Events, Delegates, and Interfaces

XX ACADEMIC COUNCIL

Windows Application

9. Develop a program to build a simple calculator
10. Develop a program to calculate the arithmetic operations using functions
11. Develop a program to do String manipulation
12. Write a function that will return a approximate count of the number of words in a string
13. Develop a program to create notepad
14. Develop a program to create a greeting card generator

Web Application

15. Develop a program to design an E-mail application form using standard controls and store these details in SQL tables
16. Develop a program to create a login page and personal webpage. Enter the username and password in the login page. If the username and password are correct, the personal web page should be loaded otherwise the error page should be loaded.
17. Develop a program to create a student details form and validate the details using validation controls
18. Develop a program to display employee details using data grid control
19. Develop a program to display an Electricity bill using data list control
20. Develop a program to display employee details using repeater control

Note: - Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Build console applications
CO2: Perform Windows and web Applications
CO3: Demonstrate validation controls in web form
CO4: Illustrate Data Grid control to database in Web application
CO5: Compose Data Repeater and Datalist Controls

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	3	3	1	9	1	3	3	3	1	54
CO2	9	9	9	3	3	1	9	1	3	3	3	1	54
CO3	9	9	9	3	3	1	9	1	3	3	3	1	54
CO4	9	9	9	3	3	1	9	1	9	9	9	1	72
CO5	9	9	9	3	9	1	9	1	9	9	9	1	78
Total	45	45	45	15	21	5	45	5	27	27	27	5	312

Low-1 Medium-3 High-9

VTU ACADEMIC COUNCIL

Core XIV – Data Mining Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 5**

Subject Code: IMCAC34P **Credit: 3**

Course Objectives:

1. To understand data mining process and important issues around data cleaning, pre-processing and integration
2. To get exposure to real life data sets for analysis and prediction and learn performance evaluation of data mining algorithms in a supervised and an unsupervised learning

List of Programs

1. Develop a program to implement of measures of proximity
2. Develop a program to demonstrate of preprocessing on dataset student.arff
3. Develop a program to demonstrate of preprocessing on dataset labor.arff
4. Develop a program to demonstrate of Association rule process on dataset contact lenses.arff using apriori algorithm
5. Develop Association rule process on dataset test.arff using apriori algorithm
6. Develop a program to implement classification rule process on dataset student.arff using j48 Algorithm
7. Develop a program to implement classification rule process on dataset employee.arff using j48 algorithm
8. Develop a program to implement classification rule process on dataset employee.arff using id3 algorithm
9. Develop a program to implement classification rule process on dataset empl.arff using Decision Trees classifier
10. Develop a program to implement classification rule process on dataset student.arff using Naïve Bayesian modelling.
11. Develop a program to demonstrate of clustering rule process on dataset iris.arff using simple k-means algorithm
12. Demonstrate the clustering rule process on dataset student.arff using simple k means algorithm
13. Develop a program to implement outlier detection algorithms

Note: Questions for the internal/external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Recall the basic concepts of data mining

CO2: Apply data mining techniques

KU ACADEMIC COUNCIL

CO3: Analyse new data mining tools.
CO4: Evaluate recent trends in data mining such as web mining, spatial-temporal mining
CO5: Predict the output of different types of algorithms

Course Outcomes	Programme Outcomes												
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**Total**
CO1	9	9	9	9	3	1	9	3	9	9	9	1	**80**
CO2	9	9	9	9	3	1	9	3	9	9	9	1	**80**
CO3	9	9	9	9	3	1	9	3	9	9	9	1	**80**
CO4	9	9	9	9	3	1	9	3	9	9	9	1	**80**
CO5	9	9	9	9	3	1	9	3	9	9	9	1	**80**
Total	**45**	**45**	**45**	**45**	**15**	**5**	**45**	**15**	**45**	**45**	**45**	**5**	**400**

Low-1 Medium-3 High-9

DSE III - a) Artificial Intelligence and Expert Systems

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 5**
Subject Code: IMCAE3A **Credit: 4**

Course Objectives:

1. To describe the modern view of AI as the study of agents that receive percepts from the Environment and perform actions and AI techniques for knowledge representation, planning and uncertainty Management
2. To develop knowledge of decision making and learning methods and explain the concept of Knowledge Representation

Unit I **(15 hours)**

Introduction to Artificial Intelligence-Intelligent Agents, Approaches in Artificial Intelligence, Definitions of Artificial Intelligence, AI problems, Features of AI Programs, Importance of AI, Advantages and Disadvantages of AI.

Unit II **(15 hours)**

Applications of Artificial Intelligence- Finance, Hospitals and Medicine, Robotics, Expert systems, Diagnosis, Pattern Recognition, Natural Language Processing, Game Playing, Image Processing, Data mining, Big Data Mining. Introduction to the state space search- State space search, search techniques, Types of searching techniques.

XX ACADEMIC COUNCIL

Unit III **(15 hours)**

Heuristic Search Strategies-Types of Heuristic Search techniques, Hill Climbing Search, Simulated Annealing search, A* Algorithm, AND-OR Graphs, Properties of the Heuristic Search Algorithm, Adversary Search, The MINIMAX Algorithm.

Unit IV **(15 hours)**

Expert Systems-Definitions of Expert Systems, Features of Good Expert systems, Architecture and Components of Expert systems, Roles of the Individuals who interact with the system, Advantages of Expert systems, Disadvantages of Expert Systems.

Unit V **(15 hours)**

Knowledge Representation-Definitions of Knowledge Representation, Characteristics of Good Knowledge Representation, Basics of Knowledge representation, Properties of the Symbolic representation of knowledge, Properties of the Good knowledge representation systems, Categories of knowledge representation schemes, types of knowledge representation schemes.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Illustrate knowledge on Artificial Knowledge concepts
CO2: Apply all searching algorithms and Hill-climbing procedures
CO3: Analyze their gaming skills and learn about Expert system
CO4: Evaluate the learners for aspiring careers in the field of Artificial Intelligence
CO5: Develop the game playing and planning of expert systems

Text Book:

1. I.Gupta, G.Nagpal, *Artificial Intelligence and Expert Systems*, Laxmi Publications, 2018.

Reference Books:

1. V.S. Jankiraman, *Foundations of Artificial Intelligence and Expert Systems*, Laxmi Publications, 2017.
2. Joseph C.Giarratano, Gary D.Riley, *Expert Systems: Principles and Programming*, Brooks/Cole Publications, Fourth Edition, 2018.
3. Lavika Goel, *Artificial Intelligence: Concepts and Applications*, Wiley India Private Limited, 2015.

E-Resources:

1. https://nptel.ac.in/courses/106/102/106102220/
2. https://nptel.ac.in/courses/112/103/112103280/

XX ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	1	9	9	3	9	3	9	9	9	9	88
CO2	9	9	3	9	3	9	3	9	3	9	9	1	76
CO3	3	9	9	3	9	3	9	1	9	1	3	3	62
CO4	9	1	3	9	3	9	9	3	9	3	9	1	68
CO5	9	9	9	9	9	3	3	3	9	9	9	3	84
Total	38	37	25	39	33	27	33	19	39	31	39	17	378

Low-1 Medium-3 High-9

DSE III - b) Digital Image Processing

(For Students Admitted from 2024-25)

Semester: III **Hours / Week: 5**
Subject code: IMCAE31B **Credit: 4**

Course Objectives:

1. To explain the fundamentals of digital image and its processing
2. To perform image enhancement techniques in spatial and frequency domain, apply the concept of image segmentation and describe object detection and recognition techniques

Unit I **(15 hours)**

Introduction: Digital Image Processing-The Origins of Digital Image Processing- Examples of Fields that Use Digital Image Processing- Fundamental Steps in Digital Image Processing - Components of an Image Processing System**. Digital Image Fundamentals:** Elements of Visual Perception- Image Sensing and Acquisition - Image Sampling and Quantization -Introduction to the Basic Mathematical Tools Used in Digital Image Processing.

Unit II **(15 hours)**

Intensity Transformations and Spatial Filtering: Background - Some Basic Intensity Transformation Functions -Histogram Processing- Fundamentals of Spatial Filtering -Smoothing (Lowpass) Spatial Filters-Sharpening (Highpass) Spatial Filters-High Pass, Bandreject, and Bandpass Filters from Lowpass Filters -Combining Spatial Enhancement Methods.

Unit III **(15 hours)**

Filtering in the Frequency Domain: Background - Preliminary Concepts - Sampling and the Fourier Transform of Sampled Functions - The Discrete Fourier Transform of One Variable - Extensions to Functions of Two Variables - Image Smoothing Using Low Pass Frequency Domain Filters - Image Sharpening Using High Pass Filters - Selective Filtering- The Fast Fourier Transform.

XX ACADEMIC COUNCIL

Unit IV **(15 hours)**

Image Restoration and Reconstruction: Noise Models - Wavelet and Other Image Transforms: Matrix-based transforms- Fourier-Related Transforms- Wavelet Transforms. **Color Image Processing**: Color Models- Basics of Full-Color Image Processing-Color Transformations-Color Image Smoothing and Sharpening-Using Color in Image Segmentation-Noise in Color Images-Color Image Compression.

Unit V **(15 hours)**

Morphological Image Processing: Erosion and Dilation-Opening and Closing-The Hit-or-Miss Transform-Some Basic Morphological Algorithms. **Image Segmentation:** Edge Detection, Thresholding, and Region Detection: Thresholding - Segmentation by Region Growing and by Region Splitting and Merging-Region Segmentation Using Clustering and Super pixels-Region Segmentation Using Graph Cut. Image Pattern Classification: Optimum (Bayes) Statistical Classifiers-Neural Networks and Deep Learning.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the origins, components, elements of visual perception, basic intensity, transformation, discrete Fourier transform, color models, noise models and morphological algorithms of image processing.

CO2: Apply fundamental steps, smoothing, sharpening, segmentation and classification to the image.

CO3: Analyze relationship between pixels, mathematical tools, fuzzy techniques, filters, wavelet transforms, region grouping, splitting and merging.

CO4: Determine histogram, the color image compression.

CO5: Solve noise for color image.

Text Book:

1. Rafael C. Gonzalez, Richard E. Woods, *Digital Image Processing*, Pearson Education, Fourth Edition, 2018.

Reference Books:

1. B.Chanda, D.Dutta Majumder, *Digital Image Processing and Analysis*, Prentice Hall of India, 2003.
2. Nick Efford, *Digital Image Processing a practical Introducing using Java*, Pearson Education, 2004.

E-Resources:

1. https://www.tutorialspoint.com/dip/index.htm
2. https://onlinecourses.nptel.ac.in/noc19_ee55/preview
3. https://www.edx.org/learn/image-processing

KK ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	9	9	1	9	9	9	1	3	3	80
CO2	9	9	9	3	9	1	9	9	9	1	3	3	74
CO3	9	9	9	9	9	1	9	9	3	1	3	3	74
CO4	9	9	9	9	9	1	9	9	9	1	3	3	80
CO5	9	9	9	9	9	1	9	9	9	1	3	3	80
Total	45	45	45	39	45	5	45	45	39	5	15	15	388

Low-1 Medium-3 High-9

DSE III – c) Organizational Behaviour

(For Students Admitted from 2024-25)

[

Semester: III **Hours/week: 5**

Subject Code: IMCAE31C **Credit: 4**

[

Course Objectives:

1. To identify the various leadership styles and the role of leaders in a decision-making process and processes used in developing communication and resolving conflicts.
2. To discuss the development of the field of organizational behaviour, explain the micro and macro approaches and development of the field of organizational behaviour, and explain the micro and macro approaches.

Unit I **(15 hours)**

Organizational Behavior: Introduction - Explaining organizational behaviour - Research and practice: evidence-based management - Human resource management **Environment:** Analysing the organization's environment - PESTLE - Ethical behaviour - Business ethics and corporate social responsibility.

Unit II **(15 hours)**

Individuals in the organization: **Learning**: The learning process - The behaviourist approach to learning - The cognitive approach to learning - Behaviour modification versus socialization. **Communication:** Interpersonal communication - Verbal communication - Non-verbal communication - Cultural differences in communication style - Impression management -Emotional intelligence - Organizational communication.

Unit III **(15 hours)**

Motivation: Nature and Importance - Content theories - Process theories - The social process of motivating others - Engagement and high performance. **Groups and teams in the organization: Group formation:** Groups in organizations - Definitions of groups - Types of group tasks - Group-oriented view of organizations - Formal and informal groups - Group formation - Group development - Groups and teams.

EX ACADEMIC COUNCIL

Unit IV **(15 hours)**

Foundation of Individual Behaviour: Introduction - The Individual and Individual Differences – Human Behaviour and its Causation – **Personality:** Concept of Personality – Determinants of Personality – Types of Personalities – Theories of Personality – Personality Development – Influences of Personality in Organisational Behaviour.

Unit V **(15 hours)**

Leadership: Leadership and management – Theories of leadership-Trait Theory-Behavioural Theory-Contingency Theory-**Decision-making:** Models of decision-making - Decision conditions: risk and programmability - Group decision-making - Problems with group decision making - Organizational decision making.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe the development of the field of organizational behaviour and explain the micro and macro approaches.

CO2: Demonstrate the applicability of analysing the complexities associated with management of individual behaviour in the organization and how the organizational behaviour can integrate in understanding the motivation (why) behind behaviour of people in the organization.

CO3: Analyse and compare different models used to explain individual behaviour related to motivation and rewards and the complexities associated with management of the group behaviour in the organization.

CO4: Evaluate the applicability of the concept of organizational behaviour to understand the behaviour of people in the organization.

CO5: Formulate the various leadership styles and the role of leaders in a decision-making process.

Text Books:

1. David A. Buchanan, Andrzej A. Huczynski, *Organizational Behaviour*, Pearson Education, Ninth Edition, 2017.
2. S. S. Khanka, *Organisational* Behaviour *Text and Cases*, S Chand Ltd, New Delhi 2021.

Reference Books:

1. A. Mustafa**,** *Organisational Behaviour*, Global Professional Publishing Ltd, Second Edition, 2013.
2. L M Prasad, *Organizational Behavior,* Sultan Chand & Sons, Fifth Edition, 2011.
3. K Aswathappa, *Organizational Behavior***,** Himalaya Publishing House, Tenth Edition, 2012.
4. Mirza S Saiyadain, *Organizational Behavior***,** Tata McGraw Hill, Ninth Edition, 2010.

Journal:

1. Journal of Organizations and Human Behavior

E - Resources:

1. https://nptel.ac.in/courses/110/106/110106145/
2. https://nptel.ac.in/courses/110/105/110105033/

XX ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	9	3	1	9	3	9	9	9	1	80
CO2	9	9	9	9	3	1	9	3	9	9	9	1	80
CO3	9	9	9	9	3	1	9	3	9	9	9	1	80
CO4	9	9	9	9	3	1	9	3	9	9	9	1	80
CO5	9	9	9	9	3	1	9	3	9	9	9	1	80
Total	45	45	45	45	15	5	45	15	45	45	45	5	400

Low-1 Medium-3 High-9

DSE IV – a) Operating Systems

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 5**
Subject Code: IMCAE3D **Credit: 4**

Course Objectives:

1. To understand the services provided by and the design of an operating system.
2. To understand what a process is and how processes are synchronized and scheduled

Unit I **(15 hours)**

Introduction: What is an Operating System -Mainframe systems- desktop systems- Multiprocessor Systems-Distributed systems- Clustered Systems- Real time systems- Hand held systems? **Operating System Structure:** System components- Operating System services- System calls- System structure.

Unit II **(15 hours)**

Processes: Process concept- process scheduling- operations on processes- Inter process Communication**. CPU Scheduling**: Basic Concepts- Scheduling Criteria- Scheduling algorithms **Process Synchronization**: Background- The critical section problem- Mutex Locks-semaphores-Monitors.

Unit III **(15 hours)**

Deadlock: System Model-Deadlock Characterization- Methods of Handling Deadlock-Deadlock Prevention- Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock. **Memory management**: Background- Contiguous memory allocation- Swapping.

Unit IV **(15 hours)**

Virtual memory: Background- Demand paging-Copy-on-Develop -Page replacement Thrashing. **Filesystem interface**: File concepts- access methods- Directory structure. **Mass storage structure**: Overview of mass storage structure-HDD Scheduling-NVM Scheduling.

KU ACADEMIC COUNCIL

Unit V **(15 hours)**

Protection: Goals of protection- domain of protection- Access matrix- Implementation of Access matrix- revocation of access rights. **Security:** The security problem- User authentication- Program threats- System threats- securing systems and facilities- Intrusion detection- Cryptography.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the structure of operating system and scheduling algorithms
CO2: Apply the concept of process scheduling, deadlocks and its recovery
CO3: Analyze the background of memory with segmentation and paging
CO4: Evaluate file management with file organization, and disk scheduling
CO5: Create Securing systems and facilities

Text Book:

1. Abraham G Silberschatz, *Operating System***,** Wiley Publisher, Tenth Edition, 2017.

Reference Books:

1. Milan Milenkovic, *Operating System Concepts & Design*, Tata, McGraw Hill,Second Edition,1997.
2. Peter Baer Galvin and Robert Neilson Boyd, *Applied Operating system concepts*, John Wiley & Sons, First Edition, 2000.
3. Dhananjay M. Dhamdhere, *Operating System A Concept-Based Approach*, Tata McGraw Hill, Third Edition, 2012.
4. W. Stallings, *Operating Systems, Internals & Design Principles*, Prentice Hall of India, Fifth Edition, 2008.

E-Resources:

1. https://nptel.ac.in/courses/106/105/106105214/
2. https://nptel.ac.in/courses/106/106/106106144/
3. https://onlinecourses.nptel.ac.in/noc21_cs44/preview
4. https://www.udacity.com/course/introduction-to-operating-systems--ud923
5. https://onlinecourses.nptel.ac.in/noc21_cs72/preview

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	3	3	1	9	3	9	9	9	1	9	9	74
CO2	9	3	3	1	9	3	9	9	9	1	9	9	74
CO3	9	3	3	1	9	3	9	9	9	1	9	9	74
CO4	9	3	3	1	9	3	9	9	9	1	9	9	74
CO5	9	3	3	1	9	3	9	9	9	1	9	9	74
Total	45	15	15	5	45	15	45	45	45	5	45	45	370

Low-1 Medium-3 High-9

VV ACADEMIC COUNCIL

DSE IV – b) Open Source Technologies

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 5**
Subject Code: IMCAE3E **Credit: 4**

Course Objectives:

1. To expose students to free open source software environment and introduce them to use open source packages
2. Implement various applications using build systems and understand the installation of various packages in open source operating systems

Unit I **(15 hours)**

PHP- Introduction-What is PHP-Why use PHP and MYSQL-PHP strengths-Key features of PHP-**Using PHP-**Accessing PHP-Creating sample application- Embedding PHP in HML –Accessing form variables-Understanding identifiers- Examining Variable types- Using Operators-Making Decisions with conditionals-Repeating actions through iteration.

Unit II **(15 hours)**

Storing and Retrieving Data-Processing files-Opening a file-Writing to a file-Closing a file-Reading from a file-Using other file functions-**Using arrays**-What is an array-Numerically indexed arrays-Arrays with different indices-array operators-multidimensional array-sorting array-String manipulation and regular expressions.

Unit III **(15 hours)**

MYSQL- SQL-Inserting Data into the Database-Retrieving Data from the Database-Updating Records in the Database-Altering Tables after creation-Deleting Records from the Database-Dropping Tables-Dropping a Whole Database-Accessing your MYSQL database from the web with PHP-Querying a database from the web-putting new information in the database-Using other PHP database interfaces.

Unit IV **(15 hours)**

PYTHON-Introduction-Algebra with Variables-variables, complex quantities, common functions with numbers, logical operators, strings and printing. Simple programs-basic program structure, flowchart, conditional operations, iterative routines. Functions and Modules-Functions-Recursion, Nested functions, Nested scope, Modules-Built-in modules, maths module.

Unit V **(15 hours)**

Sequences and Operations with Sequences-String, tuple, list, dictionary, set, operators with sequences, iterator, iterator functions, input. Classes and Objects- classes, functions with attributes, overloading, inheritance, execution from command line.

Course Outcomes:

After successful completion of this course, student will be able to

XX ACADEMIC COUNCIL

CO1: Demonstrate install and run Linux operating system
CO2: Apply the MYSQL database concepts
CO3: Develop website and control using PHP and MYSQL
CO4: Explain Install open source web technologies MySQL and PHP
CO5: Illustrate the Python software making process

Text Books:

1. Luke Welling, Laura Thomson, *PHP and MYSQL Web Development*, Pearson Education, Fifth Edition, 2017.
2. T.R. Padmanabhan, Programming *with Python*, Springer Nature, 2016.

Reference Books:

1. James Lee and Brent Ware, *Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP*, Dorling Kindersley Private Limited, 2008.
2. Eric S. Raymond, Michael Tiemann, *Open Sources: Voices from the Open Source Revolution*, O'Reilly, 1999.
3. Steve Holzner, *PHP: The Complete Reference*, Tata McGraw Hill, Second Edition, 2009.

E - Resources:

1. http://www.openresources.com/documents/open-resources/
2. http://www.alexsoft.com/

Course Outcomes	Programme Outcomes												
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**Total**
CO1	9	9	1	3	9	3	9	3	9	9	3	9	**76**
CO2	9	9	3	9	3	9	9	9	3	9	9	3	**84**
CO3	9	9	9	3	9	3	3	9	9	1	3	9	**76**
CO4	9	1	3	9	3	9	1	3	9	3	9	9	**68**
CO5	3	9	3	9	9	3	3	3	9	9	9	3	**72**
Total	**39**	**37**	**19**	**33**	**33**	**27**	**25**	**27**	**39**	**31**	**33**	**33**	**376**

Low-1 Medium-3 High-9

DSE IV – c) Internet of Things

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 5**
Subject Code: IMCAE3F **Credit: 4**

Course Objectives:

1. To understand the application areas of IoT, building blocks of Internet of Things and characteristics
2. To realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks

KX ACADEMIC COUNCIL

Unit I **(15 hours)**

Introduction to IoT: Introduction to IoT- Enabling technologies of IoT - AI and Machine Learning - Physical and logical design of IoT - IoT Reference Architecture - IoT Functional Architecture - IoT levels and deployment templates – **Application domains of IoT**: Home automation – Cities – Environment – Energy – Industry – Agriculture – Transportation - Health care & Lifestyle.

Unit II **(15 hours)**

IoT and M2M: Introduction to M2M – Difference between IoT and M2M- SDN and NFV for IoT-IoT System Management with NETCONF-YANG- Need for IoT Systems Management-SNMP-Network Operator Requirements-NETCONF- YANG- IoT Systems Management with NETCONF-YANG.

Unit III **(15 hours)**

IOT Platforms Design Methodology: Step 1 to Step 10- Case Study on IoT System for Weather Monitoring- Motivation for Using Python- IoT Systems Logical Design using Python-Introduction-Installing Python- Python Data Types and Data Structures-Control Flow-Functions-Modules- Packages-File Handling-Date/Time Operations- Classes- Python Packages of Internet for IoT.

Unit IV **(15 hours)**

IoT Physical Devices and Endpoints: What is an IoT Device- Exemplary Device: Raspberry Pi-About the board-Linux and Raspberry Pi- Raspberry Pi Interfaces- Programming Raspberry Pi with Python- Other IoT Devices.

Unit V **(15 hours)**

IoT Physical Servers and Cloud Offerings: Introduction to Cloud Storage Models and Communication API – WAMP-AutoBahn for IoT-Xively Cloud for IoT-Python Web Application Framework-Django-Designing a RESTful Web API-Amazon Web Services for IoT-Case Studies Illustrating IoT Design- Home Automation-Cities-Environment-Agriculture-Productivity Applications.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Recall the importance of smart objects and smart environment

CO2: Define IoT and M2M

CO3: Create IoT platforms using design methodology

CO4: Perform WiFi data communications, remote data storage in cloud, and handle the data using web applications

CO5: Develop potential problems and solutions using IoT

Text Book:

1. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach*, Universities Press, 2015.

ACADEMIC COUNCIL

Reference Books:

1. Charles Platt, *Make Electronics – Learning by Discovery*, O'Reilly Media, 2015.
2. Michael Miller, *The Internet of Things*, Pearson Education, 2015.

E-Resources:

1. https://nptel.ac.in/courses/106/105/106105166/
2. https://www.classcentral.com/course/swayam-introduction-to-internet-of-things-10093

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	3	3	1	9	9	1	3	1	1	58
CO2	9	9	9	3	3	1	9	9	3	3	1	1	60
CO3	9	9	9	3	3	1	9	9	3	3	1	1	60
CO4	9	9	9	3	3	1	9	9	3	9	1	1	66
CO5	9	9	9	9	9	1	9	9	9	9	1	1	84
Total	45	45	45	21	21	5	45	45	19	27	5	5	328

Low-1 Medium-3 High-9

Core XV - Software Project Management

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 5**
Subject Code: IMCAC412 **Credit: 5**

Course Objectives:

1. To identify the different project contexts and suggest an appropriate management strategy and key phases of project management.
2. To determine an appropriate project management approach through an evaluation of the business context and scope of the project and role of professional ethics in successful software development.

Unit I **(15 hours)**

Introduction to Software Project Management: Introduction – Plans, Methods and Methodologies – Setting Objectives – Project Success and Failure – Management Control – Traditional versus Modern Project Management Practices. **Project Evaluation and Programme Management:** Project portfolio Management – Evaluation of Individual Projects – Programme Management.

Unit II **(15 hours)**

An overview of Project Planning: Stepwise Project Planning - **Selection of an Appropriate Project Approach:** Software Processes and Process Models - Choice of Process models - Structure versus speed of Delivery - Waterfall Model - The Spiral Model - Software Prototyping.

AUTONOMOUS ACADEMIC COUNCIL

Unit III **(15 hours)**

Activity Planning: Objectives of Activity planning - Project schedules - Sequencing and Scheduling Activities - Network Planning models. **Risk Management:** Risk - Categories of Risk – Risk identification – Risk Planning – Evaluating Risks to the Schedule – Applying the PERT technique.

Unit IV **(15 hours)**

Monitoring and Control: Creating the Framework – Collecting the Data – Review – Project Termination Review - Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Change control - Software Configuration Management.

Unit V **(15 hours)**

Agile Technique: The Agile Business Case-Objectives-Adding Value with the Business Case-Business Value Models-Models for the Business Case-Project Balance Sheet-Communicating with the Project Balance Sheet Tool.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Summarize Software Process Models

CO2: Illustrate the steps involved in Software Project Management and activity planning, Risk Management using case studies.

CO3: Apply Software effort Estimation Methods

CO4: Evaluate Software Project Management Tools

CO5: Design the Agile techniques in Software Project Management

Text Books:

1. Bob Hughes, Mike Cotterell, Rajib Mall, *Software Project Management*, Tata McGraw Hill, Fifth Edition, 2012.
2. John C.Goodpasture, PMP, *Project Management the Agile Way*, Second Edition, 2016.

Reference Books:

1. Robert K.Wysocki, *Effective Software Project Management*, Wiley Publication, 2011.
2. Walker Royce, *Software Project Management*, Addison-Wesley, 1998.
3. Gopalaswamy Ramesh, *Managing Global Software Projects*, McGraw Hill Education, Fourteenth Reprint, 2013.

E-Resources:

1. https://nptel.ac.in/courses/106/105/106105218/
2. https://onlinecourses.nptel.ac.in/noc19_cs70/preview

AC ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	9	9	3	9	9	9	1	9	3	88
CO2	9	9	9	9	9	3	9	9	9	1	9	3	88
CO3	9	9	9	9	9	3	9	9	9	1	9	3	88
CO4	9	9	9	9	9	3	9	9	9	1	9	3	88
CO5	9	9	9	9	9	3	9	9	9	1	9	3	88
Total	45	45	45	45	45	15	45	45	45	5	45	15	440

Low-1 Medium-3 High-9

Core XVI – Machine Learning

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 5**
Subject Code: IMCAC42 **Credit: 5**

Course Objectives:

1. To recognize the characteristics of machine learning that makes it useful to real-world problems
2. To understand the concept behind neural networks for learning non-linear functions

Unit I **(15 hours)**

Introduction: Well-Posed Learning Problems-Designing a Learning System-Perspectives and Issues in Machine Learning. Concept Learning: Introduction - A Concept Learning Task-Concept Learning as Search - Decision Tree Learning: Introduction-Decision Tree Representation-Appropriate Problems-Basic Decision Tree Learning Algorithm-Hypothesis Space Search-Inductive Bias-Issues.

Unit II **(15 hours)**

Artificial Neural Networks: Introduction-Neural Network Representations - Appropriate Problems - Perceptrons - Multilayer Networks and the Back Propagation Algorithm-An Illustrative Example: Face Recognition-Advanced Topics.

Unit III **(15 hours)**

Bayesian Learning: Introduction-Bayes Theorem-- Bayes Theorem and Concept Learning – Maximum Likelihood and Least-squared Error Hypotheses- Maximum Likelihood Hypothesis for Predicting Probabilities-Minimum Description Length Principle-Bayes Optimal Classifier-Gibbs

XX ACADEMIC COUNCIL

Algorithm-Naïve Bayes Classifier-An Example: Learning to Classify Text-Bayesian Belief Networks-The EM Algorithm.

Unit IV **(15 hours)**

Instance-Based Learning: Introduction-K-Nearest Neighbor Learning-Locally Weighted Regression-Radial Basis Functions-Case-based Reasoning - Genetic Algorithms: Genetic Algorithms-An Illustrative Example-Hypothesis Space Search-Genetic programming-Models of Evolution and Learning-Parallelizing Genetic Algorithms.

Unit V **(15 hours)**

Learning Sets of Rules: Introduction-Sequential Covering Algorithms-Learning Rule Sets: Summary- Learning First-Order Rules-Learning Sets of First-Order Rules: FOIL - Induction as Inverted Deduction-Inverting Resolution - Reinforcement Learning: Introduction- Learning Task-Q Learning-Nondeterministic Rewards and Actions-Temporal Difference Learning-Generalizing from Examples-Relationship to Dynamic Programming.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Understand the need for machine learning for various problem solving

CO2: Demonstrate Decision Tree Learning Algorithm, Back propagation algorithm, Gibbs Algorithm, K-Nearest Neighbour Learning and Temporal Difference Learning with examples

CO3: Categorize the various supervised, semi-supervised and unsupervised learning algorithms in machine learning

CO4: Apply different classification techniques in real time examples

CO5: Design appropriate machine learning algorithms for different problems

Text Book:

1. Tom M. Mitchell, *Machine Learning*, Tata McGraw Hill, 2017.

Reference Books:

1. Jeremy Watt, Reza Borhani, Aggelos K Katsaggelos, *Machine Learning Refined Foundations, Algorithms & Applications*, Cambridge University Press, , 2016.
2. Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press Cambridge, 2010.
3. Andreas C. Muller and Sarah Guido, *Introduction to Machine Learning with Python*, O'Reilly Media, First Edition, 2016.

E -Resources:

1. https://nptel.ac.in/courses/106/106/106106139/
2. https://onlinecourses.nptel.ac.in/noc22_cs58/preview

XI ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	3	3	3	3	9	1	1	3	1	1	46
CO2	9	9	3	3	3	3	9	1	1	3	1	1	46
CO3	9	9	3	3	3	3	9	1	1	3	1	3	48
CO4	9	9	9	9	3	3	9	1	1	3	1	3	90
CO5	9	9	9	9	3	9	9	1	3	3	1	9	74
Total	45	45	27	27	15	21	45	5	7	15	5	17	274

Low-1 Medium-3 High-9

Core XVII - Project

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 18**
Subject Code: IMCAC43PW **Credit: 6**

Course Objectives:

1. To understand the fundamental principles of Project management and be familiar with the different methods and techniques used for project development
2. To get good knowledge of the issues and challenges faced while doing the project and to do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques

Students have to undergo an individual project work either on campus or in an industry and appear for the viva voce examination with the software developed and document prepared by her

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Identify goals, constraints, deliverables, performance criteria and resource requirements in consultation with stakeholders
CO2: Implement the plan by executing the code
CO3: Integrate the various aspects of software development for the total project
CO4: Construct the entire software project according to the specific problem
CO5: Check the software project by executing with the various data

KU ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	9	9	9	9	9	9	9	9	9	108
CO2	9	3	9	3	9	9	3	3	9	3	9	9	78
CO3	9	9	9	9	9	3	9	3	9	3	9	9	90
CO4	9	9	3	9	9	3	3	9	9	9	9	9	90
CO5	9	9	3	3	9	9	9	9	9	9	9	9	96
Total	45	39	33	33	45	33	33	33	45	33	45	45	462

Low-1 Medium-3 High-9

Extra Credit I - RDBMS Lab

(For Students Admitted from 2024-25)

Semester: I
Subject Code: IMCAX1P **Credit: 2**

Course Objectives:

1. To explain basic database concepts, applications, data models, schemas and instances and emphasize the importance of normalization in databases
2. To demonstrate the use of constraints and relational algebra operations and describe the basics of SQL and construct queries using SQL

SQL DDL

1. Create an address table with fields name, doorno , street & city
   - describe its structure
   - alter the table to include pincode
   - alter the table to modify street column
   - drop the table

DML

2. Create a student table with regno, name, age and dept.
   - insert records
   - delete the students with age above 20
   - truncate and drop the table

Functions

3. Create an employee table with fields eno , ename , sex ,age & years of experience
   - find out the no. of female employees
   - find out the employees with age ranging between 30 and 35
   - list out the employees who are working more than 5 years
4. Create a library file with fields accno,title,author,cost & no of copies
   - arrange the books according to accno

XX ACADEMIC COUNCIL

- find out the TOTAL no. of books available in the library
- find out the book of minimum cost

5. Create a player table with fields name,sports(cricket,hockey,etc.),age & country
   - find out the eldest and youngest player
   - group players according to sports
   - list out the Indian players
6. Write the SQL queries to illustrate all number functions
7. Write the SQL queries to illustrate date functions
8. Write the SQL queries to illustrate all string functions
9. Create an item table with field's itemno, itemname, quantity & price and insert records.
10. Illustrate the comparison operators (between, like, in & isnull)
11. Create a table with the fields clientno, clientname & phoneno. Illustrate the set operators union , unionall, minus & intersect
12. Create a student table with fields' regno, name, English, Tamil, Maths and TOTAL
    - insert records
    - arrange all records according to TOTAL
    - find the student who got first mark in Maths
    - list out the students whose name starts with 'S'
13. Create an inventory table with fields' itemno, itemname, qnty, price and reorder level
    - insert records
    - update the qnty when it goes less than reorderlevel
    - list the items with price less than 100
14. Create an employee table with fields ecode, ename, age & salary and create a department table with fields ecode, designation, deptcode & dept. Illustrate joins and sub queries using the above tables.

Constraints

15. Create a vendormaster table with fields vencode,venname,place and phoneno
    Create an ordermaster table with fields item no, itemcode, vencode, qnty and orderdate.
    Illustrate the following constraints using the above tables
    - vencode as primary key in vendormaster
    - vencode as foreign key in ordermaster
    - phoneno as unique
    - place as notnull &
    - qnty > 100

Note: - Questions for the external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Demonstrate DDL, DML and TCL Commands

CO2: Apply the basic concepts of Database Systems and Applications

CO3: Illustrate the use of implementing constraints in tables

MX ACADEMIC COUNCIL

CO4: Implement normalization queries using SQL in database creation and interaction
CO5: Design ER-models to represent simple database application scenarios

Course Outcomes	Programme Outcomes												
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**Total**
CO1	9	9	9	9	3	1	9	3	1	1	1	1	**56**
CO2	9	9	9	9	3	1	9	3	1	1	1	1	**56**
CO3	9	9	9	9	3	1	9	3	1	1	1	1	**56**
CO4	9	9	9	9	3	1	9	3	1	1	1	1	**56**
CO5	9	9	9	9	3	1	9	3	1	1	1	1	**56**
Total	**45**	**45**	**45**	**45**	**15**	**5**	**45**	**15**	**5**	**5**	**5**	**5**	**280**

Low- 1 Medium-3 High-9

Extra Credit II - Internship

(For Students Admitted from 2024-25)

Semester: II
Subject Code: IMCAX2P **Credit: 2**

Course Objectives:

1. To articulate and apply principles learned in and outside of the classroom to a specific internship site experience
2. To get the practical knowledge to apply programming skills for developing a project

Students have to undergo an internship in an industry and submit report prepared by them about the internship programme.

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Understand self-understanding, self-confidence, and interpersonal skills
CO2: Assess Strengths, Weaknesses, Opportunities and Threats (SWOT) and explore career options and gain general work experience
CO3: Examine any specific learning outcomes identified in supplemental documentation provided as part of the internship application process
CO4: Apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization
CO5: Create the document which contains company profile by compiling the brief history, management structure, products / services offered, key achievements and market performance for organization of internship

AC ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Total
CO1	9	9	9	9	9	1	9	9	1	1	9	1	76
CO2	9	9	9	9	9	1	9	9	1	1	9	1	76
CO3	9	9	9	9	9	1	9	9	1	1	9	1	76
CO4	9	9	9	9	9	1	9	9	1	1	9	1	76
CO5	9	9	9	9	9	1	9	9	1	1	9	1	76
Total	45	45	45	45	45	5	45	45	5	5	45	5	380

Low-1 Medium-3 High-9

Extra Credit IV – Document Preparation Lab (LATEX)

(For Students Admitted from 2024-25)

Semester: IV
Subject Code: IMCAX4P **Credit: 2**

Course Objectives:

1. To get practical knowledge on preparing documents containing mathematical formulas
2. To prepare a technical and scientific documentation

List of Programs

1. Create a document using an input file
2. Create a document using special symbols, dashes, line breaks & footnotes
3. Create a document using the sectioning command
4. Create a document using quotations, typestyle, commands & environments
5. Create a document using the mathematical symbol
6. Create a document using arrays and table
7. Create a document using a bibliography
8. Create a document using clauses and page style
9. Create a document using pictures and colors
10. Create a document using basics of the math index
11. Create a document using fine print and bibliography database
12. Create a document using math mode, tabbing environment, and files

Note: - Questions for the External examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Identify bibliography database
CO2: Relate math mode, and fine print
CO3: Apply mathematical symbol to create the document

MX ACADEMIC COUNCIL

CO4: Select clauses, typestyle, commands, and page style
CO5: Create Latex documents

Course Outcomes	Programme Outcomes												
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**Total**
CO1	9	9	9	9	3	1	9	3	1	1	1	1	**56**
CO2	9	9	9	9	3	1	9	3	1	1	1	1	**56**
CO3	9	9	9	9	3	1	9	3	1	1	1	1	**56**
CO4	9	9	9	9	3	1	9	3	1	1	1	1	**56**
CO5	9	9	9	9	3	1	9	3	1	1	1	1	**56**
Total	**45**	**45**	**45**	**45**	**15**	**5**	**45**	**15**	**5**	**5**	**5**	**5**	**280**

Low- 1 Medium-3 High-9

M Sc INFORMATION TECHNOLOGY

(Two Years Regular Programme)
(For Students Admitted from 2024-25)

Program Specific Outcomes (PSO):
On Completion of this programme, the student will be able to

PSO1: Enrich the knowledge in the areas like Artificial Intelligence, Cloud Computing, Software Project Management, Machine Learning and core computing subjects
PSO2: Apply programming and technical skills to solve real life complex problems and hence enhance employability
PSO3: Design solutions for complex problems and design processes that meet the specific needs of the society
PSO4: Apply the knowledge of latest trends to carryout research & development in modern computing environment
PSO5: Apply learned skills to build optimized solution to latest technologies
PSO6: Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team
PSO7: Engage in life-long learning, to remain up-to-date in their profession and obtain additional qualifications to enhance their career positions in IT industries

PREAMBLE
The Board of Studies of Computer Science revamped the curriculum with the following changes
Core courses

- New syllabus has been framed for Data Analytics and Data Structures and Algorithms
- Cryptography and Network Security and Software Project Management has been modified

Discipline Elective Courses

- Internet of Things Syllabus has been modified

XX ACADEMIC COUNCIL

PROGRAMME STRUCTURE – PROGRAM CODE : PIT

Sem	Subject Code	Course	Subject Title	Hours / week	Credit	CIA	ESE	Total Marks
I	HMITC111	Core I	○ **Data Analytics**	6	5	25	75	100
	HMITC12	Core II	Open Source Technologies	6 (T-4 P-2)	5	25 (T-15 P-10)	75	100
	HMITC13	Core III	Optimization Techniques	6	5	25	75	100
	HMITC14P	Core IV	Data Analytics Lab	6	5	25	75	100
	HMITE11A / HMITE1B	DSE I	a. **Internet of Things** b. Artificial Intelligence and Expert Systems	6	5	25	75	100
	HMITX1P / HMITX1O	Extra Credit I	RDBMS Lab / * Online Course	-	2	-	100	100
			Total	**30**	**25+2**	**125**	**375 + 100**	**500+ 100**
II	HMITC21	Core V	#Advanced Java	6	5	25	75	100
	HMITC221	Core VI	**Data Structures and Algorithms**	6	5	25	75	100
	HMITC231	Core VII	**Cryptography and Network Security**	6	5	25	75	100
	HMITC24P	Core VIII	Advanced Java Lab	6	5	25	75	100

XX ACADEMIC COUNCIL

	HMITE2A / HMITE2B	DSE II	a. Probability and Applied Statistics b. Mobile Communications	6	5	25	75	100
	HMITX2P / HMITX2O	Extra Credit II	#Internship / *Online Course	-	2	-	100	100
			Total	**30**	**25+2**	**125**	**375 + 100**	**500+ 100**
III	HMITC311	Core IX	**Software Project Management**	6	5	25	75	100
	HMITC32	Core X	Software Development Framework	6	5	25	75	100
	HMITC33	Core XI	Data Mining and Warehousing	6 (T-4 P-2)	5	25 (T-15 P-10)	75	100
	HMITC34P	Core XII	Software Development Framework Lab	6	5	25	75	100
	HMITE3A / HMITE3B	DSE III	a. Human Resource Management b. Compiler Design	6	5	25	75	100
	HMITX3 / HMITX3O	Extra Credit III	Employability Skills / * Online Course	-	2	100	-	100
			Total	**30**	**25+2**	**125 +100**	**375**	**500+ 100**
	HMITC41	Core XIII	Cloud and Distributed Computing	6	5	25	75	100

XX ACADEMIC COUNCIL

IV	HMITC42	Core XIV	○ Machine Learning	6	5	25	75	100
	HMITC43PW	Core XV	Project	18	5	100	100	200
	HMITX4P / HMITX4O	Extra Credit IV	Document Preparation Lab (LATEX) / *Online Course	-	2	-	100	100
			Total	**30**	**15+2**	**150**	**250 + 100**	**400+ 100**
			Grand Total	**120**	**90+8**	**525+ 100**	**1375+ 300**	**1900+ 400**

*****For Online Course credit alone will be assigned on submission of certificate obtained by appearing for online examination from EdX, Spoken Tutorial, NPTEL or Coursera etc.

#For internship course, refer www.internshala.com or any online internship course

○ For online course integration, syllabus will be taken from spoken tutorial, swayam, edx, Udemy, coursera

DSE - Discipline Specific Elective

Core I - Data Analytics

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6**
Subject Code: HMITC111 **Credit: 5**

Course Objectives:

1. To understand the Big Data Platform and its Use cases and Map Reduce Jobs
2. To provide an overview of Apache Hadoop, HDFS Concepts and Interfacing with HDFS and Apply analytics on Structured, Unstructured Data

Unit I **(18 hours)**

Introduction to Big Data: Classification of Digital Data, Structured and Unstructured Data - Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data -Why Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop Environment Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in

XX ACADEMIC COUNCIL

Big Data Environments – Basically Available Soft State Eventual Consistency - Top Analytics Tools

Unit II **(18 hours)**

Technology Landscape: NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop -Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem

Unit III **(18 hours)**

Mongodb and Mapreduce programming: MongoDB: Why Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language Map Reduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression

Unit IV **(18 hours)**

Hive and pig Hive: Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements –Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having – RCFile Implementation - Hive User Defined Function - Serialization and Deserialization. Pig: Introduction -Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types -Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function -Complex Data Types - Piggy Bank - User-Defined Functions - Parameter Substitution – Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive

Unit V **(18 hours)**

Introduction to Data Analytics with R- Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Machine Learning Algorithms: Regression Model, Clustering, Collaborative Filtering, Associate Rule Making, Decision Tree, Big Data Analytics with BigR.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe Data sources, generations, data formats, Data Evolution, Data from various domains

CO2: Determine Big Data Characteristics, Frameworks, components and Limitation of traditional approaches and map Big Vs to Data Domains

CO3: Analyse various domains of Data Characteristics, Platform, Programming Model and Design Data Analytic ecosystem, and data processing framework

CO4: Evaluate the Concepts of Data Analytics Phases and Techniques

CO5: Formulate Data Analytics Techniques practically using R environment

Text Books:

1. Seema Acharya, Subhashini Chellappan, “Big Data and Analytics”, Wiley Publications, First Edition,2015

XXX ACADEMIC COUNCIL

2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman , *Big Data for Dummies*, Wiley India Private Limited, 2014

Reference Books:

1. Boris lublinsky, Kevin T. Smith, Alexey Yakubovich, *Professional Hadoop Solutions*, Wiley, India Private Limited, 2015.
2. Chris Eaton, Dirk deroos, Understanding *Big data*, McGraw Hill, 2012.
3. Tom White, *HADOOP: The definitive Guide*, O Reilly, 2012.
4. Tom Plunkett, Brian Macdonald, Oracle *Big Data Handbook*, Oracle Press, 2014.
5. JyLiebowitz, *Big Data and Business analytics*, CRC press, 2013.
6. VigneshPrajapati, *Big Data Analytics with R and Hadoop*, Packet Publishing, 2013.

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc20_cs92/preview
2. https://nptel.ac.in/courses/110/106/110106072/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	3	9	**49**
CO2	9	9	9	1	9	3	9	**49**
CO3	9	9	9	1	9	3	9	**49**
CO4	9	9	9	1	9	3	9	**49**
CO5	9	9	9	1	9	3	9	**49**
Total	**45**	**45**	**45**	**5**	**45**	**15**	**45**	**245**

Low-1 Medium-3 High-9

Core II - Open Source Technologies

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6 (T: 4 P: 2)**
Subject Code: HMITC12 **Credit: 5**

Course Objectives:

1. To expose students to free open source software environment and introduce them to use open source packages
2. To implement various applications using build systems and understand the installation of various packages in open source operating systems

Unit I **(12 hours)**

PHP: Introduction-What is PHP-Why use PHP and MYSQL-PHP strengths-Key features of PHP-**Using PHP**-Accessing PHP-Creating sample application- Embedding PHP in HTML-Accessing form variables-Understanding identifiers- Examining Variable types- Using Operators-Making Decisions with conditionals-Repeating actions through iteration**.**

MX ACADEMIC COUNCIL

Unit II **(12 hours)**

Storing and Retrieving Data-Processing files-Opening a file-Writing to a file-Closing a file-Reading from a file-Using other file functions-**Using arrays**-What is an array-Numerically indexed arrays-Arrays with different indices-array operators-multidimensional array-sorting array-String manipulation and regular expressions.

Unit III **(12 hours)**

Mysql: What is SQL-Inserting Data into the Database-Retrieving Data from the Database-Updating Records in the Database-Altering Tables after creation-Deleting Records from the Database-Dropping Tables-Dropping a Whole Database-Accessing your MYSQL database from the web with PHP-Querying a database from the web-putting new information in the database-Using other PHP database interfaces.

Unit IV **(12 hours)**

Python: Introduction-Algebra with Variables-variables, complex quantities, common functions with numbers, logical operators, strings and printing. Simple programs-basic program structure, flowchart, conditional operations, iterative routines. Functions and Modules-Functions-Recursion, Nested functions, Nested scope, Modules-Built-in modules, maths module.

Unit V **(12 hours)**

Sequences and Operations with Sequences: String, tuple, list, dictionary, set, operators with sequences, iterator, iterator functions, input. Classes and Objects- classes, functions with attributes, overloading, inheritance, execution from command line.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Demonstrate install and run Linux operating system
CO2: Apply the MYSQL database concepts
CO3: Develop website and control using PHP and MYSQL
CO4: Explain Install open source web technologies MySQL and PHP
CO5: Illustrate the Python software making process

Text Books:

1. Luke Welling, Laura Thomson, *PHP and MYSQL Web Development*, Pearson Education, Fifth Edition, 2016.
2. T.R. Padmanabhan, *Programming with Python*, Springer Nature, 2016.

Reference Books:

1. James Lee and Brent Ware, *Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP*, Dorling Kindersley, 2008.
2. Eric S. Raymond, Michael Tiemann, *Open Sources: Voices from the Open Source Revolution* , O'Reilly, 1999.

EX-ACADEMIC COUNCIL

3. Martin C, *Brown, Perl: The Complete Reference*, Tata McGraw Hill, Second Edition, 2009.
4. Steve Holzner, *PHP: The Complete Reference*, Tata McGraw Hill, Second Edition, 2009.

E-Resources:

1. https://nptel.ac.in/courses/106/106/106106182/
2. https://nptel.ac.in/courses/106/105/106105182/
3.

Open Source Technologies (Lab)

Hours/week: 2

Python:

Display Text

1. To display any given text message
2. To display Fibonacci series

Array

3. To count the number of vowel in the string

Function

4. To convert a date read from the user, given in DD/MM/YYYY format into written format. For example, Enter a date in DD/MM/YYYY Format: 16/7/2003 Output: 16 July, 2003
5. To print the contents of a file in uppercase using function

MySQL:

6. Create student database and display the data using Python
7. Create Employee database and display the employee salary data using Python

PHP:

8. To find Sum of digits of given number
9. To find factorial of a number
10. To display count, from 10 to 20 using loop
11. To check given number is prime number or not

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	1	3	9	3	9	**43**
CO2	9	9	3	9	3	9	9	**51**
CO3	9	9	9	3	9	3	3	**45**
CO4	9	1	3	9	3	9	1	**35**
CO5	3	9	3	9	9	3	3	**39**
Total	**39**	**37**	**19**	**33**	**33**	**27**	**25**	**213**

Low-1 Medium-3 High-9

XXI ACADEMIC COUNCIL

Core III - Optimization Techniques

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6**
Subject Code: HMITC13 **Credit: 5**

Course Objectives:

1. To impart knowledge in concepts and tools of Operations Research and to understand mathematical models used in Operations Research
2. To apply these techniques constructively to make effective business decisions

Unit I **(18 hours)**

Basics of Operations Research: Development of OR – Definition-Characteristics-Scientific Method-Necessity of OR-Scope-OR and Decision-Making-Scope of OR in Management, Financial management-Applications of various OR Techniques-Objectives –Phases-Models-Classification Schemes of Models-Role of Computers in OR – Difficulties in OR - Limitations of OR

Linear Programing: Introduction-Requirements for a Linear Programming Problem - Assumptions in Linear Programming Models – Applications of LP method- Formulation of LPP-Advantages – Limitations – Graphical Method of Solutions – Some Exceptional Cases.

Unit II **(18 hours)**

General LPP-Canonical and standard Forms of LPP-Theory of Simplex Method – Some Important Definitions –Analytical Method or Trial and Error Method – Simplex Method – Artificial Variables Techniques – Special cases in Simplex Method Applications – Solution of Simultaneous Equations by Simplex Method – Some Additional Points – Computational Efficiency of the Simplex Technique.

Unit III **(18 hours)**

Transportation Model: Introduction to the Model – Assumptions in Transportation Model - Definition-Matrix Terminology- Formulation and Solution- Variants in Transportation Problems-Additional Problems-Least-Time Transportation Problems-Post Optimality Analysis in Transportations – Trans-Shipment Problem- Dual of the Transportation Problem.

Unit IV **(18 hours)**

Assignment Model: Definition of Assignment Model- Mathematical Representation- Comparison with the Transportation Model-Solution of Assignment Models -Hungarian Method for Solution of Assignment Problems- Formulation and Solution of Assignment Models -Variations -Additional Problems- Sensitivity Analysis in Assignment Problem- Travelling Salesman Problem.

Unit V **(18 hours)**

Advanced Topics in LP: Duality in LP - Dual Simplex Method -Revised Simplex Method - Bounded Variable Problem.

KAU ACADEMIC COUNCIL

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain characteristics of Operational Research, Computational Efficiency of the Simplex Technique, Transportation Problems, Assignment problem and Duality

CO2: Apply Graphical, Simplex methods, Assignment Problem, Transportation Problem and Dual Simplex Method methods to get optimal solution for Linear Programming

CO3: Analyse the optimal solutions of different Linear Programming methods such as Graphical, Simplex method, Assignment Problem and Transportation Problem and Dual Simplex methods for making effective business decisions

CO4: Compare Solutions of as Graphical, Simplex and Dual Simplex method

CO5: Generate dual of LPP and dual of Transportation Problem

Text Book:

1. Er. Prem Kumar Gupta, Dr D S Hira, *Operations Research*, S Chand Company, 2017.

Reference Books:

1. V.K.Kapoor, *Operations Research*, Sultan Chand & Sons Publishers, Fourth Edition, 2001.
2. Hamdy A.Taha, *Operations Research*, Prentice Hall of India Pvt Ltd, Seventh Edition, 2005.
3. J K Sharma, *Operations Research Theory and Applications*, Fifth Edition, Macmillan Publishers, 2013.
4. Kanti Swarup , P.K. Gupta and Man Mohan, *Operations Research*, Sultan Chand & Sons Publishers, Thirteenth Edition, 2004.

E-Resources:

1. https://nptel.ac.in/courses/110/106/110106062/
2. https://onlinecourses.swayam2.ac.in/cec20_ma10/preview
3. https://www.bbau.ac.in/dept/UIET/EMER601%20Operation%20Research%20Queuing%20theory.pdf

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	9	1	9	9	**49**
CO2	9	3	9	9	1	9	9	**49**
CO3	9	3	9	9	1	9	9	**49**
CO4	9	1	9	9	1	9	9	**47**
CO5	9	1	9	9	3	9	9	**49**
Total	**45**	**11**	**45**	**45**	**7**	**45**	**45**	**243**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core IV - Data Analytics Lab

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6**
Subject Code: HMITC14P **Credit: 5**

Course Objectives:

1. Able to identify datasets and explain how they are organized and manipulate data
2. Able to know how to transform the data into useful information and use functions for data visualization

List of Programs

Using Spread sheet

1. To perform Basic Functions in Spread sheets
2. To perform Formatting and Proofing
3. To perform Mathematical & Text Functions
4. Implement Date and Time Functions
5. Implement Sorting & Filtering Techniques
6. To perform Logical Functions
7. To perform Data Validation
8. To display Pivot Tables
9. To display Charts and Slicers
10. To perform Lookup Functions

Using R

11. To get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND)
12. To perform data import/export (.CSV, .XLS, .TXT) operations using data frames
13. To get the input matrix from user and perform Matrix addition, subtraction, multiplication, inverse transpose and division operations using vector concept
14. To perform statistical operations (Mean, Median, Mode and Standard deviation)
15. To perform data pre-processing operations i) Handling Missing data ii) Min-Max normalization
16. To perform Simple Linear Regression
17. To perform K-Means clustering operation and visualize for iris data set

Using SciLab

18. Implement the basic matrix operations
19. Find the Eigenvalues and eigenvectors
20. Solve equations by Gauss elimination, Gauss Jordan Method and Gauss Seidel
21. Find the reduced row echelon form of a matrix

Note: - Questions for the external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Outline Excel functions to solve mathematical, text, Date and time operations, R functions for numerical operations and Scilab functions for matrix operations

XX ACADEMIC COUNCIL

CO2: Demonstrate the concepts of sorting, filtering using Excel
CO3: Illustrate statistical operations using R
CO4: Evaluate the Regression and Clustering
CO5: Develop programs to solve equations by Gauss elimination, Gauss Jordan Method and Gauss Seidel

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	1	9	9	**43**
CO2	9	1	9	3	1	9	9	**41**
CO3	9	1	9	3	1	9	9	**41**
CO4	9	1	9	3	1	9	9	**41**
CO5	9	3	9	3	1	9	9	**43**
Total	**45**	**9**	**45**	**15**	**5**	**45**	**45**	**209**

Low-1 Medium-3 High-9

DSE I - a) Internet of Things

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6**
Subject Code: HMITE11A **Credit: 5**

Course Objectives:

1. To understand the fundamentals of Internet of Things and its building blocks
2. To understand the recent application domains of IoT in everyday life and the protocols with standards designed for IoT and the current research on it

Unit I **(18 hours)**

Introduction to IoT: Introduction to IoT- Enabling technologies of IoT - AI and Machine Learning - Physicaland logical design of IoT - IoT levels and deployment templates– **Application domains of IoT:** Home automation – Cities – Environment – Agriculture – Transportation - Health care & Lifestyle.

Unit II **(18 hours)**

IoT and M2M: Introduction to M2M – Difference between IoT and M2M- SDN and NFV for IoT- SNMP- NETCONF- YANG- IoT Systems Management with NETCONF- YANG.

Unit III **(18 hours)**

IoT Platforms Design Methodology: Step 1 to Step 10-Case Study on IoT System for Weather Monitoring- IoT Systems Logical Design using Python- Python Data Types and Data Structures-Control Flow-Functions-Modules- Packages-File Handling-Date/Time-Operations-Classes.

EXACADEMIC COUNCIL

Unit IV **(18 hours)**

IoT Physical Devices and Endpoints: What is an IoT Device- Exemplary Device: Raspberry Pi- Linux and Raspberry Pi- Raspberry Pi Interfaces- Programming Raspberry Pi with Python- Other IoTDevices.

Unit V **(18 hours)**

IOT Physical Servers and Cloud Offerings: Introduction to Cloud Storage Models and Communication API-WAMP- Python Web Application Framework-Django - Amazon Web Services for IoT-Case Studies Illustrating IoT Design- Home Automation- Cities-Environment-Agriculture-Productivity Applications.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Recall the importance of smart objects and smart environment

CO2: Define IoT and M2M

CO3: Create IoT platforms using design methodology

CO4: Perform WiFi data communications, remote data storage in cloud, and handle the data using web applications

CO5: Develop potential problems and solutions using IoT

Text Book:

1. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach*, Universities Press, 2015.

Reference Books:

1. Charles Platt, *Make Electronics – Learning by discovery*, O'Reilly Media, 2015.
2. Michael Miller, *The Internet of Things*, Pearson Education, 2015.

E-Resources:

1. NPTEL:https://nptel.ac.in/courses/106/105/106105166/
   2.Classcentral:https://www.classcentral.com/course/swayam-introduction-to-internet-of- things-10093

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	3	3	3	9	3	1	3	**25**
CO2	1	3	9	9	3	1	9	**35**
CO3	3	3	3	1	1	9	9	**29**
CO4	1	3	9	1	3	3	9	**29**
CO5	3	3	3	3	1	3	9	**25**
Total	**11**	**15**	**27**	**23**	**11**	**17**	**39**	**143**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

DSE I - b) Artificial Intelligence and Expert Systems

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6**
Subject Code: HMITE1B **Credit: 5**

Course Objectives:

1. To understand basics of Artificial Intelligence and its applications
2. To learn about Expert systems and knowledge representation schemes

Unit I **(18 hours)**

Introduction to Artificial Intelligence-Intelligent Agents, Approaches in Artificial Intelligence, Definitions of Artificial Intelligence, AI problems, Features of AI Programs, Importance of AI, Advantages and Disadvantages of AI.

Unit II **(18 hours)**

Applications of Artificial Intelligence- Finance, Hospitals and Medicine, Robotics, Expert systems, Diagnosis, Pattern Recognition, Natural Language Processing, Game Playing, Image Processing, Data mining, Big Data Mining. Introduction to the state space search- State space search, search techniques, Types of searching techniques.

Unit III **(18 hours)**

Heuristic Search Strategies-Types of Heuristic Search techniques, Hill Climbing Search, Simulated Annealing search, A* Algorithm, AND-OR Graphs, Properties of the Heuristic Search Algorithm, Adversary Search, The MINIMAX Algorithm.

Unit IV **(18 hours)**

Expert Systems-Definitions of Expert Systems, Features of Good Expert systems, Architecture and Components of Expert systems, Roles of the Individuals who interact with the system, Advantages of Expert systems, Disadvantages of Expert Systems.

Unit V **(18 hours)**

Knowledge Representation - Definitions of Knowledge Representation, Characteristics of Good Knowledge Representation, Basics of Knowledge representation, Properties of the Symbolic representation of knowledge, Properties of the Good knowledge representation systems, Categories of knowledge representation schemes, types of knowledge representation schemes.

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Illustrate knowledge on Artificial Knowledge concepts
CO2: Apply all searching algorithms and Hill-climbing procedures
CO3: Analyse their gaming skills and learn about Expert system
CO4: Evaluate the learners for aspiring careers in the field of Artificial Intelligence.
CO5: Develop the game playing and planning of expert systems

KAC ACADEMIC COUNCIL

Text Book:

1. I.Gupta, G.Nagpal, Artificial *Intelligence and Expert Systems,* Laxmi Publications, 2018.

Reference Books:

1. V.S. Jankiraman, *Foundations of Artificial Intelligence and Expert Systems*, Laxmi Publications, 2017.
2. Joseph C.Giarratano, Gary D.Riley, *Expert Systems: Principles and Programming*, Fourth Edition, 2018.
3. Lavika Goel, *Artificial Intelligence: Concepts and Applications*, Wiley India Private Limited, 2018.

E-Resources:

1. https://nptel.ac.in/courses/106/102/106102220/
2. https://nptel.ac.in/courses/112/103/112103280/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	1	9	9	3	9	**49**
CO2	9	9	3	9	3	9	1	**43**
CO3	3	9	9	3	9	3	3	**39**
CO4	9	1	3	9	3	9	1	**35**
CO5	9	9	9	9	9	3	3	**51**
Total	**39**	**37**	**25**	**39**	**33**	**27**	**17**	**217**

Low-1 Medium-3 High-9

Extra Credit I– RDBMS Lab

(For Students Admitted from 2024-25)

Semester: I
Subject Code: HMITX1P **Credit: 2**

Course Objectives:

1. The Students get practical knowledge on designing and creating Relational Database Management
2. To understand various advanced queries such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL

SQL DDL

1. Create an address table with fields name , doorno , street & city
   - Describe its structure

ACADEMIC COUNCIL

- Alter the table to include pincode
- Alter the table to modify street column
- Drop the table

DML

2. Create a student table with regno, name, age and dept.
   - Insert records
   - Delete the students with age above 20
   - Truncate and drop the table

Functions

3. Create an employee table with fields eno , ename , sex ,age & years of experience
   - Find out the no. Of female employees
   - Find out the employees with age ranging between 30 and 35
   - List out the employees who are working more than 5 years
4. Create a library file with fields accno,title,author,cost & no of copies
   - Arrange the books according to accno
   - Find out the total no. Of books available in the library
   - Find out the book of minimum cost
5. Create a player table with fields name,sports(cricket,hockey,etc.),age & country
   - Find out the eldest and youngest player
   - Group players according to sports
   - List out the Indian players
6. Write the SQL queries to illustrate all number functions
7. Write the SQL queries to illustrate date functions
8. Write the SQL queries to illustrate all string functions
9. Create an item table with field's itemno, itemname, quantity & price and insert records.
10. Illustrate the comparison operators (between, like, in & isnull)
11. Create a table with the fields clientno , clientname & phoneno Illustrate the set operators union , unionall, minus & intersect
12. Create a student table with fields' regno, name, English, Tamil, Maths and TOTAL
    - Insert records
    - Arrange all records according to total
    - Find the student who got first mark in maths
    - List out the students whose name starts with 'S'
13. Create an inventory table with fields' itemno, itemname, qnty, price and reorder level
    - Insert records
    - Update the qnty when it goes less than reorderlevel
    - List the items with price less than 100
14. Create an employee table with fields ecode,ename,age & salary and create a department table with fields ecode, designation, deptcode & dept. Illustrate joins and sub queries using the above tables

Constraints

15. Create a vendormaster table with fields vencode,venname,place and phoneno
    Create an ordermaster table with fields item no, itemcode,vencode,qnty and orderdate .

VAC ACADEMIC COUNCIL

Illustrate the following constraints using the above tables

- Vencode as primary key in vendormaster
- Vencode as foreign key in ordermaster
- Phoneno as unique
- Place as notnull
- Qnty > 100

Note: Questions for the external examinations will be based on concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Build DDL, DML and TCL Commands
CO2: Make use of implementing constraints in tables
CO3: Apply to create block structure programming language
CO4: Create the concepts of functions
CO5: Develop the procedures, exceptions, triggers in PL/SQL block

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	1	9	9	3	9	**49**
CO2	9	9	3	9	3	9	1	**43**
CO3	3	9	9	3	9	3	3	**39**
CO4	9	1	3	9	3	9	1	**35**
CO5	9	9	9	9	9	3	3	**51**
Total	**39**	**37**	**25**	**39**	**33**	**27**	**17**	**217**

Low-1 Medium-3 High-9

Core V - Advanced Java

(For Students Admitted from 2024-25)

Semester: II **Hours/ Week: 6**
Subject code: HMITC21 **Credit: 5**

Course Objectives:

1. Learn networking and remote method invocation using Java API and Java Bean to increase the ability of students in web application development
2. Ability to develop programming knowledge to create dynamic web applications using server side technology with Java database connectivity

VX ACADEMIC COUNCIL

Unit I **(18 hours)**

JSP- JEEE- JSF- J2ME- Struts. **Networking with Java:** Basics of Networking - Sockets in Java - Client-Server in Networking - Proxy Servers - Internet Addressing - Domain Naming Service(DNS) - Inet4 Addresses and Inet6 Addresses - The URL Class - The URI Class - TCP/IP and Datagram - Java Net APIs – InetAddresses - InetAddress Caching - Creating and Using Sockets - Creating TCP Clients and Servers - A Whois Example - Submitting an HTML Form from Java - Handling URL- Using URLConnection Objects - Working With Datagrams - Datagram Server and Client

Swing: The Java Foundation Classes - Swing- Heavyweight versus Lightweight Components- Swing Features- Graphics Programming Using Panes- Model View Controller Architecture- Working With Swing- Preparing to Create a Swing Applet- Understanding Root Panes, Layered Pane and Content Panes- Creating a Swing Applet and Application – Closing JFrame Windows.

Unit II **(18 hours)**

Understanding RMI: Remote Method Invocation (RMI) - Client/Server Architecture- Implementing RMI - Limitation of RMI, A Model RMI Transaction -Writing an RMI Server- Designing a Remote Interface- Implementing a Remote Interface- Passing Object in RMI- Implementing the Server's Main Method- Creating a Client Program- Compiling and Running the Example – Exporting with Unicast Remote Object

Working with Java Beans: What is Java Bean - Understanding Java Beans - Designing programs Using Java Beans - Creating Applets that Use Java Beans - Creating a Java Bean - Creating a Bean Manifest File and JAR File - Using a New Bean - Adding Controls to Beans - Giving a Bean Properties- Design Patterns for Properties- Simple Properties - Design Patterns for Events - Methods and Design Patterns - Giving a Bean Methods - Giving a Bean an Icon - The JavaBeans API.

Unit III **(18 hours)**

Talking to Database: JDBC- JDBC versus ODBC and Other APIs - Two- Tier and Three - Tier Models - Introducing SQL - The JDBC Package - Types of JDBC Drivers - Javasoft Framework- Driver Interface and Driver Manager Class - The Essential JDBC Program- Using a Prepared Statement Object- The Interactive SQL Tool- Using Tables- Defining a Table Model

JDBC in Action: Data Types and JDBC – Scrollable Result Sets - Batch Updates - Mapping Relational Data into Java Objects - Basic JDBC Types - Advanced JDBC data types.

Unit IV **(18 hours)**

Servlets: Architecture – Life cycle – First program – Client HTTP request – Server HTTP response – HTTP status code – Writing filters – Exception handling – Cookies handling – Session tracking – Database access – File uploading – Handling date – Servlets-page redirection – Sample program – Servlets-packaging.

AC ACADEMIC COUNCIL

Unit V **(18 hours)**

Java Server Pages: An Overview – Advantages of JSP – Architecture – JSP life cycle – JSP comments – JSP syntax – Implicit objects – Control-flow statements – Client-Server JSP – Database access – Custom tags – Exception handling – JSP standard tag library.

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Explain the concepts of JSP, JEEE, JSF, J2ME, Struts, Swing, RMI, Java Bean and Servlet

CO2: Utilize the technique of swing and RMI to create various fields and invoke client/ server communication

CO3: Examine an implementation of networking with Java, RMI and Java Bean

CO4: Evaluate different types of JDBC drivers and connectivity

CO5: Design the web application using swing, servlet, JSP and database

Text Books:

1. DT Editorial Services, *Java 8 Programming Black Book*, Dreamtech Press, 2015.
2. B Prasanalakshmi *Advanced Java Programming*, CBS Publishers & Distributors d, 2015.

Reference Books:

1. Steven Holzner et al, *Java 2(JDK 5 Edition) Programming Black Book*, Dreamtech press, 2006.
2. Herbert Schildt, *Java: The Complete Reference*, Eleventh Edition, McGraw Hill, 2020.
3. James Gosling, David Holmes, Ken Arnold, *The Java Programming Language*, Addison-Wesley Professional, Fourth Edition, 2005.

E - Resources:

1. Advanced Java, https://www.youtube.com/watch?v=Ae-r8hsbPUo
2. Java Programming, https://www.learnvern.com/course/advanced-java-tutorial

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	3	9	**29**
CO2	9	3	1	1	3	3	9	**29**
CO3	9	3	1	1	3	3	9	**29**
CO4	9	3	3	3	3	3	9	**33**
CO5	9	3	3	3	3	3	9	**33**
Total	**45**	**15**	**9**	**9**	**15**	**15**	**45**	**153**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core VI- Data Structures and Algorithms

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 6**
Subject Code: HMITC221 **Credit: 5**

Course Objectives:

1. To understand data structures and algorithms in computer science perspectives, algorithms analysis procedure, space and time complexity of various algorithms
2. To apply data structures and algorithms to solve real world problems

Unit I **(18 hours)**

Computational Complexity: Computer Architecture-Big oh Notation-other asymptotic notations for complexity of algorithms-More asymptotic notations.**Introduction:** History of Algorithm-Data structures and Algorithms-Data structure-Definition and Classification.**Stacks:** Introduction-stack Operation-Application. **Queues:** Introduction-Operation-circular Queues-Other Types of Queues-Application

Unit II **(18 hours)**

Linked Lists: Introduction-Singly Linked Lists-Circularly Linked List-Doubly Linked List-Multiply Linked List-Application. **Linked Stacks and Linked Queues:** Introduction-Operation on Linked Stacks and Linked Queues-Dynamic Memory Management and Linked Stacks-Implementation of Linked Representations-Applications. **Trees and Binary Tress:** Introduction-Trees: Definition and Basic Terminologies-Representation of Trees-Binary Tree Traversals-Threaded Binary Trees-Applications.

.**Unit III** **(15 hours)**

Graphs: Introduction-Definitions and Basic Terminologies-Representations of Graphs-Graph Traversals-Single-source & All pairs shortest paths problem- Minimum cost spanning trees. **Binary Search Trees and AVL Trees:** introduction-Binary Search Trees: Definition and Operations-AVL Trees: Definition and Operations-Applications.

Unit IV **(15 hours)**

B Trees and Tries: Introduction to m-way search Trees: Definition and Operations-B Trees: Definition and Operations-Tries: Definition and Operations-Applications. **Red-Black Trees and Splay Trees:** Red-Black Trees-Splay Trees-Applications. **Hash Tables:** Introduction-Hash Table Structure-Hash Functions-Linear Open Addressing-Chaining-Applications.

Unit V **(15 hours)**

Searching: Introduction-Linear Search- Transpose Sequential Search-Interpolation Search- Binary Search-Fibonacci Search-Other Search Techniques. **Internal Sorting:** Introduction-Bubble Sort-Insertion Sort-Selection Sort0-Merge Sort-Shell Sort-Quick Sort-Heap Sort-Radix Sort. **External**

MX ACADEMIC COUNCIL

Sorting: Introduction-External Storage Devices- Sorting with Tapes: Balanced Merge-Sorting with Disks :Balanced Merge-Polyphase Merge sort-Cascade Merge Sort.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the concepts of data structures and its classification, Linked lists, Graphs and B Trees

CO2: Apply data structures and its algorithms in real time applications

CO3: Analyze the efficiency of graphs and searching algorithms

CO4: Compare different sorting algorithms

CO5: Develop different algorithm design techniques

Text Books:

1. Kent D. Lee, Steve Hubbard, *Data Structures and Algorithms with Python*, Springer International
2. Publishing Switzerland, 2015.
3. G A Vijayalakshmi Pai, *Data structures and Algorithms, Concepts, Techniques and Application*,Tata McGraw Hill Education Private Limited,New Delhi, 2008

Reference Books:

1. Ellis Horowitz, Sartaj Sahni, *Fundamentals of Data Structures*, Galgotia Book Source, Second Edition, 2004
2. Alfred V.Aho Johne, Hopcroft, *Data Structures and Algorithm*, Addison-Wesley, Third Edition,2012
3. Mark Allen Weiss, *Data Structures and Algorithm Analysis in C++*, Pearson Education,Fourth Edition, 2014

E-Resources:

1. http://www.dave-reed.com/csc427.F04/
2. http://www.math.tau.ac.il/~matias/ds03.html
3. https://onlinecourses.nptel.ac.in/noc20_cs70/preview
4. https://www.tutorialspoint.com/python_data_structure/python_data_structure_tutorial.pdf
5. https://nptel.ac.in/courses/106/106/106106145/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	3	9	**29**
CO2	9	3	1	1	3	3	9	**29**
CO3	9	3	1	1	3	3	9	**29**
CO4	9	3	3	3	3	3	9	**33**
CO5	9	3	3	3	3	3	9	**33**
Total	**45**	**15**	**9**	**9**	**15**	**15**	**45**	**153**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core VII- Cryptography and Network Security

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 6**
Subject Code: HMITC231 **Credit: 5**

Course Objectives:

1. To understand the basics of Cryptography and Network Security and secure a message over insecure channel by various means
2. To learn about how to maintain the Confidentiality, Integrity and Availability of data and various protocols for network security to protect against the threats in the networks

Unit I **(18 hours)**

Computer and Network Security concept: Computer security concepts-The OSI security Architecture-Security Attacks- Security Services-Security Mechanisms. **Number Theory:** The Euclidean Algorithm-Modular Arithmetic - Fermat's Euler's Theorem.

Unit II **(18 hours)**

Symmetric Ciphers: Classical Encryption Techniques: Symmetric Chippers Model- Substitution Techniques-Transposition Techniques-Traditional Block Cipher Structure. **Finite Fields:** Groups-Rings-Fields-Finite Fields of the FormGF(p).

Unit III **(18 hours)**

Advanced Encryption Standard: Finite Field Arithmetic-AES Structure -AES Key Expansion. **Asymmetric Ciphers:** The RSA Algorithm.

Unit IV **(18 hours)**

Other Public-Key Cryptosystem: Diffie-Hellman Key Exchange-Elgamal cryptographic system-Elliptic curve Cryptography. **Digital Signature:** Digital signature - Elgamal Digital Signature Scheme-Schnorr Digital Scheme-NIST Digital signature algorithm.

Unit V **(18 hours)**

Wireless Network Security: Wireless Security-Mobile Device Security- IEEE802.11 Wireless LAN Security. **Electronic Mail Security:** Internet Mail Architecture-Email Formats-Email Threats and compressive Email Security-S/MIME -Domain Keys Identify Mail.

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Define various Cryptographic Techniques
CO2: Demonstrate various data encryption techniques
CO3: Explain the encryption standard and asymmetric ciphers

KAA ACADEMIC COUNCIL

CO4: Analyze Hashing and Digital Signature techniques
CO5: Discuss various Security Applications

Text Book:
1. William Stallings, *Cryptography and Network Security Principles and Practice*, Pearson Education, Seventh Edition, 2017.

Reference Books:
1. Wade Trappe, Lawrence C Washington, *Introduction to Cryptography with Coding Theory*, Pearson Education, Second Edition, 2007.
2. William Stallings, *Cryptography and Network security Principles and Practices*, Pearson Education, Fourth Edition, 2006.
3. W.Mao, *Modern Cryptography – Theory and Practice*, Pearson Education, Second Edition, 2007.

E- Resource:
1. https://nptel.ac.in/courses/106/105/106105162/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	**45**
CO2	9	9	3	9	9	3	9	**51**
CO3	3	9	3	9	9	3	9	**45**
CO4	9	9	3	3	9	3	9	**45**
CO5	9	9	3	9	9	3	9	**51**
Total	**39**	**45**	**15**	**33**	**45**	**15**	**45**	**237**

Low-1 Medium-3 High-9

Core VIII - Advanced Java Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 6**
Subject Code: HMITC24P **Credit: 5**

Course Objectives:
1. To apply the concept of RMI to invoke Client/Server Communication and AWT, Swing to design and develop GUI applications
2. To build dynamic web applications using JSP, Servlet and Java Data Base Connectivity (JDBC)

XX ACADEMIC COUNCIL

List of Programs

Networking

1. Develop a program to do one and two way communication(s)
2. Develop a program to implement TCP Socket

Swing

3. Develop a program to display current date & time in different format
4. Develop a program to set a foreground and background color for label
5. Develop a program to create simple calculator

Bean

6. Develop a program to create a button
7. Develop a program to create text box which accepts only characters
8. Develop a program to create text box which accepts only integer value

JDBC

9. Develop a program to prepare a student's details with Roll-No, Name, Mark1, Mark2, Mark3, Total, Average and Grade to perform insert, update, delete and display of student information
10. Develop a program to prepare an Electricity Bill to perform insert, update, delete and display Electricity bill of a particular user

RMI

11. Develop a program to display a string message
12. Develop a program to perform arithmetic operations
13. Develop a program to find factorial value of a number
14. Develop a program to generate Fibonacci series

SERVLET

15. Develop a program to create a Servlet to display Simple Message
16. Develop a program to create a Servlet that uses cookies to store the number of times a user has visited the servlet
17. Develop a program to create a Servlet to generate Random Numbers
18. Develop a program to create a Servlet that prints today's date
19. Develop a program to create Servlet for login page, if the username and password is correct then prints message "Hello username" else "login failed"
20. Develop a program to create Student Information System to view the details of the Students

JSP

21. Develop a program to create a JSP that prints hello world
22. Develop a program to create a JSP that prints current date and time
23. Develop a program to create a JSP that add and subtract two numbers.
24. Develop a program to design a JSP Program to implement verification of a particular user login and display a welcome page
25. Develop a program to design and implement a JAVA JSP Program to get student information and display the same information through Servlet

Note: - Questions for the internal / external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

AAC ACADEMIC COUNCIL

CO1: Demonstrate the concepts such as client/ server, socket and RMI to implement Java code
CO2: Apply an event handling using swing components
CO3: Illustrate the concept of Java bean in Java program
CO4: Discover the database access through Java code using JDBC connectivity
CO5: Create dynamic web pages using Servlet and JSP

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	3	9	**29**
CO2	9	3	1	1	3	3	9	**29**
CO3	9	3	1	1	3	3	9	**29**
CO4	9	3	3	3	3	3	9	**33**
CO5	9	3	3	3	3	3	9	**33**
Total	**45**	**15**	**9**	**9**	**15**	**15**	**45**	**153**

Low-1 Medium-3 High-9

DSE II - b) Mobile Communications

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 6**
Subject Code: HMITE2B **Credit: 5**

Course Objectives:

1. To define mobile technologies in terms of hardware, software, and communications and describe existing mobile computing frameworks and architectures
2. To evaluate the effectiveness of different mobile computing frameworks and describe how mobile technology functions to enable other computing technologies

Unit I **(18 hours)**

Introduction: Mobile Computing- Middleware and Gateways-Developing Mobile Computing Applications- Security in Mobile Computing – Architecture of Mobile Computing-Three-Tier Architecture-Design Consideration for Mobile Computing-Mobile Computing through Internet-Mobile Computing through Telephone-Developing an IVR Applications.

Unit II **(18 hours)**

Bluetooth and GSM: Bluetooth- Features and working of RFID -Wireless Broadband (WiMAX) - Mobile IP – IPV6- IPV4 Vs IPV6 –Global System for Mobile Communications – GSM Architecture – Call Routing in GSM – GSM Addresses and Identifiers – Network Aspects in

KAC ACADEMIC COUNCIL

GSM – GSM Frequency Allocation – Authentication and Security- Mobile Computing Over SMS – SMS- Value Added Services through SMS**.**

Unit III **(18 hours)**

GPRS, 3G and 4G Networks: GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in GPRS- Applications for GPRS – Limitations of GPRS- Spread Spectrum Technology- CDMA Versus GSM – Features of 3G Networks – Architecture of 3G- Applications of 3G - Features of 4G- Architecture of 4G - Wireless Technologies Used in 4G- Merits and Demerits of 4G.

Unit IV **(18 hours)**

Mobile Ad-hoc Networks: Mobile Ad-Hoc Basic Concepts-Characteristics- Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc Networks (VANET) – MANET Vs VANET – Security of VANET and MANET - **Open Source Tools for Mobile Testing:** Appium - Katalon Studio – Monkey Talk – IOS Driver – Robotium – Calabash.

Unit V **(18 hours)**

Overview of Kotlin- Installation of Android Studio – Getting started with Hello World app- Creating a Registration form- Adding Radio Buttons- Adding spinner and Image- Creating a search App-URL request-Display Search Result-Playing video using YouTube API.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the principles of mobile technologies like GPRS, GSM, CDMA and TDMA and the concepts of Bluetooth and GSM, Mobile Ad-hoc networks

CO2: Apply the features of Android programming for developing Android Applications

CO3: Analyze technology of 1G, 2G, 3G and 4G for gaining the working knowledge of four generation Wireless technologies and Analyze the architecture, merits and demerits of Wireless technologies like Infra-Red, blue tooth, Wi-Fi, RFID and Wi-Max

CO4: Compare the characteristics and techniques MANET with VANET

CO5: Derive wireless communication systems with 3G and 4G technologies.

Text Books:

1. Asoke K. Talukder, Hasan Ahmed, Roopa R Yavagal. *Mobile Computing: Technology, Applications, And Service Creation*, Tata McGraw Hill, 2017.
2. Stefano Basagni , Marco Conti , Silvia Giordano , Ivan IvanStojmenovic, *Mobile AdHoc Networking, Cutting Edge Directions*, Wiley Publications, 2015.

Reference Books:

1. Sunilkumar S. Manvi, Mahabaleshwar S. Kakkasageri, *Wireless and Mobile Networks, Concepts and Protocols*, Wiley Publications, 2016.
2. James C.Sheusi, *Android Application Development for Java programmers*, Cengage Learning, 2013.
3. Peter Spath, *Learn Kotlin for Android Development*, APress Publications, 2019.

ACADEMIC COUNCIL

4. Charles E.Perkins, *Ad Hoc Networking*, Addison-Wesley Publications, 2008.

E-Resources:

1. www.cse.iitk.ac.in/users/rkg/Talks/mobile_main.pdf
2. pl.cs.jhu.edu/oose/resources/android/Android-Tutorial.pdf
3. SWAYAM: https://swayam.gov.in/nd1_noc19_ee48/preview
4. SWAYAM: https://onlinecourses.swayam2.ac.in/aic20_sp02/preview
5. http://172.16.25.76/course/view.php?id=2224

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	9	9	**55**
CO2	9	9	9	1	9	9	9	**55**
CO3	9	9	9	1	9	9	9	**55**
CO4	9	9	9	1	9	9	9	**55**
CO5	9	9	9	1	9	9	9	**55**
Total	**45**	**45**	**45**	**5**	**45**	**45**	**45**	**275**

Low-1 Medium-3 High-9

Extra Credit II - Internship

(For Students Admitted from 2024-25)

Semester: II
Subject Code: HMITX2P **Credit: 2**

Course Objectives:

1. To articulate and apply principles learned in and outside of the classroom to a specific internship site experience
2. To get the practical knowledge to apply programming skills for developing a project

Students have to undergo an internship in an industry and submit report prepared by them about the internship programme.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Understand self-understanding, self-confidence, and interpersonal skills
CO2: Assess Strengths, Weaknesses, Opportunities and Threats (SWOT) and explore career options and gain general work experience
CO3: Examine any specific learning outcomes identified in supplemental documentation provided as part of the internship application process

VK ACADEMIC COUNCIL

CO4: Apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization

CO5: Create the document which contains company profile by compiling the brief history, management structure, products / services offered, key achievements and market performance for organization of internship

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	3	9	**39**
CO2	9	3	3	9	1	1	9	**35**
CO3	3	3	3	9	1	1	9	**29**
CO4	9	1	3	9	1	1	9	**33**
CO5	9	3	1	9	1	3	9	**35**
Total	**39**	**13**	**13**	**45**	**7**	**9**	**45**	**171**

Low-1 Medium-3 High-9

Core IX - Software Project Management

(For Students Admitted from 2024-25)

Semester:III **Hours/week: 6**
Subject Code: HMITC311 **Credit: 5**

Course Objectives:

1. To identify the different project contexts and suggest an appropriate management strategy and key phases of project management
2. To determine an appropriate project management approach through an evaluation of the business context and scope of the project and role of professional ethics in successful software development

Unit I **(18 hours)**

Introduction to Software Project Management: Introduction – Software projects versus other types of project – Contract Management and Technical Project Management – Plans, Methods and Methodologies – Setting Objectives – Project Success and Failure – Management Control – Traditional versus Modern Project Management Practices. **Project Evaluation and Programme Management:** Project portfolio Management – Evaluation of Individual Projects – Programme Management – Strategic programme Management.

Unit II **(18 hours)**

An overview of Project Planning: Stepwise Project Planning - **Selection of an Appropriate Project Approach:** Build or Buy - Choosing Methodologies and Technologies - Software

XX ACADEMIC COUNCIL

Processes and Process Models - Choice of Process models - Structure versus speed of Delivery - Waterfall Model - The Spiral Model - Software Prototyping.

Unit III **(18 hours)**

Activity Planning: Objectives of Activity planning - Project schedules - Sequencing and Scheduling Activities - Network Planning models - Formulating a Network Model – The Forward Pass - The Backward Pass – Identifying the Critical path - Shortening the Project Duration – Identifying Critical Activities. **Risk Management:** Risk - Categories of Risk – Risk identification – Risk Planning – Evaluating Risks to the Schedule – Applying the PERT technique.

Unit IV **(18 hours)**

Monitoring and Control: Creating the Framework – Collecting the Data – Review – Project Termination Review - Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Change control - Software Configuration Management. **Managing Contracts:** Types of Contract - Stages in Contract Placement - Typical Terms of a Contract.

Unit V **(18 hours)**

Agile Technique: The Agile Business Case-Objectives-Adding Value with the Business Case-Business Value Models-Models for the Business Case-Project Balance Sheet-Communicating with the Project Balance Sheet Tool-Building the Business Case by Levels-Building the Level 0 Business Case- Building the Level 1 Business Case- Building the Level 2 Business Case.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Summarize Software Process Models

CO2: Illustrate the steps involved in Software Project Management and activity planning, Risk Management using case studies

CO3: Apply Software effort Estimation Methods

CO4: Evaluate Software Project Management Tools

CO5: Design the Agile techniques in Software Project Management

Text Books:

1. Bob Hughes, Mike Cotterell, Rajib Mall, *Software Project Management*, Tata McGraw Hill, Fifth Edition, 2012.
2. John C.Goodpasture, PMP, *Project Management the Agile Way*, Second Edition, 2016.

Reference Books:

1. Robert K.Wysocki, *Effective Software Project Management*, Wiley Publication, 2011.
2. Walker Royce, *Software Project Management*, Addison-Wesley, 1998.
3. Gopalaswamy Ramesh, *Managing Global Software Projects*, McGraw Hill Education, Fourteenth Reprint, 2013

EX ACADEMIC COUNCIL

E-Resources:

1. https://nptel.ac.in/courses/106/105/106105218/
2. https://onlinecourses.nptel.ac.in/noc19_cs70/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	9	9	**55**
CO2	9	9	9	1	9	9	9	**55**
CO3	9	9	9	1	9	9	9	**55**
CO4	9	9	9	1	9	9	9	**55**
CO5	9	9	9	1	9	9	9	**55**
Total	**45**	**45**	**45**	**5**	**45**	**45**	**45**	**275**

Low-1 Medium-3 High-9

Core X - Software Development Framework

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 6**
Subject Code: HMITC32 **Credit: 5**

Course Objectives:

1. To understand the code solutions and compile C# projects within the .NET Framework
2. To design and develop professional console and window based .NET Application

Unit I **(18 hours)**

The .NET Framework: .Net programming Framework-VB.NET,C#.NET and the .NET Languages-The Common Language Runtime-The .NET Class Library-ASP.NET-Visual Studio .NET. Learning the .NET Languages: The .NET Languages-Data Types-Declaring Variables-Scope and Accessibility-Variable Operations-Object-Based Manipulation-Conditional Structures-Loop Structures-Functions and Subroutines. Types, Objects and Namespaces: The Basics about classes – Value Types and Reference Types-Advanced Class Programming-Understanding Namespaces and Assemblies.

Unit II **(18 hours)**

ASP.NET APPLICATIONS: ASP.NET Applications-Code-Behind-The Global asax Application File-Understanding ASP.NET Classes-ASP.NET Configuration. Web Form Fundamentals: A Simple Page Applet-A Deeper Look at HTML Control Classes-The Page Class-Accessing HTML Server Controls. Web Controls Stepping Up to Web Controls-Web control Classes-Auto Post Back and Web Control Events.

AX ACADEMIC COUNCIL

Unit III **(18 hours)**

Using Visual Studio .NET: The promise of Visual Studio.NET-Starting a Visual Studio.Net Project – The Web form Designer-Writing Code-Visual Studio.NET Debugging-Working Without Visual Studio. NE Validation and Rich Controls: Validation-A simple Validation Example-Understanding Regular Expressions-A Validated Customer Form-Other Rich Controls State Management: The Problem of State-View state-Transferring Information-Custom Cookies-Session State.

Unit IV **(18 hours)**

Tracing, Logging and Error Handling: Common Errors-The .NET Exception Object-Handling exceptions-Throwing Your Own Exceptions-Logging Exceptions-Error Pages-Page Tracing. Overview of ADO.NET: Introducing ADO.NET and Data Management-Characteristics of ADO.Net-The ADO.NET Object Model. ADO.NET Data Access: About the ADO.NET Examples-SQL Basics-The SQL Select Statement-Update-Insert-Delete-Accessing Data the Easy Way-Creating a connection-Defining a Select Command-Using a Command with a Data Reader-Updating Data-Accessing Disconnected Data-Selecting Multiple Tables.

Unit V **(18 hours)**

Data Binding: Introduction-Single-Value Data Binding-Repeated-Value Data Binding-Data Binding with Databases. The Data List, Data Grid and Repeater: Introducing Templates-Using Templates with the Data List-Data Binding with Multiple Templates-Comparing the Template Controls-Selecting Items-Editing Items-Paging with the DataGrid-Sorting with the DataGrid Using XML: XML's Hidden Role in .NET-XML Explained- The XML Classes-XML Validation-XML Display and Transforms-XML in ADO.NET.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Interpret the basic concepts of .NET, Problem of the state, data, management, validation and Rich controls

CO2: Determine types, objects and namespaces, enumerators and iterators and error handling

CO3: Illustrate table controls, ASP.Net applications and the web server, interfaces and structures

CO4: Evaluate on Exception Handling, Serializing objects, Direct Data Access

CO5: Develop XML classes and XML Validation, web forms and use web controls

Text Book:

1. Matthew MacDonald, *The Complete Reference ASP.NET*, Tata McGraw Hill, 2017.

Reference Books:

1. Dino Esposito, *Programming Microsoft ASP.NET*, Tata McGraw Hill, 2003.
2. Chris Ullman , John Kauffman, Chris Hart, David Sussman, *Beginning ASP.Net 1.1 with VB.NET* , Wiley Publishing , First Edition, 2003.
3. Elliotte Rusty Harold, *XML 1.1 Bible*, Wesley Publications, Third Edition, 2004.

AC ACADEMIC COUNCIL

E-Resources:

1. https://nptel.ac.in/courses/106/104/106104220/#
2. https://nptel.ac.in/courses/110/105/110105033/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	3	9	**39**
CO2	9	3	3	9	1	1	9	**35**
CO3	3	3	3	9	1	1	9	**29**
CO4	9	1	3	9	1	1	9	**33**
CO5	9	3	1	9	1	3	9	**35**
Total	**39**	**13**	**13**	**45**	**7**	**9**	**45**	**171**

Low-1 Medium-3 High-9

Core XI – Data Mining and Warehousing

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 6 (T: 4 P: 2)**
Subject Code: HMITC33 **Credit: 5**

Course Objectives:

1. To Understand and implement classical models and algorithms in data warehouses and data mining
2. To understand data mining techniques in various applications like social, scientific and environmental context and develop skill in selecting the appropriate data mining algorithm for solving practical problems

Unit I **(12 hours)**

Data Mining: Data Mining-Kinds of Data-Kind of Patterns can be mined-Technologies used-Kinds of Application Targeted-Major Issues in Data Mining. **Data Preprocessing:** Data Cleaning-Data Integration -Data Reduction – Data Transformation and Data Discretization.

Unit II **(12 hours)**

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse: Basic Concepts-A Multidimensional Data Modeling: Data Cube and OLAP Data Warehouse Implementation. **Data Cube Technology:** Data Cube Computation: Preliminary Concepts- Data Cube Computation Methods-Mining Frequent Patterns-**Associations and Correlations:** Basic Concepts-Frequent Item set Mining Methods-Advanced Pattern Mining- Pattern Mining Multilevel, Multidimensional Space Various Kinds of Association Rules-From Association Mining to Correlation Analysis.

KX ACADEMIC COUNCIL

Unit III **(12 hours)**

Classification and Prediction: Issues Regarding Classification and Prediction-Classification by Decision Tree Induction-Bayesian Classification-Classification by Backpropagation–Support Vector Machines-Associative Classification: Classification by Association Rule Analysis-Other Classification Methods-Prediction- Accuracy and Error Measures.

Unit IV **(12 hours)**

Cluster Analysis: Basic Concepts, Methods and Advanced Cluster Analysis: Cluster Analysis-Types of data in Cluster Analysis-A Categorization of Major Clustering Methods-Partitioning Methods-Hierarchical Methods-Density based Methods-Grid based Methods-**Evaluation of Clustering-** Methods-Clustering high dimensional data-Clustering Graph and Network Data-Clustering with Constraints.

Unit V **(12 hours)**

Outlier Detection: Outlier and Outlier analysis-Outlier Detection Methods-Statistical Approaches-Proximity Based Approaches-Outlier Detection in high-Dimensional Data-**Data Mining Trends and Research Frontiers:** Mining Complex Data Types-Other Methodologies of Data Mining-Data Mining Applications-Data Mining Applications.

Course Outcomes:

After Successful completion of the course, student will be able to

CO1: Explore the Basic Concepts of Data Mining
CO2: Analyze the Classification algorithm and Error Prediction
CO3: Improve the knowledge about Types of Classification Methods in Data Mining
CO4: Determine the types of Data clustering methods and types of Data Mining
CO5: Evaluate Data Mining Application with Latest Trends

Text Book:

1. Jiawei Han, Micheline Kamber, *Data Mining: Concept and Technique***,** Morgan Kaufmann Publishers, Third Edition, 2013.

Reference Books:

1. Pieter Adriaans, Dolf Zantinge, *Data Mining*, Pearson Education, Ninth Indian Reprint, 2003.
2. Anand Rajaraman and Jeffrey David Ullman, *Mining of Massive Datasets*, Cambridge University Press, 2012.
3. Pete Warden, *Big Data Glossary***,** O'Reilly, 2011.

Journals:

1. ACM SIGKDD International Conference on Knowledge Discovery & Data Mining
2. ACM International Conference on Web Search and Data Mining

E-Resources:

1. https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing
2. https://onlinecourses.nptel.ac.in/noc21_cs06/preview

KSG ACADEMIC COUNCIL

Data Mining and Warehousing (Lab)

Hours/week: 2

List of Programs:

1. Implementation of measures of proximity
2. Demonstration of pre-processing on dataset student.arff
3. Demonstration of pre-processing on dataset labor.arff
4. Demonstration of Association rule process on dataset contact lenses.arff using apriori algorithm
5. Develop Association rule process on dataset test.arff using apriori algorithm
6. Implement classification rule process on dataset student.arff using j48 Algorithm
7. Implement classification rule process on dataset empl.arff using Decision Trees classifier
8. Implement classification rule process on dataset student.arff using Naïve Bayesian modelling.
9. Demonstration of clustering rule process on dataset iris.arff using simple k-means algorithm
10. Demonstration of clustering rule process on dataset student.arff using simple k means algorithm

Note: - Questions for the internal examination will be based on the concepts learnt

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	9	1	1	**27**
CO2	9	3	3	9	3	9	3	**39**
CO3	9	3	9	3	3	1	1	**29**
CO4	9	1	9	9	9	1	3	**41**
CO5	9	3	9	9	1	9	9	**49**
Total	**45**	**11**	**33**	**33**	**25**	**21**	**17**	**185**

Low-1 Medium-3 High-9

Core XII - Software Development Framework Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 6**
Subject Code: HMITC34P **Credit: 5**

Course Objectives:

1. To know about .Net IDE Component Framework
2. To know Programming concepts in .Net Framework and create website using ASP.Net Controls

List of Programs

Console Application

1. Calculate the area of a floor given its length and width
2. Calculate the factorial of a number N, assuming the number is more than zero
3. Check the given numbers (prime, perfect, Armstrong etc.)

KAACADEMIC COUNCIL

4. Generate the numbers (prime, perfect, Armstrong etc.)
5. Calculate age for a person using properties
6. Sort a given list of numbers and find out the average of a list of numbers.
7. Display how many days are in a given month(check for leap years also)
8. Demonstrate Events, Delegates, and Interfaces

Windows Application

9. Build a simple calculator
10. Calculate the arithmetic operations using functions
11. Do String manipulation
12. Write a function that will return a approximate count of the number of words in a string
13. Create notepad
14. Create a greeting card generator

Web Application

15. Design an E-mail application form using standard controls and store these details in SQL tables
16. Create a login page and personal webpage. Enter the username and password in the login page. If the username and password are correct, the personal web page should be loaded otherwise the error page should be loaded
17. Create a student details form and validate the details using validation controls
18. Display employee details using data grid control
19. Display an Electricity bill using data list control
20. Display employee details using repeater control

Note: - Questions for the external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Build console applications
CO2: Perform Windows and web Applications
CO3: Demonstrate validation controls in web form
CO4: Illustrate Data Grid control to database in Web application
CO5: Compose Data Repeater and Datalist Controls

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	3	9	**39**
CO2	9	3	3	9	1	1	9	**35**
CO3	3	3	3	9	1	1	9	**29**
CO4	9	1	3	9	1	1	9	**33**
CO5	9	3	1	9	1	3	9	**35**
Total	**39**	**13**	**13**	**45**	**7**	**9**	**45**	**171**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

DSE III - b) Compiler Design

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 6**
Subject Code: HMITE3B **Credit: 5**

Course Objectives:

1. To understand the basic principles of compiler design.
2. To acquire the knowledge of various constituent parts, algorithms and data structures required to be used in the compiler

Unit I **(18 hours)**

Introduction – The structure of a compiler –Evolution of programming languages-Applications of compiler technology-**A Simple Syntax Directed Translator**: Syntax definition-syntax-directed translation.

Unit II **(18 hours)**

Parsing-Lexical Analysis-Symbol Tables-**Lexical Analysis**: The role of the lexical analyser-Input Buffering- Specification of Tokens-Recognition of tokens-The lexical analyser generator Lex-Finite Automata.

Unit III **(18 hours)**

Design of lexical analyser generator: DFA for lexical analyser - Important states of an NFA - Converting a regular expression directly to a DFA-Minimizing the number of states of a DFA-**Syntax Analysis:** Syntax error handling-error recovery strategies-Context free grammars-**Top down parsing**: FIRST and FOLLOW –LL(1) Grammars-Bottom Up Parsing.

Unit IV **(18 hours)**

LR Parsing, More Powerful LR Parsers-Using Ambiguous Grammars-Parser Generators-Syntax-**Directed Translation**: Evaluation orders for SDD's –application of SDT-Syntax Directed Translation Schemes- **Intermediate Code Generation**: Variants of Syntax Trees-Three address code.

Unit V **(18 hours)**

Run time environment: Heap Management- **Code Generation**: The target language-Address in the Target Code-A Simple code generator-Peephole Optimization-Optimal Code generation for Expression-Dynamic Programming code-Generation-**Machine-Independent Optimization:** Semantics preserving Transformations-Copy Propagation-Dead –Code Elimination-Code Motion.

Course Outcome:

After successful completion of this course, student will be able to

CO1: Define common forms of parsers

XX ACADEMIC COUNCIL

CO2: Illustrate compiler construction tools and describes the Functionality of each stage of compilation process
CO3: Construct Grammars for Natural Languages and find the Syntactical errors/Semantic errors during the compilations using parsing techniques
CO4: Analyze different representations of intermediate code
CO5: Design to construct new compiler for new languages

Text Book:

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman, *Compiler Principles, Techniques & Tools*, Pearson Addison Wesley, Second Edition, 2007.

Reference Books:

1. Alfred V. Aho, Jeffrey D. Ullman, *Principles of Compiler Design*, Pearson Education, 2001.
2. Kenneth C. Louden, *Compiler Construction– Principles and Practice*, PWS Publishing, First Edition, 1997.
3. K.L.P Mishra, N. Chandrashekaran , *Theory of Computer Science- Automata Languages and Computation*, Prentice Hall of India, Second Edition, 2003.
4. Andrew W. Appel, *Modern Compiler Implementation C*, Cambridge University Press, 2004.

E- Resources:

1. https://www.geeksforgeeks.org/compiler-design-tutorials/
2. https://nptel.ac.in/courses/106/108/106108113/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	9	9	9	9	**57**
CO2	9	3	3	3	3	3	3	**27**
CO3	9	9	3	3	3	9	3	**39**
CO4	9	3	3	3	3	9	3	**33**
CO5	3	3	3	3	3	3	3	**21**
Total	**39**	**27**	**15**	**21**	**21**	**33**	**21**	**177**

Low-1 Medium-3 High-9

Core XIII – Cloud and Distributed Computing

(For Students Admitted from 2024-25)

Semester: IV **Hours/Week: 6**
Subject code: HMITC41 **Credit: 5**

Course Objectives:

1. To impart the complete understanding of cloud, virtualization and distributed clouds
2. To enhance the students to understand the significance of cloud storage, identity and access management

XX ACADEMIC COUNCIL

Unit I **(18 hours)**

Introduction to Cloud, Virtualization, and Virtual Machine: Introduction to Cloud Computing - Features of Today's Cloud - Introduction to Virtualization - Mitigation Techniques for VM Migration

Network Virtualization and Geo-Distributed Clouds: Introduction - Cloud Computing and Server Virtualization - Networking of Virtual Machines Inside the Hypervisor – Docker - Software-Defined Network - Network Virtualization in Multi-Tenant Data Centers: VL2 - Network Virtualization in Multi-Tenant Data Centers: NVP - Geo-Distributed Cloud Data Centers.

Unit II **(18 hours)**

Leader Election in Cloud, Distributed Systems, and Industry Systems: Introduction - Leader Election in Rings (Classical Distributed Algorithms) - Ring Leader Election and Bully Leader Election Algorithms - Classical Algorithm: Ring Election Algorithm - Classical Algorithm: Bully Election - Industry Systems: Google Chubby and Apache ZooKeeper - Design of ZooKeeper

Cloud-Native Computing: Introduction – Micro services – Docker – Kubernetes - Introduction to Edge Computing - Classification of Edge Computing.

Unit III **(18 hours)**

Cloud Asset Management and Protection: Differences from Traditional IT - Types of Cloud Assets - Compute Assets - Storage Assets - Network Assets - Asset Management Pipeline - Procurement Leaks - Processing Leaks - Tooling Leaks - Findings Leaks - Tagging Cloud Assets

Software-Defined Networking and Network Function Virtualization: Introduction - Software-Defined Networking - Applications and Use Cases - Software-Defined NFV - Network Slicing - Ongoing Research Opportunities.

Unit IV **(18 hours)**

Cloud Storage: Key-Value Stores/NoSQL Stores and HBase: Design of Key-Value Stores - Design of HBase-**Identity and Access Management:** Differences from Traditional IT - Life Cycle for Identity and Access-Request -Approve - Create, Delete, Grant, or Revoke - Authentication - Cloud IAM Identities-Business-to-Consumer and Business -to-Employee-Multi-Factor Authentication - Passwords and API Keys - Shared IDs - Federated Identity - Single Sign-On - Instance Metadata and Identity Documents-Secrets Management-Authorization- Centralized Authorization - Roles - Revalidate - Putting It All Together in the Sample Application.

Unit V **(18 hours)**

Classical Distributed Algorithms and the Industry Systems: Introduction - Time and Clock Synchronization in Cloud Data Center - Key Challenges - Clock Synchronization - Algorithms for Recording Global State and Snapshot - Mutual Exclusion Algorithms for Distributed Systems-

Cloud Applications: MapReduce, Spark, and Apache Kafka -MapReduce -Spark- Kafka.

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Identify the features of Cloud Computing and Virtualization

XAVIER ACADEMIC COUNCIL

CO2: Demonstrate the leader election and cloud native computing
CO3: Classify types of cloud assets, software-defined networking and network function virtualization
CO4: Justify cloud storage, Identity and Access Management
CO5: Generate the Classical Distributed Algorithms, the Industry Systems and Cloud applications

Text Books:

1. Rajiv Misra, Yashwant Singh Patel, *Cloud and Distributed Computing: Algorithms and Systems*, Wiley Emerging Technology Series, Wiley India Private Limited, 2020.
2. Chris Dotson, *Practical Cloud Security: A Guide for Secure Design and Deployment*, O'Reilly Media, First Edition, 2019.

Reference Books:

1. Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi, *Mastering Cloud Computing*, Tata McGraw Hill, 2017.
2. Rajkumar Buyya, James Broberg, Andrzej Goscinski, *Cloud Computing Principles and Paradigms*, John Wiley & Sons Limited ,2011.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, *Cloud Computing-A Practical Approach*, Tata McGraw Hill, 2010.

E - Resources:

1. https://nptel.ac.in/courses/106/104/106104182/
2. https://www.amazon.in/Cloud-Distributed-Computing-Algorithms-Systems/dp/8126520272?asin=B086V7Q2KW&revisionId=&format=4&depth=1

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	9	3	1	9	**35**
CO2	9	1	9	9	3	1	33	**35**
CO3	9	3	3	9	3	1	9	**37**
CO4	3	9	9	9	9	3	9	**51**
CO5	3	9	9	9	9	3	9	**51**
Total	**33**	**23**	**33**	**45**	**27**	**9**	**39**	**209**

Low-1 Medium-3 High-9

Core XIV – Machine Learning

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 6**
Subject Code: HMITC42 **Credit: 5**

Course Objectives:

1. To know the characteristics of machine learning and machine learning algorithms
2. To understand the concept behind neural networks for learning non-linear functions

XX ACADEMIC COUNCIL

Unit I **(18 hours)**

Introduction: Well-Posed Learning Problems-Designing a Learning System-Perspectives and Issues in Machine Learning. Concept Learning: Introduction-A Concept Learning Task-Concept Learning as Search. **Decision Tree Learning:** Introduction-Decision Tree Representation-Appropriate Problems-Basic Decision Tree Learning Algorithm-Hypothesis Space Search-Inductive Bias-Issues.

Unit II **(18 hours)**

Artificial Neural Networks: Introduction-Neural Network Representations-Appropriate Problems-Perceptrons - Multilayer Networks and the Back Propagation Algorithm-An **Illustrative Example:** Face Recognition-Advanced Topics.

Unit III **(18 hours)**

Bayesian Learning: Introduction-Bayes Theorem-- Bayes Theorem and Concept Learning – Maximum Likelihood and Least-squared Error Hypotheses- Maximum Likelihood Hypothesis for Predicting Probabilities-Minimum Description Length Principle-Bayes Optimal Classifier-Gibbs Algorithm-Naïve Bayes Classifier-An Example: Learning to Classify Text-Bayesian Belief Networks-The EM Algorithm.

Unit IV **(18 hours)**

Instance-Based Learning: Introduction-K-Nearest Neighbor Learning-Locally Weighted Regression-Radial Basis Functions-Case-based Reasoning. **Genetic Algorithms:** Genetic Algorithms-An Illustrative Example-Hypothesis Space Search-Genetic programming-Models of Evolution and Learning-Parallelizing Genetic Algorithms.

Unit V **(18 hours)**

Learning Sets of Rules: Introduction-Sequential Covering Algorithms-Learning Rule Sets: Summary- Learning First-Order Rules-Learning Sets of First-Order Rules: FOIL - Induction as Inverted Deduction-Inverting Resolution. **Reinforcement Learning:** Introduction- Learning Task-Q Learning-Nondeterministic Rewards and Actions-Temporal Difference Learning-Generalizing from Examples-Relationship to Dynamic Programming.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Understand the need for machine learning for various problem solving

CO2: Demonstrate Decision Tree Learning Algorithm, Back propagation algorithm, Gibbs Algorithm, K-Nearest Neighbor Learning and Temporal Difference Learning with examples

CO3: Categorize the various supervised, semi-supervised and unsupervised learning algorithms in machine learning

CO4: Apply different classification techniques in real time examples

CO5: Design appropriate machine learning algorithms for different problems

VACADEMIC COUNCIL

Text Book:

1. Tom M. Mitchell, Machine Learning, Tata McGraw Hill, 2017

Reference Books:

1.Jeremy Watt, Reza Borhani, Aggelos K Katsaggelos, *Machine Learning Refined Foundations, Algorithms,& Applications*, Cambridge University Press, 2016
2. Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press Cambridge, 2010
3. Andreas C. Muller, Sarah Guido, *Introduction to Machine Learning with Python*, O'Reilly Media, First Edition, 2016

E-Resources:

1. NPTEL: https://nptel.ac.in/courses/106/106/106106139/
2. NPTEL: https://onlinecourses.nptel.ac.in/noc22_cs58/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	1	9	9	**43**
CO2	9	1	9	3	1	9	9	**41**
CO3	9	1	9	3	1	9	9	**41**
CO4	9	1	9	3	1	9	9	**41**
CO5	9	3	9	3	1	9	9	**43**
Total	**45**	**9**	**45**	**15**	**5**	**45**	**45**	**209**

Low-1 Medium-3 High-9

Core XV - Project

(For Students Admitted from 2024-25)

Semester: IV **Hours/Week: 18**
Subject Code: HMITC43PW **Credits: 5**

Course Objectives:

1. To understand the fundamental principles of Project management and be familiar with the different methods and techniques used for project development
2. To get good knowledge of the issues and challenges faced while doing the project and to do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques

Students have to undergo an individual project work either on campus or in an industry and appear for the viva voce examination with the software developed and document prepared by them

XXA ACADEMIC COUNCIL

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Identify goals, constraints, deliverables, performance criteria and resource requirements in consultation with stakeholders

CO2: Implement the plan by executing the code

CO3: Integrate the various aspects of software development for the total project

CO4: Construct the entire software project according to the specific problem

CO5: Check the software project by executing with the various data

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	9	9	3	9	**57**
CO2	9	3	9	3	9	9	9	**51**
CO3	9	3	9	9	9	9	9	**57**
CO4	9	3	9	9	9	9	9	**57**
CO5	9	9	9	9	9	9	9	**45**
Total	**45**	**27**	**45**	**39**	**45**	**39**	**45**	**285**

Low-1 Medium-3 High-9

Extra Credit IV – Document Preparation Lab (LATEX)

(For Students Admitted from 2024-25)

Semester: IV

Subject Code: HMITX4P **Credit: 2**

Course Objectives:

1. To get practical knowledge on preparing documents containing mathematical formulas
2. To prepare a technical and scientific documentation

List of Programs

1. Create a document using an input file
2. Create a document using special symbols, dashes, line breaks & footnotes
3. Create a document using the sectioning command
4. Create a document using quotations, typestyle, commands & environments
5. Create a document using the mathematical symbol
6. Create a document using arrays and table
7. Create a document using a bibliography
8. Create a document using clauses and page style
9. Create a document using pictures and colors
10. Create a document using basics of the math index
11. Create a document using fine print and bibliography database

AC ACADEMIC COUNCIL

12. Create a document using math mode, tabbing environment, and files

Note: - Questions for the External examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Identify bibliography database
CO2: Relate math mode, and fine print
CO3: Apply mathematical symbol to create the document
CO4: Select clauses, typestyle, commands, and page style
CO5: Create latex documents

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low-1 Medium-3 High-9

M Sc Computer Science

(Two Years Regular Programme)

(For Students Admitted from 2024-25)

Program Specific Outcomes (PSO):

On Completion of this programme, the student will be able to

PSO1: Enrich the knowledge in the areas like Artificial Intelligence, Cloud Computing, Software Project Management, Machine Learning and core computing subjects

PSO2: Apply programming and technical skills to solve real life complex problems and hence enhance employability

PSO3: Design solutions for complex problems and design processes that meet the specific needs of the society

PSO4: Apply the knowledge of latest trends to carryout research & development in modern computing environment

PSO5: Apply learned skills to build optimized solution to latest technologies

PSO6: Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team

PSO7: Engage in life-long learning, to remain up-to-date in their profession and obtain additional qualifications to enhance their career positions in IT industries

KAU ACADEMIC COUNCIL

Preamble
Core Papers

- New syllabus has been framed for Big Data Analytics, Data Structures and Algorithms
- Software Project Management and Cryptography and Network Security syllabus has been modified

PROGRAMME STRUCTURE - PROGRAMME CODE: PCS

Sem	Subject Code	Course	Subject Title	Hours / week	Credit	CIA	ESE	Total Marks
I	IMCSC11	Core I	#Advanced Java	6	5	25	75	100
	IMCSC12	Core II	Internet of Things	6	5	25	75	100
	IMCSC13	Core III	Compiler Design	6	5	25	75	100
	IMCSC14P	Core IV	Advanced Java Lab	6	5	25	75	100
	IMCSE1A/ IMCSE1B	DSE I	a. Open Source Technologies b. Optimization Techniques	6 (T-4 P-2)	5	25 (T-15 P-10)	75	100
	IMCSX1P/ IMCSX1O	Extra Credit I	RDBMS Lab / * Online Course	-	2	-	100	100
			Total	**30**	**25+2**	**125**	**375+ 100**	**500+ 100**
II	IMCSC211	Core V	**Big Data Analytics**	6	5	25	75	100
	IMCSC221	Core VI	○ **Data Structures and Algorithms**	6	5	25	75	100
	IMCSC23	Core VII	Cloud and Distributed	6	5	25	75	100

XX ACADEMIC COUNCIL

			Computing					
	IMCSC24P	Core VIII	Data Structures and Algorithms using Python Lab	6	5	25	75	100
	IMCSE2A/ IMCSE2B	DSE II	a. Artificial Intelligence b. Mobile Computing	6	5	25	75	100
	IMCSX2P/ IMCSX2O	Extra Credit II	#Internship / *Online Course	-	2	-	100	100
			Total	**30**	**25+2**	**125**	**375+ 100**	**500+ 100**
III	IMCSC311	Core IX	**Software Project Management**	6	5	25	75	100
	IMCSC32	Core X	Digital Image Processing	6	5	25	75	100
	IMCSC33	Core XI	Web Technology	6 (T-4 P-2)	5	25 (T-15 P-10)	75	100
	IMCSC34P	Core XII	Image Processing Lab	6	5	25	75	100
	IMCSE3A/ IMCSE3B	DSE III	a. Theory of Computation b. Data Mining and Warehousing	6	5	25	75	100
	IMCSX3/ IMCSX3O	Extra Credit III	Employability Skills / * Online Course	-	2	100	-	100
			Total	**30**	**25+2**	**125 +100**	**375**	**500+ 100**

XV ACADEMIC COUNCIL

IV	IMCSC411	Core XIII	**Cryptography and Network Security**	6	5	25	75	100
	IMCSC42	Core XIV	○ Machine Learning	6	5	25	75	100
	IMCSC43PW	Core XV	Project	18	5	100	100	200
	IMCSX4P/ IMCSX4O	Extra Credit IV	Document Preparation Lab (LATEX) / *Online Course	-	2	-	100	100
			Total	**30**	**15+2**	**150**	**250+ 100**	**400+ 100**
			Grand Total	**120**	**90+8**	**525+ 100**	**1375 + 300**	**1900+ 400**

***For Online Course credit alone will be assigned on submission of certificate obtained by appearing for online examination from EdX, Spoken Tutorial, NPTEL or Coursera etc.

For internship course, refer www.internshala.com or any online internship course

○ For online course integration, syllabus will be taken from spoken tutorial, , swayam, edx, Udemy, coursera

DSE - Discipline Specific Elective

Core I - Advanced Java

(For Students Admitted from 2024-25)

Semester: I **Hours/ Week: 6**

Subject code: IMCSC11 **Credit: 5**

Course Objectives:

1. To learn networking and remote method invocation using Java API and Java Bean to increase the ability of students in web application development
2. To develop programming knowledge to create dynamic web applications using server side technology with Java database connectivity

MX ACADEMIC COUNCIL

Unit I **(18 hours)**

JSP- JEEE- JSF- J2ME- Struts. **Networking with Java:** Basics of Networking - Sockets in Java - Client-Server in Networking - Proxy Servers - Internet Addressing - Domain Naming Service(DNS) - Inet4 Addresses and Inet6 Addresses - The URL Class - The URI Class - TCP/IP and Datagram - Java Net APIs – Inet Addresses - Inet Address Caching - Creating and Using Sockets - Creating TCP Clients and Servers - A Who is Example - Submitting an HTML Form from Java - Handling URL- Using URL Connection Objects - Working With Datagrams - Datagram Server and Client

Swing: The Java Foundation Classes - Swing- Heavyweight versus Lightweight Components- Swing Features- Graphics Programming Using Panes- Model View Controller Architecture- Working With Swing- Preparing to Create a Swing Applet- Understanding Root Panes, Layered Pane and Content Panes- Creating a Swing Applet and Application – Closing JFrame Windows.

Unit II **(18 hours)**

Understanding RMI: Remote Method Invocation (RMI) - Client/Server Architecture- Implementing RMI - Limitation of RMI, A Model RMI Transaction -Writing an RMI Server- Designing a Remote Interface- Implementing a Remote Interface- Passing Object in RMI- Implementing the Server's Main Method- Creating a Client Program- Compiling and Running the Example – Exporting with Unicast Remote Object

Working with Java Beans: What is Java Bean - Understanding Java Beans - Designing programs Using Java Beans - Creating Applets that Use Java Beans - Creating a Java Bean - Creating a Bean Manifest File and JAR File - Using a New Bean - Adding Controls to Beans - Giving a Bean Properties- Design Patterns for Properties- Simple Properties - Design Patterns for Events - Methods and Design Patterns - Giving a Bean Methods - Giving a Bean an Icon - The JavaBeans API.

Unit III **(18 hours)**

Talking to Database: JDBC- JDBC versus ODBC and Other APIs - Two- Tier and Three - Tier Models - Introducing SQL - The JDBC Package - Types of JDBC Drivers - Javasoft Framework- Driver Interface and Driver Manager Class - The Essential JDBC Program- Using a Prepared Statement Object- The Interactive SQL Tool- Using Tables- Defining a Table Model

JDBC in Action: Data Types and JDBC – Scrollable Result Sets - Batch Updates - Mapping Relational Data into Java Objects - Basic JDBC Types - Advanced JDBC data types.

Unit IV **(18 hours)**

Servlets: Architecture – Life cycle – First program – Client HTTP request – Server HTTP response – HTTP status code – Writing filters – Exception handling – Cookies handling – Session tracking – Database access – File uploading – Handling date – Servlets-page redirection – Sample program – Servlets-packaging.

Unit V **(18 hours)**

Java Server Pages: An Overview – Advantages of JSP – Architecture – JSP life cycle – JSP

AA ACADEMIC COUNCIL

comments – JSP syntax – Implicit objects – Control-flow statements – Client-Server JSP – Database access – Custom tags – Exception handling – JSP standard tag library.

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Explain the concepts of JSP, JEEE, JSF, J2ME, Struts, Swing, RMI, Java Bean and Servlet

CO2: Utilize the technique of swing and RMI to create various fields and invoke client/ server communication

CO3: Examine an implementation of networking with Java, RMI and Java Bean

CO4: Evaluate different types of JDBC drivers and connectivity

CO5: Design the web application using swing, servlet, JSP and database

Text Books:

1. DT Editorial Services, *Java 8 Programming Black Book*, Dreamtech Press, 2015.
2. B Prasanalakshmi *Advanced Java Programming*, CBS Publishers & Distributors d, 2015.

Reference Books:

1. Steven Holzner et al, *Java 2(JDK 5 Edition) Programming Black Book*, Dreamtech press, 2006.
2. Herbert Schildt, *Java: The Complete Reference*, Eleventh Edition, McGraw Hill, 2020.
3. James Gosling, David Holmes, Ken Arnold, *The Java Programming Language*, Addison-Wesley Professional, Fourth Edition, 2005.

E - Resources:

1. Advanced Java, https://www.youtube.com/watch?v=Ae-r8hsbPUo
2. Java Programming, https://www.learnvern.com/course/advanced-java-tutorial

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	3	9	**29**
CO2	9	3	1	1	3	3	9	**29**
CO3	9	3	1	1	3	3	9	**29**
CO4	9	3	3	3	3	3	9	**33**
CO5	9	3	3	3	3	3	9	**33**
Total	**45**	**15**	**9**	**9**	**15**	**15**	**45**	**153**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core II – Internet of Things

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6**
Subject Code: IMCSC12 **Credit: 5**

Course Objectives:

1. To understand the application areas of IoT, building blocks of Internet of Things and characteristics
2. To realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks

Unit I **(18 hours)**

Introduction to IoT: Introduction to IoT- Enabling technologies of IoT - AI and Machine Learning - Physical and logical design of IoT - IoT Reference Architecture - IoT Functional Architecture - IoT levels and deployment templates – Application domains of IoT: Home automation – Cities – Environment – Energy – Industry – Agriculture – Transportation - Health care & Lifestyle.

Unit II **(18 hours)**

IoT and M2M: Introduction to M2M – Difference between IoT and M2M- SDN and NFV for IoT-IoT System Management with NETCONF-YANG- Need for IoT Systems Management-SNMP-Network Operator Requirements-NETCONF- YANG- IoT Systems Management with NETCONF-YANG.

Unit III **(18 hours)**

IOT Platforms Design Methodology: Step 1 to Step 10- Case Study on IoT System for Weather Monitoring- Motivation for Using Python- IoT Systems Logical Design using Python-Introduction-Installing Python- Python Data Types and Data Structures-Control Flow-Functions-Modules- Packages-File Handling-Date/Time Operations- Classes- Python Packages of Internet for IoT.

Unit IV **(18 hours)**

IoT Physical Devices and Endpoints: What is an IoT Device- Exemplary Device: Raspberry Pi-About the board-Linux and Raspberry Pi- Raspberry Pi Interfaces- Programming Raspberry Pi with Python- Other IoT Devices.

Unit V **(18 hours)**

IoT Physical Servers and Cloud Offerings: Introduction to Cloud Storage Models and Communication API – WAMP-AutoBahn for IoT-Xively Cloud for IoT-Python Web Application Framework-Django-Designing a RESTful Web API-Amazon Web Services for IoT-Case Studies Illustrating IoT Design- Home Automation-Cities-Environment-Agriculture-Productivity Applications.

AK ACADEMIC COUNCIL

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Recall the importance of smart objects and smart environment
CO2: Define IoT and M2M
CO3: Create IoT platforms using design methodology
CO4: Perform WiFi data communications, remote data storage in cloud and handle the data using web applications
CO5: Develop potential problems and solutions using IoT

Text Book:
1. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach*, Universities Press, 2015

Reference Books:
1. Charles Platt, *Make Electronics – Learning by Discovery*, O'Reilly Media, 2015
2. Michael Miller, *The Internet of Things*, Pearson Education, 2015

E-Resources:
1. https://nptel.ac.in/courses/106/105/106105166/
2. https://www.classcentral.com/course/swayam-introduction-to-internet-of-things-10093

Course Outcomes	Program Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	1	3	9	9	**35**
CO2	9	3	3	1	3	9	9	**37**
CO3	9	3	3	1	3	9	9	**37**
CO4	9	3	3	1	3	9	9	**37**
CO5	9	9	9	1	9	9	9	**55**
Total	**45**	**19**	**21**	**5**	**21**	**45**	**45**	**201**

Low-1 Medium-3 High-9

Core III- Compiler Design

(For Students Admitted from 2024-25)

Semester: I **Hours/ Week: 6**
Subject code: IMCSC13 **Credit: 5**

Course Objectives:
1. To provide an understanding of the fundamental principles in compiler design
2. To learn the process of translating a modern high-level language to executable code required for compiler construction

KA ACADEMIC COUNCIL

Unit I **(18 hours)**

Introduction: The structure of a compiler –Evolution of programming languages-Applications of compiler technology-A Simple Syntax Directed Translator: Syntax definition-syntax-directed translation.

Unit II **(18 hours)**

Parsing: Lexical Analysis-Symbol Tables-Lexical Analysis: The role of the lexical analyser-Input Buffering- Specification of Tokens-Recognition of tokens-The lexical analyser generator Lex-Finite Automata.

Unit III **(18 hours)**

Design of lexical analyser generator: DFA for lexical analyser - Important states of an NFA, Converting a regular expression directly to a DFA-Minimizing the number of states of a DFA-**Syntax Analysis:** Syntax error handling-error recovery strategies-Context free grammars-Top down parsing: FIRST and FOLLOW –LL (1) Grammars-Bottom Up Parsing.

Unit IV **(18 hours)**

LR Parsing: More Powerful LR Parsers-Using Ambiguous Grammars-Parser Generators-Syntax-Directed Translation: Evaluation orders for SDD's – application of SDT-Syntax Directed Translation Schemes- Intermediate Code Generation: Variants of Syntax Trees-Three address code.

Unit V **(18 hours)**

Run time environment: Heap Management- Code Generation: The target language-Address in the Target Code-A Simple code generator-Peephole Optimization-Optimal Code generation for Expression-Dynamic Programming code-Generation-Machine-Independent Optimization: Semantics preserving Transformations-Copy Propagation-Dead –Code Elimination-Code Motion.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Define common forms of parsers

CO2: Illustrate compiler construction tools and describes the Functionality of each stage of compilation process

CO3: Construct Grammars for Natural Languages and find the Syntactical errors/Semantic errors during the compilations using parsing techniques

CO4: Analyze different representations of intermediate code

CO5: Design to construct new compiler for new languages

Text Book:

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman, *Compiler Principles, Techniques & Tools*, Pearson Addison Wesley, Second Edition, 2007.

Reference Books:

1. Alfred V. Aho, Jeffrey D. Ullman, *Principles of compiler design*, Pearson Education, Indian student Edition, 2001.
2. Kenneth C. Louden, *Compiler Construction– Principles and Practice*, PWS Publishing, First edition, 1997.

TAX ACADEMIC COUNCIL

3. K. L. P Mishra, N. Chandrashekaran, *Theory of computer science- Automata Languages and Computation*, Prentice Hall of India, Second edition, 2003.
4. Andrew W. Appel, *Modern Compiler Implementation C*, Cambridge University Press, 2004.

E- Resources:

1. https://www.geeksforgeeks.org/compiler-design-tutorials/
2. https://nptel.ac.in/courses/106/108/106108113/

Course Outcomes	Program Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	9	9	**55**
CO2	9	9	9	1	9	9	9	**55**
CO3	9	9	9	1	9	9	9	**55**
CO4	9	9	9	1	9	9	9	**55**
CO5	9	9	9	1	9	9	9	**55**
Total	**45**	**45**	**45**	**5**	**45**	**45**	**45**	**275**

Low-1 Medium-3 High-9

Core IV -Advanced Java Lab

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6**
Subject Code: IMCSC14P **Credit: 5**

Course Objectives:

1. To apply the concept of RMI to invoke Client/Server Communication and AWT, Swing to design and develop GUI applications
2. To build dynamic web applications using JSP, Servlet and Java Data Base Connectivity (JDBC)

List of Programs

NETWORKING

1.Do one and two way communication(s)
2. Implement TCP Socket

SWING

3. Display current date & time in different format
4. Set a foreground and background color for label
5. Create simple calculator

EXACADEMIC COUNCIL

BEAN

6. Create button
7. Create text box which accepts only characters
8. Create text box which accepts only integer value

JDBC

9. Prepare a student's details with Roll-No, Name, Mark1, Mark2, Mark3, Total, Average and Grade to perform insert, update, delete and display of student information
10. Prepare an Electricity Bill to perform insert, update, delete and display Electricity bill of a particular user

RMI

11. Display a string message
12. Perform arithmetic operations
13. Find factorial
14. Generate Fibonacci series

SERVLET

15. Create a Servlet to display Simple Message
16. Create a Servlet that uses cookies to store the number of times a user has visited the servlet
17. Create a Servlet to generate Random Numbers
18. Create a Servlet that prints Today's date
19. Create Servlet for login page, if the username and password is correct then prints message "Hello username" else "login failed"
20. Create Student Information System to view the details of the Students

JSP

21. Create a JSP that prints hello world
22. Create a JSP that prints current date and time
23. Create a JSP that add and subtract two numbers.
24. Design a JSP Program to implement verification of a particular user login and display a welcome page
25. Design and implement a JAVA JSP Program to get student information and display the same information through Servlet

Note: - Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Demonstrate the concepts such as client/ server, socket and RMI to implement Java code
CO2: Apply an event handling using swing components
CO3: Illustrate the concept of Java bean in Java program
CO4: Discover the database access through Java code using JDBC connectivity
CO5: Create dynamic web pages using Servlet and JSP

KK ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	3	9	**29**
CO2	9	3	1	1	3	3	9	**29**
CO3	9	3	1	1	3	3	9	**29**
CO4	9	3	3	3	3	3	9	**33**
CO5	9	3	3	3	3	3	9	**33**
Total	**45**	**15**	**9**	**9**	**15**	**15**	**45**	**153**

Low-1 Medium-3 High-9

DSE I – a) Open Source Technologies

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6 (T:4 P:2)**
Subject Code: IMCSE1A **Credit: 5**

Course Objectives:

1. To expose students to free open source software environment and introduce them to use open source packages
2. To implement various applications using build systems and understand the installation of various packages in open source operating systems

Unit I **(12 hours)**

PHP- Introduction-What is PHP-Why use PHP and MYSQL-PHP strengths-Key features of PHP-**Using PHP-**Accessing PHP-Creating sample application- Embedding PHP in HML –Accessing form variables-Understanding identifiers- Examining Variable types- Using Operators-Making Decisions with conditionals-Repeating actions through iteration.

Unit II **(12 hours)**

Storing and Retrieving Data-Processing files-Opening a file-Writing to a file-Closing a file-Reading from a file-Using other file functions-**Using arrays**-What is an array-Numerically indexed arrays-Arrays with different indices-array operators-multidimensional array-sorting array-String manipulation and regular expressions.

Unit III **(12 hours)**

MYSQL- SQL-Inserting Data into the Database-Retrieving Data from the Database-Updating Records in the Database-Altering Tables after creation-Deleting Records from the Database-Dropping Tables-Dropping a Whole Database-Accessing your MYSQL database from the web with PHP-Querying a database from the web-putting new information in the database-Using other PHP database interfaces.

EX ACADEMIC COUNCIL

Unit IV **(12 hours)**

PYTHON-Introduction-Algebra with Variables-variables, complex quantities, common functions with numbers, logical operators, strings and printing. Simple programs-basic program structure, flowchart, conditional operations, iterative routines. Functions and Modules-Functions-Recursion, Nested functions, Nested scope, Modules-Built-in modules, maths module.

Unit V **(12 hours)**

Sequences and Operations with Sequences-String, tuple, list, dictionary, set, operators with sequences, iterator, iterator functions, input. Classes and Objects- classes, functions with attributes, overloading, inheritance, execution from command line.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Demonstrate install and run Linux operating system
CO2: Apply the MYSQL database concepts
CO3: Develop website and control using PHP and MYSQL
CO4: Explain Install open source web technologies MySQL and PHP
CO5: Illustrate the Python software making process

Text Books:

1. Luke Welling, Laura Thomson, *PHP and MYSQL Web Development*, Pearson Education, Fifth Edition, 2017
2. T.R. Padmanabhan, Programming *with Python*, Springer Nature, 2016

Reference Books:

1. James Lee and Brent Ware, *Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP*, Dorling Kindersley Private Limited, 2008
2. Eric S. Raymond, Michael Tiemann, *Open Sources: Voices from the Open Source Revolution*, O'Reilly,1999
3. Steve Holzner, *PHP: The Complete Reference*, Tata McGraw Hill, Second Edition, 2009

E - Resources:

1. http://www.openresources.com/documents/open-resources/
2. http://www.alexsoft.com/

Open Source Technologies (Lab)

Hours/week: 2

Python:

Display Text

1. To display any given text message
2. To display Fibonacci series

Array

3. To count the number of vowel in the string

MX ACADEMIC COUNCIL

Function

4. To convert a date read from the user, given in DD/MM/YYYY format into written format. For example, Enter a date in DD/MM/YYYY Format: 16/7/2003 Output: 16 July, 2003
5. To print the contents of a file in uppercase using function

MySQL:

6. Create student database and display the data using Python
7. Create Employee database and display the employee salary data using Python

PHP:

8. To find Sum of digits of given number
9. To find factorial of a number
10. To display count, from 10 to 20 using loop
11. To check given number is prime number or not

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	1	3	9	3	9	**43**
CO2	9	9	3	9	3	9	9	**51**
CO3	9	9	9	3	9	3	3	**45**
CO4	9	1	3	9	3	9	1	**35**
CO5	3	9	3	9	9	3	3	**39**
Total	**39**	**37**	**19**	**33**	**33**	**27**	**25**	**213**

Low-1 Medium-3 High-9

DSE I - b) Optimization Techniques

(For Students Admitted from 2024-25)

Semester: I **Hours/week 6**

Subject Code: IMCSE1B **Credit: 5**

Course Objectives:

1. To impart knowledge in concepts and tools of Operations Research (OR)
2. To apply OR techniques constructively to make effective business decisions

Unit I **(18 hours)**

Basics of Operations Research: Development of OR – Definition-Characteristics-Scientific Method-Necessity of OR-Scope-OR and Decision-Making-Scope of OR in Management, Financial management-Applications of various OR Techniques-Objectives –Phases-Models-Classification Schemes of Models-Role of Computers in OR – Difficulties in OR - Limitations of OR

Linear Programing: Introduction-Requirements for a Linear Programming Problem - Assumptions in Linear Programming Models – Applications of LP method- Formulation of LPP-Advantages – Limitations – Graphical Method of Solutions – Some Exceptional Cases.

PA ACADEMIC COUNCIL

Unit II **(18 hours)**

General LPP-Canonical and standard Forms of LPP-Theory of Simplex Method – Some Important Definitions –Analytical Method or Trial and Error Method – Simplex Method – Artificial Variables Techniques – Special cases in Simplex Method Applications – Solution of Simultaneous Equations by Simplex Method – Some Additional Points – Computational Efficiency of the Simplex Technique.

Unit III **(18 hours)**

Transportation Model: Introduction to the Model – Assumptions in Transportation Model – Definition – Matrix Terminology – Formulation and Solution – Variants in Transportation Problems – Additional Problems –Least-Time Transportation Problems – Post Optimality Analysis in Transportations – Trans-Shipment Problem – Dual of the Transportation Problem.

Unit IV **(18 hours)**

Assignment Model: Definition of Assignment Model – Mathematical Representation – Comparison with the Transportation Model – Solution of Assignment Models – Hungarian Method for Solution of Assignment Problems – Formulation and Solution of Assignment Models – Variations – Additional Problems- Sensitivity Analysis in Assignment Problem – Travelling Salesman Problem.

Unit V **(18 hours)**

Advanced Topics in LP: Duality in LP – Dual Simplex Method – Revised Simplex Method – Bounded Variable Problem.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain characteristics of Operational Research, Computational Efficiency of the Simplex Technique, Transportation Problems, Assignment problem and Duality

CO2: Apply Graphical, Simplex methods, Assignment Problem, Transportation Problem and Dual Simplex Method methods to get optimal solution for Linear Programming

CO3: Analyse the optimal solutions of different Linear Programming methods such as Graphical, Simplex method, Assignment Problem and Transportation Problem and Dual Simplex methods for making effective business decisions

CO4: Compare Solutions of as Graphical, Simplex and Dual Simplex method

CO5: Generate dual of LPP and dual of Transportation Problem

Text Book:

1. Er. Prem Kumar Gupta, Dr D S Hira, *Operations Research*, S Chand Publisher, Revised Edition, 2017.

Reference Books:

1. V.K.Kapoor, *Operations Research*, Sultan Chand & Sons Publishers, Fourth Edition, 2001

AA ACADEMIC COUNCIL

2. Hamdy A.Taha, *Operations Research*, Prentice Hall of India, Seventh Edition, 2005.
3. J K Sharma, *Operations Research Theory and Applications*, Macmillan Publishers India Limited, Fifth Edition, 2013.
4. Kanti Swarup , P.K. Gupta and Man Mohan, *Operations Research*, Sultan Chand & Sons Publishers,Thirteenth Edition, 2004.

E-Resources:

1. https://nptel.ac.in/courses/110/106/110106062/
2. https://onlinecourses.swayam2.ac.in/cec20_ma10/preview
3. https://www.bbau.ac.in/dept/UIET/EMER-601%20Operation%20Research%20Queuing%20theory.pdf

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	1	9	9	**37**
CO2	9	3	3	3	1	9	9	**37**
CO3	9	3	3	3	1	9	9	**37**
CO4	9	3	3	3	1	9	9	**37**
CO5	9	3	3	9	1	9	9	**43**
Total	**45**	**15**	**15**	**21**	**5**	**45**	**45**	**191**

Low-1 Medium-3 High-9

Core V – Big Data Analytics

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 6**
Subject Code: IMCSC211 **Credit: 5**

Course Objectives:

1. To understand the Big Data Platform and its Use cases and Map Reduce Jobs
2. To provide an overview of Apache Hadoop, HDFS Concepts and Interfacing with HDFS and Apply analytics on Structured, Unstructured Data

Unit I **(18 hours)**

Introduction to Big Data: Classification of Digital Data, Structured and Unstructured Data - Introduction to Big Data: Characteristics – Evolution – Definition - Challenges with Big Data - Other Characteristics of Data -Why Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop Environment Big Data Analytics: Classification of Analytics – Challenges - Big Data Analytics important - Data Science - Data Scientist - Terminologies used in Big Data Environments – Basically Available Soft State Eventual Consistency - Top Analytics Tools.

MA ACADEMIC COUNCIL

Unit II **(18 hours)**

Technology Landscape: NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges – Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop -Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem.

Unit III **(18 hours)**

Mongodb and Mapreduce programming: MongoDB: Why Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language Map Reduce: Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression.

Unit IV **(18 hours)**

Hive and pig Hive: Introduction – Architecture - Data Types - File Formats - Hive Query Language Statements –Partitions – Bucketing – Views - Sub- Query – Joins – Aggregations - Group by and Having – RCFile Implementation - Hive User Defined Function - Serialization and Deserialization. Pig: Introduction -Anatomy – Features – Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types -Running Pig - Execution Modes of Pig - HDFS Commands - Relational Operators - Eval Function -Complex Data Types - Piggy Bank - User-Defined Functions - Parameter Substitution – Diagnostic Operator - Word Count Example using Pig - Pig at Yahoo! - Pig Versus Hive.

Unit V **(18 hours)**

Introduction to Data Analytics with R- Machine Learning: Introduction, Supervised Learning, Unsupervised Learning. **Machine Learning Algorithms:** Regression Model, Clustering, Collaborative Filtering, Associate Rule Making, Decision Tree, Big Data Analytics with BigR.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe Data sources, generations, data formats, Data Evolution, Data from various domains

CO2: Determine Big Data Characteristics, Frameworks, components and Limitation of traditional approaches and map Big Vs to Data Domains

CO3: Analyse various domains of Data Characteristics, Platform, Programming Model and Design Data Analytic ecosystem, and data processing framework

CO4: Evaluate the Concepts of Data Analytics Phases and Techniques

CO5: Formulate Data Analytics Techniques practically using R environment

Text Books:

1. Seema Acharya, Subhashini Chellappan, “Big Data and Analytics”, Wiley Publications, First Edition,2015

2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman , *Big Data for Dummies*, Wiley India Private Limited, 2014

BY ACADEMIC COUNCIL

Reference Books:

1. Boris lublinsky, Kevin T. Smith, Alexey Yakubovich, *Professional Hadoop Solutions*, Wiley, India Private Limited, 2015
2. Chris Eaton, Dirk deroos, Understanding *Big data*, McGraw Hill, 2012
3. Tom White, *HADOOP: The definitive Guide*, O Reilly, 2012
4. Tom Plunkett, Brian Macdonald, Oracle *Big Data Handbook*, Oracle Press, 2014
5. JyLiebowitz, *Big Data and Business analytics*, CRC press, 2013
6. VigneshPrajapati, *Big Data Analytics with R and Hadoop*, Packet Publishing, 2013

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc20_cs92/preview
2. https://nptel.ac.in/courses/110/106/110106072/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	3	9	**49**
CO2	9	9	9	1	9	3	9	**49**
CO3	9	9	9	1	9	3	9	**49**
CO4	9	9	9	1	9	3	9	**49**
CO5	9	9	9	1	9	3	9	**49**
Total	**45**	**45**	**45**	**5**	**45**	**15**	**45**	**245**

Low-1 Medium-3 High-9

Core VI - Data Structures and Algorithms

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 6**
Subject Code: IMCSC221 **Credit: 5**

Course Objectives:

1. To understand data structures and algorithms in computer science perspectives, algorithms analysis procedure, space and time complexity of various algorithms
2. To apply data structures and algorithms to solve real world problems

Unit I **(18 hours)**

Computational Complexity: Computer Architecture-Big oh Notation-other asymptotic notations for complexity of algorithms-More asymptotic notations. **Introduction:** History of Algorithm-Data structures and Algorithms-Data structure-Definition and Classification. **Stacks:** Introduction-stack Operation-Application. **Queues:** Introduction-Operation-circular Queues-Other Types of Queues-Application.

XX ACADEMIC COUNCIL

Unit II **(18 hours)**

Linked Lists: Introduction-Singly Linked Lists-Circularly Linked List-Doubly Linked List-Multiply Linked List-Application. **Linked Stacks and Linked Queues:** Introduction-Operation on Linked Stacks and Linked Queues-Dynamic Memory Management and Linked Stacks-Implementation of Linked Representations-Applications. **Trees and Binary Tress:** Introduction-Trees: Definition and Basic Terminologies-Representation of Trees-Binary Tree Traversals-Threaded Binary Trees-Applications.

Unit III **(18 hours)**

Graphs: Introduction-Definitions and Basic Terminologies-Representations of Graphs-Graph Traversals-Single-source & All pairs shortest paths problem- Minimum cost spanning trees.**Binary Search Trees and AVL Trees:** introduction-Binary Search Trees: Definition and Operations-AVL Trees: Definition and Operations-Applications.

Unit IV **(18 hours)**

B Trees and Tries: Introduction to m-way search Trees: Definition and Operations-B Trees: Definition and Operations-Tries: Definition and Operations-Applications.**Red-Black Trees and Splay Trees:** Red-Black Trees-Splay Trees-Applications.**Hash Tables:** Introduction-Hash Table Structure-Hash Functions-Linear Open Addressing-Chaining-Applications.

Unit V **(18 hours)**

Searching: Introduction-Linear Search- Transpose Sequential Search-Interpolation Search- Binary Search-Fibonacci Search-Other Search Techniques. **Internal Sorting:** Introduction-Bubble Sort-Insertion Sort-Selection Sort0-Merge Sort-Shell Sort-Quick Sort-Heap Sort-Radix Sort. **External Sorting:** Introduction-External Storage Devices- Sorting with Tapes: Balanced Merge-Sorting with Disks: Balanced Merge-Polyphase Merge sort-Cascade Merge Sort.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the concepts of data structures and its classification, Linked lists, Graphs and B Trees

CO2: Apply data structures and its algorithms in real time applications

CO3: Analyze the efficiency of graphs and searching algorithms

CO4: Compare different sorting algorithms

CO5: Develop different algorithm design techniques

Text Books:

1. Kent D. Lee, Steve Hubbard, *Data Structures and Algorithms with Python*, Springer International Publishing Switzerland, 2015
2. G A Vijayalakshmi Pai, *Data structures and Algorithms, Concepts, Techniques and Application*,Tata McGraw Hill Education Private Limited,New Delhi, 2008

AY ACADEMIC COUNCIL

Reference Books:

1. Ellis Horowitz, Sartaj Sahni, *Fundamentals of Data Structures*, Galgotia Book Source, Second Edition, 2004
2. Alfred V.Aho Johne, Hopcroft, *Data Structures and Algorithm*, Addison-Wesley, Third Edition, 2012
3. Mark Allen Weiss, *Data Structures and Algorithm Analysis in C++*, Pearson Education, Fourth Edition, 2014

E-Resources:

1. http://www.dave-reed.com/csc427.F04/
2. http://www.math.tau.ac.il/~matias/ds03.html
3. https://onlinecourses.nptel.ac.in/noc20_cs70/preview
4. https://www.tutorialspoint.com/python_data_structure/python_data_structure_tutorial.pdf
5. https://nptel.ac.in/courses/106/106/106106145/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**15**	**5**	**45**	**45**	**45**	**215**

Low-1 Medium-3 High-9

Core VII – Cloud and Distributed Computing

(For Students Admitted from 2024-25)

Semester: II **Hours/Week: 6**
Subject code: IMCSC23 **Credit: 5**

Course Objectives:

1. To impart the complete understanding of cloud, virtualization and distributed clouds
2. To enhance the students to understand the significance of cloud storage, identity and access management

Unit I **(18 hours)**

Introduction to Cloud, Virtualization, and Virtual Machine: Introduction to Cloud Computing - Features of Today's Cloud - Introduction to Virtualization - Mitigation Techniques for VM Migration

KAC ACADEMIC COUNCIL

Network Virtualization and Geo-Distributed Clouds: Introduction - Cloud Computing and Server Virtualization - Networking of Virtual Machines Inside the Hypervisor – Docker - Software-Defined Network - Network Virtualization in Multi-Tenant Data Centers: VL2 - Network Virtualization in Multi-Tenant Data Centers: NVP - Geo-Distributed Cloud Data Centers.

Unit II **(18 hours)**

Leader Election in Cloud, Distributed Systems, and Industry Systems: Introduction - Leader Election in Rings (Classical Distributed Algorithms) - Ring Leader Election and Bully Leader Election Algorithms - Classical Algorithm: Ring Election Algorithm - Classical Algorithm: Bully Election - Industry Systems: Google Chubby and Apache ZooKeeper - Design of ZooKeeper. **Cloud-Native Computing:** Introduction – Micro services – Docker – Kubernetes - Introduction to Edge Computing - Classification of Edge Computing.

Unit III **(18 hours)**

Cloud Asset Management and Protection: Differences from Traditional IT - Types of Cloud Assets - Compute Assets - Storage Assets - Network Assets - Asset Management Pipeline - Procurement Leaks - Processing Leaks - Tooling Leaks - Findings Leaks - Tagging Cloud Assets
Software-Defined Networking and Network Function Virtualization: Introduction - Software-Defined Networking - Applications and Use Cases - Software-Defined NFV - Network Slicing - Ongoing Research Opportunities.

Unit IV **(18 hours)**

Cloud Storage: Key-Value Stores/NoSQL Stores and HBase: Design of Key-Value Stores - Design of HBase-**Identity and Access Management:** Differences from Traditional IT - Life Cycle for Identity and Access-Request -Approve - Create, Delete, Grant, or Revoke - Authentication - Cloud IAM Identities-Business-to-Consumer and Business -to-Employee-Multi-Factor Authentication - Passwords and API Keys - Shared IDs - Federated Identity - Single Sign-On - Instance Metadata and Identity Documents-Secrets Management-Authorization- Centralized Authorization - Roles - Revalidate - Putting It All Together in the Sample Application.

Unit V **(18 hours)**

Classical Distributed Algorithms and the Industry Systems: Introduction - Time and Clock Synchronization in Cloud Data Center - Key Challenges - Clock Synchronization - Algorithms for Recording Global State and Snapshot - Mutual Exclusion Algorithms for Distributed Systems- **Cloud Applications:** MapReduce, Spark, and Apache Kafka -MapReduce -Spark- Kafka.

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Identify the features of Cloud Computing and Virtualization
CO2: Demonstrate the leader election and cloud native computing
CO3: Classify types of cloud assets, software-defined networking and network function virtualization
CO4: Justify cloud storage, Identity and Access Management

AK ACADEMIC COUNCIL

CO5: Generate the Classical Distributed Algorithms, the Industry Systems and Cloud applications

Text Books:

1. Rajiv Misra, Yashwant Singh Patel, *Cloud and Distributed Computing: Algorithms and Systems*, Wiley Emerging Technology Series, Wiley India Private Limited, 2020
2. Chris Dotson, *Practical Cloud Security: A Guide for Secure Design and Deployment*, O'Reilly Media, First Edition, 2019

Reference Books:

1. Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi, *Mastering Cloud Computing*, Tata McGraw Hill, 2017
2. Rajkumar Buyya, James Broberg, Andrzej Goscinski, *Cloud Computing Principles and Paradigms***,** John Wiley & Sons Limited ,2011
3. Toby Velte, Anthony Velte, Robert Elsenpeter, *Cloud Computing-A Practical Approach*, Tata McGraw Hill, 2010

E - Resources:

1. https://nptel.ac.in/courses/106/104/106104182/
2. https://www.amazon.in/Cloud-Distributed-Computing-Algorithms-Systems/dp/8126520272?asin=B086V7Q2KW&revisionId=&format=4&depth=1

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	9	3	1	9	**35**
CO2	9	1	9	9	3	1	33	**35**
CO3	9	3	3	9	3	1	9	**37**
CO4	3	9	9	9	9	3	9	**51**
CO5	3	9	9	9	9	3	9	**51**
Total	**33**	**23**	**33**	**45**	**27**	**9**	**39**	**209**

Low-1 Medium-3 High-9

Core VIII - Data Structures and Algorithms using Python Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 6**
Subject Code: IMCSC24P **Credit: 5**

Course Objectives:

1. To identify and apply the suitable data structure for the given real world problem
2. To gain knowledge in practical applications of data structures using python

XI ACADEMIC COUNCIL

List of Programs

Display Text
1. To develop a simple calculator
2. To check given year is leap year or not

Formula Substitution
3. To find the factorial of the given number
4. To compute the GCD of two numbers.
5. To find the Distance between Two Points
6. To evaluate the Fibonacci series for n terms
7. To find given number is odd or even.
8. To find ind the square root of a number (Newton's method)
9. To find Exponentiation (power of a number)
10. To find the maximum of a list of numbers.
11. To find First n prime numbers
12. To Find Given Number is Armstrong Number or not

Algorithm Substitution
13. To perform Linear search and Binary search
14. To perform Selection sort
15. Write a Python program to perform Insertion sort
16. To perform Merge sort
17. To perform Bubble Sort Algorithm

Array
18. To multiply matrices
19. To use command line arguments for counting words (word count)

File
20. To find the most frequent words in a text read from a file

Note: - Questions for internal and external examination will be based on concepts learnt

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Describe the Python language syntax including control statements, loops and functions to write programs for a wide variety problem in mathematics.
CO2: Examine the core data structures in python to store, process and sort the data.
CO3: Basic knowledge of condition checking
CO4: Implement the structure of algorithm
CO5: Examine the file and array concept

KTU ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**15**	**5**	**45**	**45**	**45**	**215**

Low-1 Medium-3 High-9

DSE II - a) Artificial Intelligence

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 6**
Subject Code: IMCSE2A **Credit: 5**

Course Objectives:

1. To describe the modern view of AI as the study of agents that receive percepts from the Environment and perform actions and AI techniques for knowledge representation, planning and uncertainty Management
2. To develop knowledge of decision making and learning methods and explain the concept of Knowledge Representation

Unit I **(18 hours)**

Introduction to Artificial Intelligence-Intelligent Agents, Approaches in Artificial Intelligence, Definitions of Artificial Intelligence, AI problems, Features of AI Programs, Importance of AI, Advantages and Disadvantages of AI.

Unit II **(18 hours)**

Applications of Artificial Intelligence- Finance, Hospitals and Medicine, Robotics, Expert systems, Diagnosis, Pattern Recognition, Natural Language Processing, Game Playing, Image Processing, Data mining, Big Data Mining. Introduction to the state space search- State space search, search techniques, Types of searching techniques.

Unit III **(18 hours)**

Heuristic Search Strategies-Types of Heuristic Search techniques, Hill Climbing Search, Simulated Annealing search, A* Algorithm, AND-OR Graphs, Properties of the Heuristic Search Algorithm, Adversary Search, The MINIMAX Algorithm.

KK ACADEMIC COUNCIL

Unit IV **(18 hours)**

Expert Systems-Definitions of Expert Systems, Features of Good Expert systems, Architecture and Components of Expert systems, Roles of the Individuals who interact with the system, Advantages of Expert systems, Disadvantages of Expert Systems.

Unit V **(18 hours)**

Knowledge Representation-Definitions of Knowledge Representation, Characteristics of Good Knowledge Representation, Basics of Knowledge representation, Properties of the Symbolic representation of knowledge, Properties of the Good knowledge representation systems, Categories of knowledge representation schemes, types of knowledge representation schemes.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Illustrate knowledge on Artificial Knowledge concepts
CO2: Apply all searching algorithms and Hill-climbing procedures
CO3: Analyze their gaming skills and learn about Expert system
CO4: Evaluate the learners for aspiring careers in the field of Artificial Intelligence
CO5: Develop the game playing and planning of expert systems

Text Book:

1. I.Gupta, G.Nagpal, *Artificial Intelligence and Expert Systems*, Laxmi Publications, 2018.

Reference Books:

1. V.S. Jankiraman, *Foundations of Artificial Intelligence and Expert Systems*, Laxmi Publications, 2017.
2. Joseph C.Giarratano, Gary D.Riley, *Expert Systems: Principles and Programming*, Brooks/Cole Publications, Fourth Edition, 2018.
3. Lavika Goel, *Artificial Intelligence: Concepts and Applications*, Wiley India Private Limited, 2015.

E-Resources:

1. https://nptel.ac.in/courses/106/102/106102220/
2. https://nptel.ac.in/courses/112/103/112103280/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	3	9	9	9	**57**
CO2	9	3	9	9	3	9	3	**45**
CO3	3	9	3	3	9	9	9	**45**
CO4	9	9	9	9	3	1	9	**49**
CO5	9	9	9	3	9	9	3	**51**
Total	**39**	**39**	**39**	**27**	**33**	**37**	**33**	**247**

Low-1 Medium-3 High-9

XXI ACADEMIC COUNCIL

DSE II - b) Mobile Computing

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 6**
Subject Code: IMCSE2B **Credit: 5**

Course Objectives:

1. To define mobile technologies in terms of hardware, software, and communications and describe existing mobile computing frameworks and architectures
2. To evaluate the effectiveness of different mobile computing frameworks and describe how mobile technology functions to enable other computing technologies

Unit I **(18 hours)**

Introduction: Mobile Computing- Middleware and Gateways-Developing Mobile Computing Applications- Security in Mobile Computing – Architecture of Mobile Computing-Three-Tier Architecture-Design Consideration for Mobile Computing-Mobile Computing through Internet-Mobile Computing through Telephone-Developing an IVR Applications.

Unit II **(18 hours)**

Bluetooth and GSM: Bluetooth- Features and working of RFID -Wireless Broadband (WiMAX) - Mobile IP – IPV6- IPV4 Vs IPV6 –Global System for Mobile Communications – GSM Architecture – Call Routing in GSM – GSM Addresses and Identifiers – Network Aspects in GSM – GSM Frequency Allocation – Authentication and Security- Mobile Computing Over SMS – SMS- Value Added Services through SMS**.**

Unit III **(18 hours)**

GPRS, 3G and 4G Networks: GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in GPRS- Applications for GPRS – Limitations of GPRS- Spread Spectrum Technology- CDMA Versus GSM – Features of 3G Networks – Architecture of 3G- Applications of 3G - Features of 4G- Architecture of 4G - Wireless Technologies Used in 4G- Merits and Demerits of 4G.

Unit IV **(18 hours)**

Mobile Ad-hoc Networks: MOBILE Ad-Hoc Basic Concepts-Characteristics- Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc Networks (VANET) – MANET Vs VANET – Security of VANET and MANET **Open Source Tools for Mobile Testing:** Appium **-** Katalon Studio – Monkey Talk – IOS Driver – Robotium – Calabash.

Unit V **(18 hours)**

Overview of Kotlin- Installation of Android Studio – Getting started with Hello World app-Creating a Registration form- Adding Radio Buttons- Adding spinner and Image- Creating a search App-URL request-Display Search Result-Playing video using YouTube API.

XAVIER ACADEMIC COUNCIL

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the principles of mobile technologies like GPRS, GSM, CDMA and TDMA and the concepts of Bluetooth and GSM, Mobile Ad-hoc networks

CO2: Apply the features of Android programming for developing Android Applications

CO3: Analyze technology of 1G, 2G, 3G and 4G for gaining the working knowledge of four generation Wireless technologies and Analyze the architecture, merits and demerits of Wireless technologies like Infra-Red, blue tooth, Wi-Fi, RFID and Wi-Max

CO4: Compare the characteristics and techniques MANET with VANET

CO5: Derive wireless communication systems with 3G and 4G technologies.

Text Books:

1. Asoke K. Talukder, Hasan Ahmed, Roopa R Yavagal. *Mobile Computing: Technology, Applications, And Service Creation*, Tata McGraw Hill, 2017
2. Stefano Basagni , Marco Conti , Silvia Giordano , Ivan IvanStojmenovic, *Mobile AdHoc Networking, Cutting Edge Directions*, Wiley Publications, 2015

Reference Books:

1. Sunilkumar S. Manvi, Mahabaleshwar S. Kakkasageri, *Wireless and Mobile Networks, Concepts and Protocols*, Wiley Publications, 2016
2. James C.Sheusi, *Android Application Development for Java programmers*, Cengage Learning, 2013
3. Peter Spath, *Learn Kotlin for Android Development*, APress Publications, 2019
4. Charles E.Perkins, *Ad Hoc Networking*, Addison-Wesley Publications, 2008

E-Resources:

1.www.cse.iitk.ac.in/users/rkg/Talks/mobile_main.pdf
2.pl.cs.jhu.edu/oose/resources/android/Android-Tutorial.pdf
3. SWAYAM: https://swayam.gov.in/nd1_noc19_ee48/preview
4.SWAYAM: https://onlinecourses.swayam2.ac.in/aic20_sp02/preview
5.http://172.16.25.76/course/view.php?id=2224

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	9	9	**55**
CO2	9	9	9	1	9	9	9	**55**
CO3	9	9	9	1	9	9	9	**55**
CO4	9	9	9	1	9	9	9	**55**
CO5	9	9	9	1	9	9	9	**55**
Total	**45**	**45**	**45**	**5**	**45**	**45**	**45**	**275**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core IX - Software Project Management

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 6**
Subject Code: IMCSC311 **Credit: 5**

Course Objectives:

1. To identify the different project contexts and suggest an appropriate management strategy and key phases of project management
2. To determine an appropriate project management approach through an evaluation of the business context and scope of the project and role of professional ethics in successful software development

Unit I **(18 hours)**

Introduction to Software Project Management: Introduction – Software projects versus other types of project – Contract Management and Technical Project Management – Plans, Methods and Methodologies – Setting Objectives – Project Success and Failure – Management Control – Traditional versus Modern Project Management Practices. **Project Evaluation and Programme Management:** Project portfolio Management – Evaluation of Individual Projects – Programme Management – Strategic programme Management.

Unit II **(18 hours)**

An overview of Project Planning: Stepwise Project Planning - **Selection of an Appropriate Project Approach:** Build or Buy - Choosing Methodologies and Technologies - Software Processes and Process Models - Choice of Process models - Structure versus speed of Delivery - Waterfall Model - The Spiral Model - Software Prototyping.

Unit III **(18 hours)**

Activity Planning: Objectives of Activity planning - Project schedules - Sequencing and Scheduling Activities - Network Planning models - Formulating a Network Model – The Forward Pass - The Backward Pass – Identifying the Critical path - Shortening the Project Duration – Identifying Critical Activities. **Risk Management:** Risk - Categories of Risk – Risk identification – Risk Planning – Evaluating Risks to the Schedule – Applying the PERT technique.

Unit IV **(18 hours)**

Monitoring and Control: Creating the Framework – Collecting the Data – Review – Project Termination Review - Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Change control - Software Configuration Management. **Managing Contracts:** Types of Contract - Stages in Contract Placement - Typical Terms of a Contract.

Unit V **(18 hours)**

Agile Technique: The Agile Business Case-Objectives-Adding Value with the Business Case-Business Value Models-Models for the Business Case-Project Balance Sheet-Communicating with

XX ACADEMIC COUNCIL

the Project Balance Sheet Tool-Building the Business Case by Levels-Building the Level 0 Business Case- Building the Level 1 Business Case- Building the Level 2 Business Case.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Summarize Software Process Models

CO2: Illustrate the steps involved in Software Project Management and activity planning, Risk Management using case studies

CO3: Apply Software effort Estimation Methods

CO4: Evaluate Software Project Management Tools

CO5: Design the Agile techniques in Software Project Management

Text Books:

1. Bob Hughes, Mike Cotterell, Rajib Mall, *Software Project Management*, Tata McGraw Hill, Fifth Edition, 2012
2. John C.Goodpasture, PMP, *Project Management the Agile Way*, Second Edition, 2016

Reference Books:

1. Robert K.Wysocki, *Effective Software Project Management*, Wiley Publication, 2011
2. Walker Royce, *Software Project Management*, Addison-Wesley, 1998
3. Gopalaswamy Ramesh, *Managing Global Software Projects*, McGraw Hill Education, Fourteenth Reprint, 2013

E-Resources:

3. https://nptel.ac.in/courses/106/105/106105218/
4. https://onlinecourses.nptel.ac.in/noc19_cs70/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	9	9	**55**
CO2	9	9	9	1	9	9	9	**55**
CO3	9	9	9	1	9	9	9	**55**
CO4	9	9	9	1	9	9	9	**55**
CO5	9	9	9	1	9	9	9	**55**
Total	**45**	**45**	**45**	**5**	**45**	**45**	**45**	**275**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core X -Digital Image Processing

(For Students Admitted from 2024-25)

Semester: III **Hours / Week:6**
Subject Code: IMCSC32 **Credit: 5**

Course Objectives:

1. To explain the fundamentals of digital image and its processing
2. To perform image enhancement techniques in spatial and frequency domain, apply the concept of image segmentation and describe object detection and recognition techniques

Unit I **(18 hours)**

Introduction: Digital Image Processing-The Origins of Digital Image Processing- Examples of Fields that Use Digital Image Processing- Fundamental Steps in Digital Image Processing - Components of an Image Processing System**. Digital Image Fundamentals:** Elements of Visual Perception- Light and the Electromagnetic Spectrum- Image Sensing and Acquisition - Image Sampling and Quantization -Some Basic Relationships between Pixels -Introduction to the Basic Mathematical Tools Used in Digital Image Processing.

Unit II **(18 hours)**

Intensity Transformations and Spatial Filtering: Background - Some Basic Intensity Transformation Functions -Histogram Processing- Fundamentals of Spatial Filtering -Smoothing (Lowpass) Spatial Filters-Sharpening (Highpass) Spatial Filters-High Pass, Bandreject, and Bandpass Filters from Lowpass Filters -Combining Spatial Enhancement Methods-Using Fuzzy Techniques for Intensity Transformations and Spatial Filtering.

Unit III **(18 hours)**

Filtering in the Frequency Domain: Background -Preliminary Concepts -Sampling and the Fourier Transform of Sampled Functions -The Discrete Fourier Transform of One Variable - Extensions to Functions of Two Variables -Some Properties of the 2-D DFT and IDFT -The Basics of Filtering in the Frequency Domain -Image Smoothing Using Low Pass Frequency Domain Filters -Image Sharpening Using High Pass Filters- Selective Filtering- The Fast Fourier Transform.

Unit IV **(18 hours)**

Image Restoration and Reconstruction: Noise Models- Restoration in the Presence of Noise Only. Wavelet and Other Image Transforms: Matrix-based Transforms- Fourier-Related Transforms- Walsh-Hadamard Transforms -Slant Transform - Haar Transform -Wavelet Transforms . **Color Image Processing**: Color Models- Basics of Full-Color Image Processing-Color Transformations-Color Image Smoothing and Sharpening-Using Color in Image Segmentation-Noise in Color Images-Color Image Compression.

VK ACADEMIC COUNCIL

Unit V **(18 hours)**

Morphological Image Processing: Erosion and Dilation-Opening and Closing-The Hit-or-Miss Transform-Some Basic Morphological Algorithms. **Image Segmentation I:** Edge Detection, Thresholding, and Region Detection: Thresholding -Segmentation by Region Growing and by Region Splitting and Merging-Region Segmentation Using Clustering and Superpixels-Region Segmentation Using Graph Cut-Segmentation Using Morphological Watersheds -The Use of Motion in Segmentation. Image Pattern Classification: Optimum (Bayes) Statistical Classifiers-Neural Networks and Deep Learning.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the origins, components, elements of visual perception, basic intensity, transformation, discrete Fourier transform, color models, noise models and morphological algorithms of image processing

CO2: Apply fundamental steps, smoothing, sharpening, segmentation and classification to the image

CO3: Analyze relationship between pixels, mathematical tools, fuzzy techniques, filters, wavelet transforms, region grouping, splitting and merging

CO4: Determine histogram, the color image compression

CO5: Solve noise for color image

Text Book:

1. Rafael C. Gonzalez, Richard E. Woods, *Digital Image Processing*, Pearson Education, Fourth Edition, 2018

Reference Books:

1. B.Chanda, D.Dutta Majumder, *Digital Image Processing and Analysis*, Prentice Hall of India, 2003
2. Nick Efford, *Digital Image Processing a practical Introducing using Java*, Pearson Education, 2004

E-Resources:

1. https://www.tutorialspoint.com/dip/index.htm
2. https://onlinecourses.nptel.ac.in/noc19_ee55/preview
3. https://www.edx.org/learn/image-processing

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	9	9	**80**
CO2	9	9	3	1	9	9	9	**74**
CO3	9	3	9	1	9	9	9	**74**
CO4	9	9	9	1	9	9	9	**80**
CO5	9	9	9	1	9	9	9	**80**
Total	**45**	**39**	**39**	**5**	**45**	**45**	**45**	**388**

Low-1 Medium-3 High-9

XXX ACADEMIC COUNCIL

Core XI - Web Technology

(For Students Admitted from 2024-25)

Semester: III **Hours/Week: 6 (T: 4 P: 2)**
Subject Code: IMCSC32 **Credit: 4**

Course Objectives:

1. To analyze a web page and identify its elements and attributes and create web pages using XHTML and Cascading Style Sheets
2. To build dynamic web pages using JavaScript (Client side programming), create XML documents and Schemas, build interactive web applications using AJAX

Unit I **(12 hours)**

Internet Protocols: Introduction- Internet Protocols-Host Names- Internet Applications and Application Protocols. **Introduction to HTML:** Introduction-SGML-Outline of an HTML Document-Head Section-Body Section- HTML Forms. **JAVA Network Programming:** Introduction- UDP/IP and TCP/IP Communications-I/O Streams- Sockets-Remote Method Invocation-Protocol Handler.

Unit II **(12 hours)**

JAVASCRIPT: Introduction-Language Elements - Objects of JavaScript - Other Objects. **Syntax:** An overview of JavaScript's syntax- Identifiers**. Consoles:** interactive JavaScript command lines. **VBSCRIPT:** Embedding VBScript code in an HTML Document-Variables-Procedures-Conditional statements-Looping Constructs-Objects and VBScript.

Unit III **(12 hours)**

Dynamic HTML(DHTML): Introduction-Cascading Style Sheets(CSS)-DHTML Document Object Model and Collections-Event Handling-Data Binding. **EXTENSIBLE MARK-UP LANGUAGE (XML):** Introduction-HTML vs XML- XML Attributes- XML Validation- XML DTD -The Building Blocks of XML Documents.

Unit IV **(12 hours)**

JAVA SERVER PAGES (JSP): Introduction -Advantages of JSP-Components of JSP - Cookies. **Active Server Pages (ASP):** Introduction- Advantages of Using ASP-First ASP Script-Processing of ASP Scripts with Forms-Variables and Constructs-Subroutines-ASP Cookies-ASP Objects-Connecting to Data with ASP.

Unit V **(12 hours)**

Introduction to PHP: Introduction-Installing PHP-PHP Tags-Comments-Print and Echo Statements-Data Types-Constants-Operators-Control Statements-Looping Constructs-String Fuctions-Numeric Fuctions-Arrays-User Defined Functions-Working with Forms-**MYSQL:** Introduction Database Systems-Accessing the Database with PHP.

KX ACADEMIC COUNCIL

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Explain the fundamentals of web development technologies
CO2: Apply the different tags to develop a dynamic webpage using JavaScript, JSP and ASP
CO3: Able to write a well formed /valid XML document
CO4: Justify best technologies for solving web client/server problems
CO5: Build web pages using various web design languages

Text Books:
1. N.P.Gopalan, J.Akilandeswari, *Web Technology, A Developer's Perspective*, PHI Learning Private Limited, Second Edition, 2016
2. Dr. Axel Rauschmayer, *JavaScript for Impatient Programmers*, ECMA Script, 2022

Reference Books:
1. Jeffrey C. Jackson, *WEB TECHNOLOGIES A Computer Science Perspective*, Pearson Education, 2007
2. Thomas A. Powell, *HTML & CSS: The Complete Reference*, McGraw-Hill, Fifth Edition, 2010

E - Resources:
1. https://www.ecyrd.com/JSPWiki/attach/JSPWikiFileAttachments/Intro%20to%20ASP.pdf
2. https://link.springer.com/content/pdf/bbm%3A978-1-4302-1097-9%2F1.pdf
3. https://www.coursera.org/learn/html-css-javascript-for-web-developers
4. coursera.org/lecture/service-oriented-architecture/4-1-5-html-xml-json-rK9X5

Web Designing Lab

Hours/Week: 2

List of Programs
HTML
1. To illustrate all basic tags
2. To display study time table for end semester examination
3. To display a menu list for bakery
4. To use all style sheets
5. To demonstrate frame
6. To use hyperlink for both text and image
7. To demonstrate forms

Java Script
8. Leap year checking
9. To convert temperature from Fahrenheit to Celsius
10. To create login form

Note: - Questions for the internal examination will be based on the concepts learnt

ACADEMIC COUNCIL

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the basics of all HTML tags to create the static web page

CO2: Apply the concepts of table and list in HTML

CO3: Examine the use of style sheets, frames and hyperlinks

CO4: Evaluate the concept of validation using JavaScript

CO5: Create a dynamic website

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	3	9	3	3	**31**
CO2	9	3	1	3	9	3	3	**31**
CO3	9	3	3	3	9	3	3	**33**
CO4	9	3	3	9	9	3	3	**39**
CO5	9	3	9	3	9	9	3	**45**
Total	**45**	**15**	**17**	**21**	**45**	**21**	**15**	**179**

Low-1 Medium-3 High-9

Core XII - Image Processing Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 6**

Subject Code: IMCSC34P **Credit: 5**

Course Objectives:

1. To study the various techniques of image enhancement, reconstruction, Compression and segmentation
2. To gain knowledge in morphological operations

List of Programs

1. Simulation and Display of an Image, Negative of an Image(Binary & Gray Scale)
2. Implementation of Image Intensity slicing technique for image enhancement
3. To implement power Law correction
4. Implementation of Relationships between Pixels
5. Implementation of Transformations of an Image
6. Contrast stretching of a low contrast image
7. To obtain histogram and histogram equalization image
8. Display of bit planes of an Image
9. Display of colour images
10. Conversion of 24 bit color image to 8 bit, 4 bit, 1 bit image
11. Display of FFT(1-D & 2-D) of an image
12. Computation of Mean, Standard Deviation, Correlation coefficient of the given Image

ACADEMIC COUNCIL

13. Implementation of Image Smoothening Filters (Mean and Median filtering of an Image)
14. To Implement smoothing or averaging filter in spatial domain
15. To perform Filtering in frequency domain
16. Implementation of image sharpening filters and Edge Detection using Gradient Filters
17. Program for Canny and Sobel edge detection algorithm
18. Program for Edge Detection using Prewitt and Roberts Operators
19. Image Compression by DCT,DPCM, and HUFFMAN coding 11. 12. 13.
20. To fill the region of interest for the image
21. Program for Segmentation using watershed transform
22. Program for morphological operations on binary images
23. Implementation of image restoring techniques
24. Program for DCT/IDCT computation

Note: - Questions for internal and external examination will be based on concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Display the images, image attributes, and functions to write programs for a wide variety of problems in image processing.

CO2: Enhancement of an image is understood with the concept of filtering, and power law.

CO3: Basic knowledge of smoothening and sharpening in spatial and frequency domain.

CO4: Implement the structure of algorithm for edge detection and compression.

CO5: Examine the segmentation and morphological operations.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	3	9	1	9	**49**
CO2	9	9	9	3	9	1	9	**49**
CO3	9	9	9	3	9	1	9	**49**
CO4	9	9	9	3	9	1	9	**49**
CO5	9	9	9	3	9	1	9	**49**
Total	**45**	**45**	**45**	**15**	**45**	**5**	**45**	**245**

Low-1 Medium-3 High-9

DSE III - a) Theory of Computation

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 6**

Subject Code: IMCSE3A **Credit: 5**

Course Objectives:

1. To give an overview of the theoretical foundations of computer science from the perspective of formallanguages and regular grammars, context frees grammar

XX ACADEMIC COUNCIL

2. To illustrate finite state machines to solve problems in computing and explain the hierarchy of problems arising in the computer sciences

Unit I **(18 hours)**

Automata Fundamentals: Introduction to formal proof – Additional forms of Proof – Inductive Proofs – Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – Finite Automata withEpsilon Transitions.

Unit II **(18 hours)**

Regular expressions and languages: Regular Expressions – FA and Regular Expressions – ProvingLanguages notto be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata.

Unit III **(18 hours)**

Context Free Grammar and Languages: CFG – Parse Trees – Ambiguity in Grammars and Languages – Definition of the Pushdown Automata – Languages of a Pushdown Automata – Equivalence of Pushdown Automata and CFG, Deterministic Pushdown Automata.

Unit IV **(18 hours)**

Properties of Context Free Languages : Normal Forms for CFG – Pumping Lemma for CFL – ClosureProperties of CFL – Turing Machines – Programming Techniques for TM.

Unit V **(18 hours)**

Undecidability: Non Recursive Enumerable (RE) Language – Undecidable Problem with RE – Undecidable Problems about TM – Post's Correspondence Problem, The Class P and NP.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the language hierarchy, Turing machines and their capability and undecidable problemsand NP class problems

CO2: Apply the theoretical foundations of computer science from the perspective of formal languages

CO3: Illustrate finite state machines to solve problems in computing and various problems of applyingnormal form techniques push down automata and Turing Machines

CO4: Evaluate automata for any given pattern and find its equivalent regular expressions and constructcontext free grammar for various languages

CO5: Design a context free grammar for any given language and design Finite Automata's for different regular expressions and languages

Text Book:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, *Introduction to Automata Theory Languages and Computation*, Pearson Education, Third Edition, 2007.

KAC ACADEMIC COUNCIL

Reference Books:

1. K. L. P Mishra, N. Chandrashekaran, *Theory of Computer Science-Automata Languages and Computation*, Second edition, 2003.
2. H.R.Lewis and C.H.Papadimitriou, *Elements of the theory of Computation*, Prentice Hall of India, Second Edition, 2003.
3. J.Martin, *Introduction to Languages and the Theory of Computation*, Tata McGraw Hill, Third Edition, 2003.
4. Micheal Sipser, *Introduction of the Theory and Computation*, Thomson Brokecole, 1997.

E-Resources:

1. https://nptel.ac.in/courses/106/104/106104148/
2. https://nptel.ac.in/courses/106/104/106104028/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	9	**49**
CO2	9	9	3	1	9	9	9	**49**
CO3	9	9	3	1	9	9	9	**49**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	9	3	1	9	9	9	**49**
Total	**45**	**39**	**15**	**5**	**45**	**45**	**45**	**239**

Low-1 Medium-3 High-9

DSE III - b) Data Mining and Warehousing

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 6**
Subject Code: IMCSE3B **Credit: 5**

Course Objectives:

1. To understand and implement classical models and algorithms in data warehouses and data mining
2. To understand data mining techniques in various applications like social, scientific and environmental context and Develop skill in selecting the appropriate data mining algorithm for solving practical problems

Unit I **(18 hours)**

Data Mining: Data Mining-Kinds of Data-Kind of Patterns can be mined-Technologies used-Kinds of Application Targeted-Major Issues in Data Mining - **Data Preprocessing:** Data Cleaning-Data Integration -Data Reduction – Data Transformation and Data Discretization.

XX ACADEMIC COUNCIL

Unit II **(18 hours)**

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse: Basic Concepts-A Multidimensional Data Modeling: Data Cube and OLAP Data Warehouse Implementation. **Data Cube Technology:** Data Cube Computation: Preliminary Concepts- Data Cube Computation Methods-Mining Frequent Patterns- **Associations and Correlations:** Basic Concepts-Frequent Itemset Mining Methods-Advanced Pattern Mining- Pattern Mining Multilevel, Multidimensional Space Various Kinds of Association Rules-From Association Mining to Correlation Analysis.

Unit III **(18 hours)**

Classification and Prediction: Issues Regarding Classification and Prediction-Classification by Decision Tree Induction-Bayesian Classification-Classification by Backpropagation–Support Vector Machines-Associative Classification: Classification by Association Rule Analysis-Other Classification Methods-Prediction- Accuracy and Error Measures.

Unit IV **(18 hours)**

Cluster Analysis: Basic Concepts, Methods and Advanced Cluster Analysis : What is Cluster Analysis-Types of data in Cluster Analysis-A Categorization of Major Clustering Methods-Partitioning Methods-Hierarchical Methods-Density based Methods-Grid based Methods-**Evaluation of Clustering-** Methods-Clustering high dimensional data-Clustering Graph and Network Data-Clustering with Constraints.

Unit V **(18 hours)**

Outlier Detection: Outlier and Outlier analysis-Outlier Detection Methods-Statistical Approaches-Proximity Based Approaches-Outlier Detection in high-Dimensional Data - **Data Mining Trends and Research Frontiers:** Mining Complex Data Types-Other Methodologies of Data Mining-Data Mining Applications-Data Mining Applications.

Course Outcomes:

After Successful completion of the course, student will be able to

CO1: Explore the Basic Concepts of Data Mining
CO2: Analyze the Classification algorithm and Error Prediction
CO3: Improve the knowledge about Types of Classification Methods in Data Mining
CO4: Determine the types of Data clustering methods and Types of Data Mining
CO5: Evaluate Data Mining Application with Latest Trends

Text Book:

1. Jiawei Han, Micheline Kamber, *Data Mining: Concept and Technique*, Morgan Kaufmann Publishers, Third Edition, 2013

Reference Books:

1. Pieter Adriaans, Dolf Zantinge, *Data Mining*, Pearson Education, Ninth Indian Reprint, 2003

XS ACADEMIC COUNCIL

2. Anand Rajaraman, Jeffrey David Ullman, *Mining of Massive Datasets*, Cambridge University Press, 2012
3. Pete Warden, *Big Data Glossary*, O'Reilly, 2011

Journals:

1. ACM SIGKDD International Conference on Knowledge Discovery & Data Mining
2. ACM International Conference on Web Search and Data Mining

E-Resources:

1. https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing
2. https://onlinecourses.nptel.ac.in/noc21_cs06/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	1	1	1	1	1	**15**
CO2	9	1	1	1	3	3	1	**19**
CO3	9	9	3	1	3	3	1	**29**
CO4	9	9	3	3	3	1	1	**29**
CO5	9	3	3	3	3	3	1	**25**
Total	**45**	**23**	**11**	**9**	**13**	**11**	**5**	**117**

Low-1 Medium-3 High-9

Core XIII -Cryptography and Network Security

(For Students Admitted from 2024-25)

Semester: IV **Hours / Week: 6**
Subject code: IMCSC411 **Credit: 5**

Course Objectives:

1. To understand the basics of Cryptography and Network Security and secure a message over insecure channel by various means
2. To learn about how to maintain the Confidentiality, Integrity and Availability of data and various protocols for network security to protect against the threats in the networks

Unit I **(18 hours)**

Computer and Network Security concept: Computer security concepts-The OSI security Architecture-Security Attacks- Security Services-Security Mechanisms. **Number Theory:** The Euclidean Algorithm-Modular Arithmetic - Fermat's Euler's Theorem.

EX ACADEMIC COUNCIL

Unit II **(18 hours)**

Symmetric Ciphers: Classical Encryption Techniques: Symmetric Chippers Model- Substitution Techniques-Transposition Techniques-Traditional Block Cipher Structure. **Finite Fields:** Groups-Rings-Fields-Finite Fields of the FormGF(p).

Unit III **(18 hours)**

Advanced Encryption Standard: Finite Field Arithmetic-AES Structure -AES Key Expansion. **Asymmetric Ciphers:** The RSA Algorithm.

Unit IV **(18 hours)**

Other Public-Key Cryptosystem: Diffie-Hellman Key Exchange-Elgamal cryptographic system-Elliptic curve Cryptography. **Digital Signature:** Digital signature - Elgamal Digital Signature Scheme-Schnorr Digital Scheme-NIST Digital signature algorithm.

Unit V **(18 hours)**

Wireless Network Security: Wireless Security-Mobile Device Security- IEEE802.11 Wireless LAN Security. **Electronic Mail Security:** Internet Mail Architecture-Email Formats-Email Threats and compressive Email Security-S/MIME -Domain Keys Identify Mail.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Define various Cryptographic Techniques
CO2: Demonstrate various data encryption techniques
CO3: Explain the encryption standard and asymmetric ciphers
CO4: Analyze Hashing and Digital Signature techniques
CO5: Discuss various Security Applications

Text Book:

1. William Stallings, *Cryptography and Network Security Principles and Practice*, Pearson Education, Seventh Edition, 2017

Reference Books:

1. Wade Trappe, Lawrence C Washington, *Introduction to Cryptography with Coding Theory*, Pearson Education, Second Edition, 2007
2. W.Mao, *Modern Cryptography – Theory and Practice*, Pearson Education, Second Edition, 2007

E- Resource:

1. https://nptel.ac.in/courses/106/105/106105162/

AX ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	9	9	**41**
CO2	9	3	1	1	9	9	9	**41**
CO3	9	3	1	1	9	9	9	**41**
CO4	9	3	1	1	9	9	9	**41**
CO5	9	3	1	1	9	9	9	**41**
Total	**45**	**15**	**5**	**5**	**45**	**45**	**45**	**205**

Low-1 Medium-3 High-9

Core XIV – Machine Learning

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 6**
Subject Code: IMCSC42 **Credit: 5**

Course Objectives:

1. To recognize the characteristics of machine learning that makes it useful to real-world problems
2. To understand the concept behind neural networks for learning non-linear functions

Unit I **(18 hours)**

Introduction: Well-Posed Learning Problems-Designing a Learning System-Perspectives and Issues in Machine Learning. Concept Learning: Introduction - A Concept Learning Task-Concept Learning as Search - Decision Tree Learning: Introduction-Decision Tree Representation-Appropriate Problems-Basic Decision Tree Learning Algorithm-Hypothesis Space Search-Inductive Bias-Issues.

Unit II **(18 hours)**

Artificial Neural Networks: Introduction-Neural Network Representations - Appropriate Problems - Perceptrons - Multilayer Networks and the Back Propagation Algorithm-An Illustrative Example: Face Recognition-Advanced Topics.

Unit III **(18 hours)**

Bayesian Learning: Introduction-Bayes Theorem-- Bayes Theorem and Concept Learning – Maximum Likelihood and Least-squared Error Hypotheses- Maximum Likelihood Hypothesis for Predicting Probabilities-Minimum Description Length Principle-Bayes Optimal Classifier-Gibbs Algorithm-Naïve Bayes Classifier-An Example: Learning to Classify Text-Bayesian Belief Networks-The EM Algorithm.

AX ACADEMIC COUNCIL

Unit IV **(18 hours)**

Instance-Based Learning: Introduction-K-Nearest Neighbor Learning-Locally Weighted Regression-Radial Basis Functions-Case-based Reasoning - Genetic Algorithms: Genetic Algorithms-An Illustrative Example-Hypothesis Space Search-Genetic programming-Models of Evolution and Learning-Parallelizing Genetic Algorithms.

Unit V **(18 hours)**

Learning Sets of Rules: Introduction-Sequential Covering Algorithms-Learning Rule Sets: Summary- Learning First-Order Rules-Learning Sets of First-Order Rules: FOIL - Induction as Inverted Deduction-Inverting Resolution - Reinforcement Learning: Introduction- Learning Task-Q Learning-Nondeterministic Rewards and Actions-Temporal Difference Learning-Generalizing from Examples-Relationship to Dynamic Programming.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Understand the need for machine learning for various problem solving

CO2: Demonstrate Decision Tree Learning Algorithm, Back propagation algorithm, Gibbs Algorithm, K-Nearest Neighbor Learning and Temporal Difference Learning with examples

CO3: Categorize the various supervised, semi-supervised and unsupervised learning algorithms in machine learning

CO4: Apply different classification techniques in real time examples

CO5: Design appropriate machine learning algorithms for different problems

Text Book:

1. Tom M. Mitchell, *Machine Learning*, Tata McGraw Hill, 2017

Reference Books:

1. Jeremy Watt, Reza Borhani, Aggelos K Katsaggelos, *Machine Learning Refined Foundations, Algorithms & Applications*, Cambridge University Press, , 2016.
2. Ethem Alpaydin, *Introduction to Machine Learning*, MIT Press Cambridge, 2010.
3. Andreas C. Muller and Sarah Guido, *Introduction to Machine Learning with Python*, O'Reilly Media, First Edition, 2016.

E -Resources:

1. https://nptel.ac.in/courses/106/106/106106139/
2. https://onlinecourses.nptel.ac.in/noc22_cs58/preview

Course Outcomes	**Programme Outcomes**							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	9	9	**37**
CO2	9	1	3	3	3	9	9	**37**
CO3	9	1	3	3	3	9	9	**37**
CO4	9	1	9	3	3	9	9	**43**
CO5	9	3	9	9	3	9	9	**51**
Total	**45**	**7**	**27**	**21**	**15**	**45**	**45**	**205**

Low-1 Medium-3 High-9

XXX ACADEMIC COUNCIL

Core XV - Project
(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 18**
Subject Code: IMCSC43PW **Credit: 5**

Course Objectives:

1. To understand the fundamental principles of Project management and be familiar with the different methods and techniques used for project development
2. To get good knowledge of the issues and challenges faced while doing the project and to do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques

Students have to undergo an individual project work either on campus or in an industry and appear for the viva voce examination with the software developed and document prepared by them

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Identify goals, constraints, deliverables, performance criteria and resource requirements in consultation with stakeholders
CO2: Implement the plan by executing the code
CO3: Integrate the various aspects of software development for the total project
CO4: Construct the entire software project according to the specific problem
CO5: Check the software project by executing with the various data

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	9	9	9	9	**63**
CO2	9	9	3	9	9	3	3	**45**
CO3	9	9	9	3	9	9	9	**57**
CO4	9	9	9	3	9	9	3	**51**
CO5	9	9	3	9	9	9	9	**57**
Total	**45**	**45**	**33**	**33**	**45**	**39**	**33**	**273**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Extra Credit I - RDBMS Lab

(For Students Admitted from 2024-25)

Semester: I
Subject Code: IMCSX1P **Credit: 2**

Course Objectives:

1. To explain basic database concepts, applications, data models, schemas and instances and emphasize the importance of normalization in databases
2. To demonstrate the use of constraints and relational algebra operations and describe the basics of SQL and construct queries using SQL

List of Programs

SQL DDL

1. Create an address table with fields name, doorno , street & city
   - describe its structure
   - alter the table to include pincode
   - alter the table to modify street column
   - drop the table

DML

2. Create a student table with regno, name, age and dept.
   - insert records
   - delete the students with age above 20
   - truncate and drop the table

Functions

3. Create an employee table with fields eno , ename , sex ,age & years of experience
   - find out the no. of female employees
   - find out the employees with age ranging between 30 and 35
   - list out the employees who are working more than 5 years
4. Create a library file with fields accno,title,author,cost & no of copies
   - arrange the books according to accno
   - find out the TOTAL no. of books available in the library
   - find out the book of minimum cost
5. Create a player table with fields name,sports(cricket,hockey,etc.),age & country
   - find out the eldest and youngest player
   - group players according to sports
   - list out the Indian players
6. Write the SQL queries to illustrate all number functions
7. Write the SQL queries to illustrate date functions
8. Write the SQL queries to illustrate all string functions
9. Create an item table with field's itemno, itemname, quantity & price and insert records.
10. Illustrate the comparison operators (between, like, in & isnull)

EXACADEMIC COUNCIL

11. Create a table with the fields clientno, clientname & phoneno. Illustrate the set operators union , unionall, minus & intersect
12. Create a student table with fields' regno, name, English, Tamil, Maths and TOTAL
    - insert records
    - arrange all records according to TOTAL
    - find the student who got first mark in Maths
    - list out the students whose name starts with 'S'
13. Create an inventory table with fields' itemno, itemname, qnty, price and reorder level
    - insert records
    - update the qnty when it goes less than reorderlevel
    - list the items with price less than 100
14. Create an employee table with fields ecode, ename, age & salary and create a department table with fields ecode, designation, deptcode & dept. Illustrate joins and sub queries using the above tables.

Constraints

15. Create a vendormaster table with fields vencode,venname,place and phoneno
    Create an ordermaster table with fields item no, itemcode, vencode, qnty and orderdate.
    Illustrate the following constraints using the above tables
    - vencode as primary key in vendormaster
    - vencode as foreign key in ordermaster
    - phoneno as unique
    - place as notnull &
    - qnty > 100

Note: - Questions for the external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Demonstrate DDL, DML and TCL Commands

CO2: Apply the basic concepts of Database Systems and Applications

CO3: Illustrate the use of implementing constraints in tables

CO4: Implement normalization queries using SQL in database creation and interaction

CO5: Design ER-models to represent simple database application scenarios

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	9	1	3	9	9	**41**
CO2	9	1	9	1	3	9	9	**41**
CO3	9	1	9	1	3	9	9	**41**
CO4	9	1	9	1	3	9	9	**41**
CO5	9	1	9	1	3	9	9	**41**
Total	**45**	**5**	**45**	**5**	**15**	**45**	**45**	**205**

Low- 1 Medium-3 High-9

XX ACADEMIC COUNCIL

Extra Credit II - Internship

(For Students Admitted from 2024-25)

Semester: II
Subject Code: IMCSX2P **Credit: 2**

Course Objectives:

1. To articulate and apply principles learned in and outside of the classroom to a specific internship site experience
2. To get the practical knowledge to apply programming skills for developing a project

Students have to undergo an internship in an industry and submit report prepared by them about the internship programme.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Understand self-understanding, self-confidence, and interpersonal skills

CO2: Assess Strengths, Weaknesses, Opportunities and Threats (SWOT) and explore career options and gain general work experience

CO3: Examine any specific learning outcomes identified in supplemental documentation provided as part of the internship application process

CO4: Apply various soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship organization

CO5: Create the document which contains company profile by compiling the brief history, management structure, products / services offered, key achievements and market performance for organization of internship

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	3	9	**39**
CO2	9	3	3	9	1	1	9	**35**
CO3	3	3	3	9	1	1	9	**29**
CO4	9	1	3	9	1	1	9	**33**
CO5	9	3	1	9	1	3	9	**35**
Total	**39**	**13**	**13**	**45**	**7**	**9**	**45**	**171**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Extra Credit IV – Document Preparation Lab (LATEX)

(For Students Admitted from 2024-25)

Semester: IV
Subject Code: IMCSX4P **Credit: 2**

Course Objectives:

1. To get practical knowledge on preparing documents containing mathematical formulas
2. To prepare a technical and scientific documentation

List of Programs

1.Create a document using an input file
2.Create a document using special symbols, dashes, line breaks & footnotes
3.Create a document using the sectioning command
4.Create a document using quotations, typestyle, commands & environments
5.Create a document using the mathematical symbol
6.Create a document using arrays and table
7.Create a document using a bibliography
8.Create a document using clauses and page style
9.Create a document using pictures and colors
10.Create a document using basics of the math index
11.Create a document using fine print and bibliography database
12.Create a document using math mode, tabbing environment, and files

Note: - Questions for the External examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Identify bibliography database
CO2: Relate math mode, and fine print
CO3: Apply mathematical symbol to create the document
CO4: Select clauses, typestyle, commands, and page style
CO5: Create Latex documents

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low- 1 Medium-3 High-9

XX ACADEMIC COUNCIL

B Sc Information Technology

(Three Year Regular Programme)

(For Students Admitted from 2024-25)

Programme Specific Outcomes (PSO):

On completion of this programme, student will be able to

PSO1: Exhibit technical skills and excel as computer professionals, academicians, researchers and entrepreneurs

PSO2: Implement professional practice along with ethical values to serve the society

PSO3: Developing strong problem solving, analyzing and decision-making abilities. Identify the informationand apply their disciplinary knowledge and professional skills to meet required specification

PSO4: Extract computing solutions for real-world problems with the help of interdisciplinary area

PSO5: Apply strong communication and interpersonal skills, to reveal their ideas effectively in a working environment

PSO6: Engage in life-long learning, to remain stable in their profession and update themselves to enhance their career positions in IT industries

PSO7: Impart students to develop the programming knowledge

PREAMBLE

The Board of Studies of Computer Science revamped the curriculum with the following changes

Core Course

- Digital Electronics, Programming in C, Operating Systems and Programming in Java syllabus has been reduced
- RDBMS Lab syllabus has been reduced

Skill Enhancement Course

- Web Designing Lab(HTML and Scripting Language) has been reframed

Discipline Specific Elective

- Blockchain Technology syllabus has been reduced
- Organizational Behavior paper has removed and Digital Marketing has been introduced

Extra Credit:

- Coral Draw Lab removed and Desktop Publishing Lab has been introduced
- Visual Basic Lab has been removed and NoSQL Lab has been introduced

XXA ACADEMIC COUNCIL

PROGRAMME STRUCTURE – PROGRAM CODE: UIT

Sem	Subject Code	Course	Subject Title	Hours / Week	Credit	CIA	ESE	Total Marks
I	IBLT112/ IBLA111/ IBLH111	LanguageI	Tamil I/ Arabic I/ Hindi I	5	3	25	75	100
	IBLEI12/ IBLEII12	LanguageII	English I a (or) b	5	3	25	75	100
	IBITC111	Core I	Principles of Information Technology	5	4	25	75	100
	IBITC121	Core II	**Digital Electronics**	6 (T-4 P-2)	5	25 (T-15 P-10)	75	100
	IBITA13	AECC I	Accounting Principles & Package	5	4	25	75	100
	IBITS141P	SEC I	Office Automation Lab	2	2	-	50	50
			Library/Browsing	1	-	-	-	-
			Remedial/Games	1	-	-	-	-
			TOTAL	**30**	**21**	**125**	**425**	**550**
II	IBLT212/ IBLA211/ IBLH211	Language I	Tamil II/ Arabic II/ Hindi II	5	3	25	75	100
	IBLEI22/ IBLEII22	Languages	English II a (or) b	5	3	25	75	100
	IBITC211	Core III	○ **Programming in C**	5	5	25	75	100
	IBITC22P	Core IV	Programming in C Lab	4	4	25	75	100
	IBITA23	AECCII	Costing Accounting & Package	5	4	25	75	100
	IBITS24P	SEC II	Designing Lab	2	2	-	50	50
	IBES2	GIC I	Environmental Science	2	2	-	50	50
			Library/Browsing	1	-	-	-	-
			Remedial/Games	1	-	-	-	-
	IBITX21P/ IBITX2O	Extra Credit I	***Desktop Publishing Lab***/ * Online Course	-	2	-	100	100
			TOTAL	**30**	**23+2**	**125**	**475+ 100**	**600+ 100**
	IBLT311/ IBLA31/	LanguageI	Tamil III / Arabic III / Hindi III	5	3	25	75	100

XI ACADEMIC COUNCIL

III	IBLH311							
	IBLEIB32/ IBLEIIA32	Language II	English III a (or) b	5	3	25	75	100
	IBITC31	Core V	Programming in C++	4	4	25	75	100
	IBITC32P	Core VI	Programming in C++ Lab	4	4	25	75	100
	IBITA33	AECCIII	Discrete Mathematics	4	4	25	75	100
	IBITS341P	SEC III	**Web Designing Lab (HTML and Scripting Language)**	2	2	-	50	50
		OEC		2	2	-	50	50
	IBHR3	GIC II	Human Rights	2	2	-	50	50
	IBXTN3	Extension	NSS / CSS	2	2	100	-	100
	IBITX31P/ IBITX3O	Extra Credit II	***NoSQL Lab*** / * Online Course	-	2	-	100	100
			Total	**30**	**26+2**	**225**	**525+ 100**	**750+ 100**
IV	IBLT41/ IBLA41/ IBLH411	Language I	Tamil IV / Arabic IV / Hindi IV	5	3	25	75	100
	IBLEI42/ IBLEII42	Language II	English IV a (or) b	5	3	25	75	100
	IBITC411	Core VII	# RDBMS	5	4	25	75	100
	IBITC421P	Core VIII	**RDBMS Lab**	4	4	25	75	100
	IBITA43	AECCIV	Statistics	5	4	25	75	100
	IBITS44P	SEC IV	Programming in PHP Lab	2	2	-	50	50
	IBLVE4	GIC III	Life Skills and Value Education	2	2	-	50	50
		OEC		2	2	-	50	50
	IBITX4P/ IBITX4O	Extra Credit III	#R Tool Lab	-	2	-	100	100
			Total	**30**	**24+2**	**125**	**525+ 100**	**650+100**
	IBITC511	Core IX	Software Engineering	6	5	25	75	100
	IBITC521	Core X	**Operating Systems**	6	5	25	75	100
	IBITC53	Core XI	Data Structures and Algorithms	6	5	25	75	100
	IBITE5A/ IBITE51B	DSE I	a)Computer System Architecture	4	4	25	75	100

XK ACADEMIC COUNCIL

V			b)Cloud and Distributed Computing					
	IBITE51C/ IBITE51D	DSE II	a)**Blockchain Technology** b)Internet of Things	4	4	25	75	100
	IBITS54P	SEC V	Linux and Shell Programming Lab	2	2	-	50	50
	IBWE5	GIC IV	Women Entrepreneurship	2	2	-	50	50
	IBITX5/ IBITX5O	Extra Credit IV	Employability Skills	-	2	100	-	100
			Total	**30**	**27+2**	**125+ 100**	**475**	**600+100**
VI	IBITC611	Core XII	Computer Networks	6	5	25	75	100
	IBITC621	Core XIII	**Programming in Java**	6	4	25	75	100
	IBITC63P	Core XIV	Programming in Java Lab	5	4	25	75	100
	IBITC64PW	Core XV	Project	6	5	25	75	100
	IBITE6A/ IBITE61B	DSE III	a)Artificial Intelligence and Expert System b)***Digital Marketing***	4	4	25	75	100
	IBITS65P	SEC VI	Open Technology Lab	2	2	-	50	50
	IBITX6P/ IBITX6O	Extra Credit V	Data Mining Lab/*Online Course	-	2	-	100	100
			Library / Browsing	1	-	-	-	-
			Total	**30**	**24+2**	**125**	**425+ 100**	**550+100**
			Grand Total	**180**	**145+ 10**	**850+1 00**	**2850 +400**	**3700+ 500**

*****For Online Course credit alone will be assigned on submission of certificate obtained by appearing for online examination from EdX, Spoken Tutorial, NPTEL or Coursera etc.

#For internship course, refer www.internshala.com or any online internship course

- For online course integration, syllabus will be taken from spoken tutorial, swayam, edx, Udemy, coursera

AECC - Ability Enhancement Compulsory Course
SEC - Skill Enhancement Course
DSE - Discipline Specific Elective
OEC - Open Elective Course
GIC – General Interest Course

VK ACADEMIC COUNCIL

Core I – Principles of Information Technology

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 5**
Subject Code: IBITC111 **Credit: 4**

Course Objectives:

1. To know the generation of computers and various I/O devices
2. To understand new developments in the digital communication and Networks

Unit I **(15 hours)**

Computer Basics: Algorithms-Simple model of Computer - Characteristics of a Computer - Problem solving of a computer. **Data Representation:** Representation of Characters, Integers, Fractions and Hexadecimal numbers-Decimal to Binary Conversion.

Unit II **(15hours)**

Input/output Units: Traditional Computer Input/output Units- other Input Technologies-Computer Output Devices. **Computer Generation**: First Generation-Second Generation-Third Generation-Fourth Generation-FifthGeneration-Moore Law-Classification of Computers.

Unit III **(15 hours)**

Computer Memory: Memory Cell-Memory Organization-ROM-Serial Access Memory-Physical Devices Used to Construct Memories-Magnetic Hard Disk-CDROM-Magnetic Tape Drive-Memory Hierarchy. **Computer Architecture:** Interconnection of Units-Processor to Memory Communication-I/O Devices to processor Communication-Interrupt Structures-Multiprogramming.

Unit IV **(15 hours)**

Computer Network: Communication Protocols-LAN-Using Public switched Telephone Network to ConnectComputers-Interconnecting Networks-Internet and WWW-Internet Security. **Voice and Data Communications:** Communication Channels-Allocation of Communication Channel-Physical Communication Media -Cable Modems- Cellular Communication Systems

Unit V **(15 hours)**

Multimedia Data Acquisition: Image Acquisition-Storage formats for pictures-Compression of Video Data- MPEG Compression Standard-Acquiring and Storing Audio Signals- **Emerging Computing Environments:** Current Computing Scenario -Grid computing-Cloud Computing.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Summarize the concept of computer system, architecture, network, memory
CO2: Explain how computers are networked and how an operating system interacts with hardware
CO3: Illustrate the working of voice and data communication systems and networks
CO4: Evaluate and measure the performance of computer security and virus

EXACADEMIC COUNCIL

CO5: Develop the applications in multimedia and cloud computing

Text Book:

1. V Raja Raman, Neeharika Adabala, *Fundamentals of Computers***,** PHI Learning Private Limited, 2018

Reference Books:

1. Alex Leon, Methew Leons, *Fundamentals of Information Technology,* Tata McGraw Hill, Fourth Edition, 2007
2. Bethesda MD, *Planning for Integrated Academic Information Management Systems,* Proceedings of a symposium sponsored by the National Library of Medicine, 1984

E-Resources:

1. https://www.coursera.org/courses?query=computer%20fundamentals
2. https://www.classcentral.com/course/swayam-computer-fundamentals-13950
3. http://osou.ac.in/eresources/dca01-block01-computer-fundamental.pdf

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	3	9	3	9	**37**
CO2	9	3	3	3	3	9	9	**39**
CO3	9	1	9	9	3	3	9	**43**
CO4	3	1	3	9	9	3	3	**31**
CO5	9	1	9	3	3	9	9	**43**
Total	**39**	**9**	**25**	**27**	**27**	**27**	**39**	**193**

Low-1 Medium-3 High-9

Core II - Digital Electronics

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6(T: 4 P: 2)**
Subject Code: IBITC121 **Credit: 5**

Course Objectives:

1. To know the fundamental concepts associated with the digital logic and circuit design
2. To understand the concepts of different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems.

Unit I **(12 hours)**

Number Systems and Codes: Introduction - binary, octal, decimal, and hexadecimal number

AA-ACADEMIC COUNCIL

system- decimal to binary, octal to binary, hexadecimal to binary – hexadecimal to octal conversions and vice versa - binary arithmetic - 1s and 2s complement representations-BCD addition and subtraction.

Unit II **(12 hours)**

Basic Boolean functions: Boolean theorems and laws - use of Boolean algebra for simplification of logical expressions - canonical sum of products and product of sum simplifications - minimization of logical expressions using K-map - logic gates - AND, OR, NOT, EX- OR, NAND, NOR gates.

Unit III **(12 hours)**

Introduction to combinational logic circuits: arithmetic circuits – half adder, full adder, half subtractor, full subtractor, parallel binary adder - subtractor, serial adder, multiplier and divider.

Unit IV **(12 hours)**

Introduction to sequential circuits: flipflops - SR, JK, D and T flipflops - master-slave flipflops - level and edge triggering - synchronous and asynchronous counters - shift registers - serial in serial out - serial in parallel out, parallel in serial out and parallel in parallel out shift counters.

Unit V **(12 hours)**

Read only memory- architecture of ROM, PROM, EPROM, EEPROM - RAM architecture - static and dynamic RAM.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Understand the basics of number systems, Boolean functions, logic and sequential circuits, and memory architecture

CO2: Implement number systems, boolean functions to simplify the logical expressions

CO3: Examine the operations of various number systems and boolean functions, and design guidelines of logic and sequential circuits

CO4: Evaluate the functions of the memory organization using number systems, boolean functions, and logic and sequential circuits

CO5: Design and implement real time digital systems

Text Book:

1. S. Salivahanan, S. Arivazhagan, *Digital Circuits And Design*, Oxford University Press, 2018

Reference Books:

1. M. Morris Mano and Michael D. Ciletti, *Digital Design*, Pearson Education, Fifth Edition,2014.
2. A.Anand Kumar, Fundamentals *of Digital Circuits*, PHI Learning Private Limited, Fourth Edition, 2016.
3. Anil K.Maini , *Digital Electronics*, Wiley Publications, 2014.
4. Charles H.Roth, *Fundamentals of Logic Design*, Thomson Learning, Sixth Edition, 2013.

EX ACADEMIC COUNCIL

E-Resources:

1. NPTEL: https://nptel.ac.in/courses/108/105/108105113/
2. Swayam: https://www.classcentral.com/course/swayam-digital-electronic-circuits-12953
3. Swayam: https://onlinecourses.swayam2.ac.in/cec21_cs16/preview
4. https://tutorialsinhand.com/tutorials/digital-electronics-tutorial/digital-electronics-basics/digital-electronics-introduction.aspx
5. https://www.udemy.com/course/introduction-to-digital-electronics/
6. https://www.udemy.com/course/basics-of-digital-electronics/

Digital Electronics (Lab)

Hours/Week: 2

Program List

Logic Gates

1. Verification of AND Gate using ICs
2. Verification of OR Gate using ICs
3. Verification of NOT Gate using ICs
4. Verification of NAND Gate using ICs
5. Verification of NOR Gate using ICs
6. Verification of EX-OR Gate using ICs

Universal Gates

7. Universality of NAND gates using IC 7400
8. Universality of NOR gates using IC 7402

Boolean algebra and Theorem

9. Verification of Boolean Expression using ICs
10. Verification of Demorgan's theorems using ICs

Combinational Logic Circuits

11. Binary half and full adder using ICs
12. Binary half and full subtractor using ICs

Note: - Questions for internal examination will be based on concept learnt

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	3	9	**37**
CO2	9	3	3	1	9	3	9	**37**
CO3	9	3	3	1	9	3	9	**37**
CO4	9	3	3	1	9	3	9	**37**
CO5	9	3	3	1	9	3	9	**37**
Total	**45**	**15**	**15**	**5**	**45**	**15**	**45**	**185**

Low-1 Medium-3 High-9

XV ACADEMIC COUNCIL

SEC I - Office Automation Lab

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 2**
Subject Code: IBITS141P **Credit: 2**

Course Objectives:

1. To acquire knowledge about word processing, spread sheet, Data base creation and slide preparation
2. To improve creative thinking in presentations

Program List

Word Processing:

1. Create a word processing document consists two pages in a Book named "XX" and then do the following:
   a. Formatting Text, Alignment and Font Style
   b. Perform Find and Replace
   c. Add Header and Footer option to specify name of the Book Chapter Heading and Page number of total pages
2. Create a word processing document having details of our College courses using bulleted and number lists.Type the title using Word Art.
3. Design a Letter to felicitate Farewell Address to our seniors with Font Setting/Page Borders/Word Art/Clip Art/Symbols.
4. Create a Newsletter Article (using Columns, Drop cap)

Spread Sheet:

1. Create a spreadsheet consists of Student details and then do the following:
   a. Calculate student wise total and subject wise total
   b. Find the Maximum and Minimum marks of the subject
2. Grade is calculated as
   i. If %>=90, then grade A
   ii. If %>=80 and <90, then grade B
   iii. If %>=70 and <80, then grade C
   iv. If %>=60 and <70, then grade D
   v. If %<60, then grade F
3. Create a spreadsheet having Employee details suitably and then do the following
   a. Use functions to calculate Net Pay and Gross Pay
   b. Perform conditional formatting and validation

Presentation:

1. Create a presentation showing your various activities of the department a Performslide translation and Setting background designs
2. Create a presentation showing various aspect of your college and perform custom animation and import sound.

Database:

1. Create a Student Database having Name, Regno, Tamil, English, Maths, Total, and Average

KA ACADEMIC COUNCIL

Perform to findtotal and average and check data entered.

2. Create an Inventory database having Item Name, Item no. Quantity and Price. Perform query operation toretrieve data.

Note:- Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Illustrate various options of office application
CO2: Demonstrate different types of formats, formulas and transition in office application
CO3: Develop reports to solve the problems of manual report handling
CO4: Compare the options of different Microsoft office applications to use appropriately
CO5: Build a presentation, advertisement, reports etc for enterprises

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	**45**
CO2	9	9	3	9	9	9	9	**57**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	3	3	9	3	9	**45**
Total	**45**	**39**	**15**	**27**	**45**	**27**	**45**	**243**

Low-1 Medium-3 High-9

Core III - Programming in C

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 5**
Subject Code: IBITC211 **Credit: 5**

Course Objectives:

1. To improve the knowledge of complete understanding of Programming language C
2. To understand the main features of operators, input/ output statements, control statements and program structure

Unit I **(15 hours)**

Introduction to C Programming: C Character Set-Writing first program of C- Identifiers and Keywords - Data types- Constants -Variables and Arrays- Declarations - Expressions- Statements- Symbolic constants. **Operators and Expressions:** Arithmetic Operators-Unary Operators - Relational and logical Operators-Assignment Operators-The conditional Operators.

EX ACADEMIC COUNCIL

Unit II **(15 hours)**

Data Input and Output: The getchar function- The putchar function - The scanf function-The printf function- gets and puts function. **Control Statements-Branching:** The If-else Statement- Looping- while statement- do-while statement- for statement -nested control structures- switch statement - break statement- continue statement- coma operator -goto statement.

Unit III **(15 hours)**

Program Structure: Storage classes – Automatic variables – External variables – Static variables – Multi File programs. **Arrays:** Defining Array – Processing an Array – Passing arrays to Functions – Multidimensional arrays**. Strings- Functions:** Defining a function - Accessing a function -Function prototypes- Passing arguments to a function- Recursion

Unit IV **(15 hours)**

Pointers: Fundamentals – Pointer Declarations – Passing pointers to a function – Pointers and one dimensional arrays – Dynamic memory allocation – Operations on pointers - Pointers and multidimensional arrays – Arrays of Pointers - Passing functions to other functions .

Unit V **(15 hours)**

Structures and Unions: Defining a Structure – Processing a Structure – User defined data types – Structures and pointers – Passing structures to functions – Self Referential structures – Unions. **File Handling:** Opening and closing a Data file – Reading and writing a data file – Processing a data file – Unformatted data files – Concept of binary files – Accessing the file randomly

Course Outcomes:

After successful completion of this course, the student will be able to

CO1: Describe the basic programming knowledge of C, operators and expressions
CO2: Demonstrate data input and output, control statements & functions
CO3: Analyse program structure and arrays
CO4: Evaluate strings and pointers
CO5: Formulate structures, unions and file handling

Text Book:

1. Byron Gottfried, *Programming with C*, Tata McGraw Hill, Fourth Edition, 2018.

Reference Books:

1. Balagurusamy E**,** *Programming in ANSI C*, Tata McGraw Hill, Sixth Edition, 2012.
2. Venugopal K R , Sudeep R Prasad, *Programming with C*, Tata McGraw Hill ,2008.
3. Mullish, Henry Cooper, Herbert, *The Spirit of C - An Introduction to Modern Programming*, Jaico Publishing House, Third Edition, 2006.

E - Resources:

1. https://onlinecourses.nptel.ac.in/noc19_cs42/preview

KU ACADEMIC COUNCIL

2. https://nptel.ac.in/courses/106/105/106105171/
3. https://onlinecourses.nptel.ac.in/noc21_cs01/preview
4. https://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	9	3	9	**45**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	9	3	9	9	9	**57**
Total	**45**	**21**	**21**	**21**	**45**	**27**	**45**	**225**

Low-1 Medium-3 High-9

Core IV- Programming in C Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 4**
Subject Code: IBITC22P **Credit: 4**

Course Objectives

1. To introduce the field of programming using C language
2. To enhance the analyzing and problem solving skills and use the same for writing programs in C

Program List

Formula substitution

1. Develop a C Program to check whether the given number is odd or even
2. Develop a C Program to find sum of the digits and reverse the digits
3. Develop a C Program to generate the Fibonacci series
4. Develop a C Program to generate Prime number within range
5. Develop a C Program to find whether a given number is Armstrong or not
6. Develop a C Program to count the number of positive, negative and zero in the list
7. Develop a C Program to solve the Quadratic Equation
8. Develop a C Program to find the area of various shapes using switch case

Array

9. Develop a C Program to Find Matrix Addition , Subtraction, Multiplication and Transpose of a matrix using switch case
10. Develop a C Program to Check whether the element is present in the given list or not
11. Develop a C Program to sort numbers in ascending and descending order
12. Develop a C Program to sort names in Alphabetical order

EX ACADEMIC COUNCIL

Functions & Structures

13. Develop a C Program to find the factorial of a given number using function declaration
14. Develop a C Program to find the factorial of a given number using recursion function
15. Develop a C Program to Prepare student mark list using structure
16. Develop a C Program to Prepare electricity bill using structure

String Manipulation

17. Develop a C Program to count the vowels in the given string
18. Develop a C Program to convert the case of given string from upper case to lower case and vice versa

Pointers

19. Develop a C Program to sort numbers in ascending order using pointers
20. Develop a C Program to find average of two numbers using pointers

Note:-Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of the course, student will be able to

CO1: Remember the control structures and loops
CO2: Apply the concepts of functions and pointers
CO3: Analyze the concepts of structures and arrays
CO4: Evaluate string handling functions
CO5: Create programs with pointers, arrays and structures

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**15**	**5**	**45**	**45**	**45**	**215**

Low-1 Medium-3 High-9

SEC II –Designing Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 2**
Subject Code: IBITS24P **Credit: 2**

Course Objectives:

1. To understand the basic concepts of GIMP
2. To gain knowledge about various tools of GIMP

XX ACADEMIC COUNCIL

GIMP

1. Design a Business card
2. Create a logo
3. Convert an image into pencil drawing
4. Design a scenery using various brushes
5. Design a greeting card
6. Create clipping mask – place an image inside text
7. Create passport size photo
8. Animate a still photo
9. Create a shadow effect for an object
10. Create a mirror effect for an image
11. Apply the following tools in an image:
    i) Smudge ii)Blur/Sharpen iii)Dodge/Burn
12. Create a mosaic photo collage

Note:-Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Recognize the uses of various tools and effects in GIMP
CO2: Identify the steps to start designing with images
CO3: Simplify the process of designing, editing, masking etc. to solve the difficulties of designers
CO4: Support studios to create passport size photo
CO5: Design visiting card, ID card, birthday card, logo etc.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	9	9	1	**43**
CO2	9	1	9	9	3	9	3	**43**
CO3	9	3	9	9	3	9	9	**51**
CO4	9	1	3	9	3	9	3	**37**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**17**	**39**	**39**	**27**	**45**	**25**	**237**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core V- Programming in C++

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 4**
Subject Code: IBITC31 **Credit: 4**

Course Objectives:

1.To enhance the knowledge of complete understanding of programming language C++
2.To understand the main features of operators and control statements

Unit I **(12 hours)**

Principles of Object-Oriented Programming Paradigm: Basic Concepts of Object Oriented Programming-Benefits of OOP - Object Oriented languages - Application of OOP.**Beginning with C++:** What is C++ - Applications of C++ - A Simple C++ program – More C++ statements-An example with Class – Structure of C++ program – Creating the source file – Compiling and Linking.**Tokens, Expressions and Control Structure**: Introduction – Tokens – Keywords – Identifiers and Constants-Data types – Operators in C++ - Operator Overloading – Operator Precedence – Control structures.

Unit II **(12 hours)**

Functions in C++: Introduction- The main function- Function prototyping- Call by Reference- Return by Reference- Inline Functions- Default Arguments- Const Arguments- Function Overloading- Function and Virtual Functions- Math Library Functions.**Classes and Objects:** Introduction , Specifying a Class, Defining Member Functions, A C++ Program with Class, Making an Outside Function Inline, Nesting of Member Functions, Private Member Functions, Arraywithin a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Array of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects, Const Member Functions.

Unit III **(12 hours)**

Operator Overloading and Type Conversions: Introduction, Defining Operator Overloading – Overloading Unary, Binary Operators – Overloading Binary Operators using Friends – Manipulation of Strings using Operators - Rules for Overloading Operators.**Inheritance:** Extending Classes: Introduction, Defining Derived Class, Single Inheritance, Making Private Member Inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Class, Abstract Classes, Constructors in Derived Classes, Member Classes: Nestingof Classes.

Unit IV **(12 hours)**

Pointers, Virtual Functions and Polymorphism: Introduction, Pointers, Pointers to Objects, this Pointer, Pointer to Derived Classes, Virtual Functions, pure Virtual functions.**Managing Console I/O Operations:** Introduction, C++ Streams, C++ Stream classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators.

KX ACADEMIC COUNCIL

Unit V **(12 hours)**

Working with files: Introduction – classes for file stream operations- opening and closing a file – DetectingEnd of file – more about open - File modes.**Templates:** Introduction – class Templates – class templates – class templates with multiple parameters-function templates – function templates with multiple parameters.**Exception Handling:** Introduction- Basics of Exception Handling – Exception Handling Mechanism-throwing Mechanism-catching mechanism.

Course Outcomes:

After successful completion of this course, the student will be able to

CO1: Describe the principles of object oriented programming paradigm, C++ tokens, expressions andcontrol structures

CO2: Illustrate functions in C++, the concept of classes and objects

CO3: Analyse operator overloading, type conversions and inheritance extending classes

CO4: Relate pointers, virtual functions, polymorphism and managing console I/O operations

CO5: Formulate working with files, templates and exception handling

Text Book:

1. E. Balagurusamy, *Object - Oriented Programming with C++*, Eighth Edition, Tata McGraw-HillPublishing Company Limited, 2020.

Reference Books:

1. Ivor Horton, *Beginning C++ The Complete Language*, Shroff Publishers and DistributorsPrivate Limited, 2007.
2. Venugopal K R, Rajkumar B, and RaviShankar T, *Mastering C++*, Tata McGraw Hill**,** Fifth Reprint, 2006.

E - Resources:

1. NPTEL: https://onlinecourses.nptel.ac.in/noc21_cs02/preview
2. NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-cs38/
3. NPTEL: https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs17/
4. NPTEL: https://nptel.ac.in/courses/106/101/106101208/
5. https://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

Course Outcomes	**Programme Outcomes**							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	9	3	9	**45**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	9	3	9	9	9	**57**
Total	**45**	**21**	**21**	**21**	**45**	**27**	**45**	**225**

Low-1 Medium-3 High-9

XXX ACADEMIC COUNCIL

Core VI - Programming in C++ Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 4**
Subject Code: IBITC32P **Credit: 4**

Course Objectives

1. To solve simple programs using C++
2. To implement operator overloading and inheritance

Program List

Formula Substitution

1. To check a given number is odd or even
2. To check a given number is palindrome or not using class
3. To sort the list of numbers using class

Functions

4. To check a given number is positive or negative using function
5. To find sum of digit using nesting of member function
6. To demonstrate unary operator using friend function

Constructors

7. To find reverse of digit using constructor

Overloading

8. To find area of shapes using function overloading
9. To add two complex numbers using binary operator overloading

Inheritance

10. To perform student mark list using single inheritance
11. To prepare electricity bill using multilevel inheritance

Pointer

12. To searching an element in the list using pointer
13. To checking a given number is prime or not using pointer to object

File Handling

14. To create a new files to store content and display number of words in the files

Exception Handling

15. To demonstrate user defined exception

Note: - Questions for Internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of the course, student will be able to

XX ACADEMIC COUNCIL

CO1: Remember the different programming paradigm such as procedure oriented and object-oriented programming methodology and conceptualize elements of OO methodology
CO2: Apply the concepts of object oriented programming
CO3: Analyze the usage of pointers and exception handling
CO4: Evaluate the concepts of inheritance and overloading features.
CO5: Create programs with the usage of files, templates and exception Handling

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**15**	**5**	**45**	**45**	**45**	**215**

Low-1 Medium-3 High-9

SEC III – Web Designing Lab (HTML and Scripting Language)

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 2**
Subject Code: IBITS341P **Credit: 2**

Course Objectives:

1. To analyze a web page and identify its elements and attributes
2. To build dynamic web pages by using scripting language

Program List

HTML

1. Create a HTML page for displaying the personal information by using various tags such as backgroundcolor, heading tag, font tag
2. Create a HTML page, which includes images and audio for any application.
3. Create a HTML page for displaying the Tender notice which is given to you
4. To create a Time Table of your class using HTML
5. Creation of Lists in HTML
6. Design a dictionary using frames. The words are displayed in one frame and when you click the word,the meaning will be displayed on the other frame
7. Design webpage for your company product advertisement using frames

ACADEMIC COUNCIL

VBScript

8. Write a VBScript program to generate random number
9. Write a VBScript program to check whether the given number is odd or even
10. Write a VBScript program to find the largest of three given integers
11. Write a VBScript program to sort the numbers in ascending order

JavaScript

12. Write a JavaScript program to create a simple Calculator
13. Write a JavaScript program to validate User Login page
14. Write JavaScript program to validate the following fields of the Registration page.
    a. First Name (Name should contains alphabets and the length should not be less than 6 characters)
    b. Password (Password should not be less than 6 characters length).
    c. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
    d. Mobile Number (Phone number should contain 10 digits only)
    e. Last Name and Address (should not be Empty).
    f.

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Understand the basics of HTML and JavaScript
CO2: Implement webpages using basic tags
CO3: Examine the use of tables in webpages
CO4: Develop a web pages with frames
CO5: Design interactive web pages using JavaScript

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	9	9	**45**
CO2	3	3	9	9	3	9	9	**45**
CO3	3	3	9	9	1	9	9	**43**
CO4	3	3	9	9	3	3	3	**33**
CO5	3	3	3	9	1	9	3	**31**
Total	**21**	**15**	**33**	**39**	**17**	**39**	**33**	**197**

Low-1 Medium-3 High-9

XXX ACADEMIC COUNCIL

Core VII- RDBMS

(For Students Admitted from 2024-25)

Semester: IV **Hours/Week: 5**
Subject Code: IBITC411 **Credit: 4**

Course Objectives:

1. To understand the basic concepts, applications of database systems, relational database design principles and SQL queries
2. To understand the different issues involved in the design and implementation of a database system, security, integrity and concurrency

Unit I **(15 hours)**

Introduction: Database System Applications-Purpose of Database System-View of Data-Database Design- **Data Storage and Quering**-Transaction Management-Database Architecture .**Relational Databases:** Introduction to the Relational Model-Introduction to SQL-Intermediate SQL: Join Expressions-Views- Transactions-Integrity constraints-Schemas-Authorization.

Unit II **(15 hours)**

Database Design: Database design and E-R Model: Overview -ER-Model-Constraints- ER-Diagrams- Reduction to Relational Schemas – Design Issues-.Relational database model: Logical view of data- keys. **Relational Database design:** Features of good relational database design-Atomic domain and Normalization (1NF- 2NF- 3NF- BCNF).Database-Design Process-Modeling Temporal Data.

Unit III **(15 hours)**

Data Storage and Querying: Storage and File Structure: Overview of Physical Storage-Magnetic Disk and Floppy Disk-RAID- Organization of Records in Files-**Indexing and Hashing:** Basic Concepts-Ordered Indices-Multiple Key Access-Static Hashing-Dynamic Hashing-Bit Map Indices. **Query Processing**: Overview-Selection Operation-Sorting-Join Operation.

Unit IV **(15 hours)**

Transaction Management: Transaction: Transaction Concept-Simple Transaction Model-Storage Structure- Transaction Atomicity and Durability-Transaction Isolation.**Concurrency Control:** Lock- Based Protocols-Deadlock Handling-Multiple Granularity-Time Stamp Protocols-Valuation Based Protocols. **Recovery System:** Failure Classification-Recovery and Atomicity-Recovery Algorithm-Failure Management.

Unit V **(15 hours)**

System Architechture Text: Database –System Architecture Centralisedand Client-Server Architecture- Server System Architechture-Parallel System-Distributed System-**Object Based Databases:** Complex Data Types –Table Inheritance-Implementing O-R Features

XX ACADEMIC COUNCIL

Course Outcomes:

After successful completion of this course, the student will be able to

CO1: Explore about DBMS architecture, database designs, database modeling

CO2: Extend about ER-Diagram and UML, Relational Algebra and Relational Calculus

CO3: Distinguish the normalization theory

CO4: Apply Structured query language (SQL) and Constraints

CO5: Evaluate various transaction processing, concurrency control mechanisms and database protection mechanisms

Text Book:

1. A Silberschatz , H Korth, S Sudarshan, *Database System and Concepts*, Mc Graw-Hill, Sixth Edition,2019

Reference Books:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems (3/e)*, McGraw Hill, 2003
2. Atul Kahate, *Introduction to Database Management Systems*, Pearson Education, Tenth Impression, 2012
3. C.J Date, *An Introduction to Database System*, Addison- Wesley Publishing, Third Edition, 1998

E-Resources:

1. https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
2. https://www.coursera.org/projects/introduction-to-relational-database-and-sql
3. https://onlinecourses.nptel.ac.in/noc21_cs04/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low-1 Medium-3 High-9

XXI ACADEMIC COUNCIL

Core VIII-RDBMS Lab

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 4**
Subject Code: IBITC421P **Credit: 4**

Course Objectives:

1. To get practical knowledge on designing and creating Relational Database Management
2. To understand various advanced queries such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL

SQL PROGRAMS:

DDL

1.Create an address table with fields name , doorno , street & city
- describe its structure
- alter the table to include pincode
- alter the table to modify street column
- drop the table

DML

2.Create a student table with regno, name, age and dept.
- insert records
- delete the students with age above 20
- truncate and drop the table

Functions

3.Create an employee table with fields eno , ename , sex ,age & years of experience
- find out the no. of female employees
- find out the employees with age ranging between 30 and 35
- list out the employees who are working more than 5 years

4.Create a library file with fields accno, title, author, cost & no of copies
- arrange the books according to accno
- find out the total no. of books available in the library
- find out the book of minimum cost

5.Create a player table with fields name,sports(cricket,hockey,etc.),age & country
- find out the eldest and youngest player
- group players according to sports
- list out the Indian players

6. Write the SQL queries to illustrate all number functions
7. Write the SQL queries to illustrate date functions
8. Write the SQL queries to illustrate all string functions
9. Create an item table with field's itemno, itemname, quantity & price and insert records.
10.Illustrate the comparison operators (between, like, in & isnull)
11. Create a table with the fields clientno , clientname & phoneno Illustrate the set operators union ,unionall, minus & intersect

ACADEMIC COUNCIL

12.Create a student table with fields' regno, name, English, Tamil, Maths and total & insert records
- arrange all records according to total
- find the student who got first mark in Maths
- list out the students whose name starts with 'S'

13. Create an inventory table with fields' itemno, itemname, qnty, price and reorderlevel
- insert records
- update the qnty when it goes less than reorderlevel
- list the items with price less than 100

14.Create an employee table with fields ecode, ename, age & salary and create a department table withfields ecode, designation, deptcode & dept. Illustrate joins and sub queries using the above tables.

PL / SQL:

Formula Substitution

15. PL / SQL block to find out the largest among three numbers
16. PL/SQL block to print the multiplication table for given multiplier

Functions

17. Write a PL/SQL block to find the sum of digits of a given number. Use function
18. Write a PL/SQL block to find the factorial of a given number using a function

Procedure

19. Create a student table with fields regno,name, maths ,physics&biology and insert records ,write a PL/SQL block to find the total , average & grade using procedure

Triggers

20. Creating and executing triggers

Note: - Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Build DDL, DML and TCL commands
CO2: Make use of implementing constraints in tables
CO3: Apply to create block structure programming language
CO4: Create the concepts of functions.
CO5: Develop the procedures, exceptions, triggers in PL/SQL block

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	1	3	3	3	3	3	25
CO2	9	1	1	3	3	3	3	23
CO3	9	3	3	3	9	9	9	45
CO4	9	1	9	3	9	9	9	49
CO5	9	3	9	3	9	9	9	51
Total	45	9	25	15	33	33	33	193

Low-1 Medium-3 High-9

XXX ACADEMIC COUNCIL

SEC IV – Programming in PHP Lab

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 2**
Subject Code: IBITS44P **Credit : 2**

Course Objectives:

1. To understand the concepts of regular expressions including modifiers, operators and metacharacters
2. To develop PHP programs that use various PHP library functions and that manipulate files anddirectories

Program List:

1. To print Sum of digits
2. To print factorial of a number
3. To display count, from 10 to 20 using loop
4. To print prime number
5. To check Armstrong number
6. To check Palindrome number
7. To swap two numbers with and without using third variable
8. To find if the given year is leap year or not
9. To reverse the number with strrev ()
10. To show day of the week (for eg: Monday) based on numbers using Switch/casestatements
11. To print number triangle
12. To print alphabet triangle
13. To check student grade based on the marks using if-else statement
14. Using nested for loop that creates a chess board

Note: - Questions for Internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe the fundamentals of PHP language in trivial problem solving.
CO2: Determine solution to a problem and apply control structures.
CO3: Simplify the use of strings and string handling functions.
CO4: Justify real time applications using PHP language features.
CO5: Build skill on problem solving by constructing algorithms

XXA ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	3	1	1	9	1	1	25
CO2	9	3	3	3	9	3	3	33
CO3	9	3	1	3	9	9	3	37
CO4	9	3	3	3	9	9	3	39
CO5	9	3	3	3	9	9	3	39
Total	45	15	11	13	45	31	13	173

Low-1 Medium-3 High-9

Core IX - Software Engineering

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 6**
Subject Code: IBITC511 **Credit: 5**

Course Objectives:

1. To provide the idea of decomposing the given problem into analysis, design, implementation, testing and maintenance phases and provide an idea of using various process models in the software industryaccording to given circumstances
2. To gain the knowledge of how analysis, design, implementation, testing and maintenance processes are conducted in a software project

Unit I **(18 hours)**

Introduction: Software engineering: A layered technology – A process framework – Process models – The waterfall model – Incremental process models – Evolutionary process models.
Software Engineering practice: Communication practices – Planning practices – Modeling practices – Construction practice.

Unit II **(18 hours)**

Requirements Engineering: Requirements engineering tasks – Initiating the requirements engineering process – Eliciting requirements – Developing use-cases – Negotiating requirements – Validating requirements **Design Engineering:** Design process and design quality – Design concepts – The design model.

Unit III **(18 hours)**

Testing Strategies: A strategic approach to software testing – Test strategies for conventional software – Validation testing – System testing – The art of debugging. **Testing Tactics:** Software testing fundamentals – White-box testing – Basis path testing – Control structure testing – Black-box testing.

AUTONOMOUS ACADEMIC COUNCIL

Unit IV **(18 hours)**

Project Management: The management spectrum – The people – The product – The process – The project. **Risk Management:** Reactive vs proactive risk strategies – Software risks – Risk identification – Risk projection – Risk refinement.

Unit V **(18 hours)**

Quality Management: Quality concepts – Software quality assurance – Software reviews – Formal technical reviews – The ISO 9000 quality standards – The SQA plan **Change Management:** Software configuration management – The SCM process.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain a process model for a software project development

CO2: Apply project management and requirement analysis, principles to software project development

CO3: Analyze the cost estimate and problem complexity using various estimation techniques

CO4: Compare the SRS, design document, project plan of given software system

CO5: Generate test cases using the techniques involved in selecting: (a) White Box testing (b) Block Box testing

Text Book:

1. Roger S. Pressman, *Software Engineering A Practitioner's Approach*, Tata McGraw Hill, Eighth Edition, 2015

Reference Books:

1. Ian Sommerville, *Software Engineering*, Pearson Education, Seventh Edition, 2004
2. Samarjeet kaur, Sandhir Sharma, P.P Singh, *Software Engineering – Complete Course Book*, Deep &Deep Publications, 2006
3. Waman S Jawadekar, *Software Engineering -Principles and Practice*, Tata McGraw Hill, 2004

E-Resources:

1. https://nptel.ac.in/courses/106/105/106105182/
2. https://www.coursera.org/courses?query=software%20engineering

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	9	3	**45**
CO2	9	9	9	3	9	9	9	**57**
CO3	9	9	9	3	9	9	9	**57**
CO4	9	9	3	3	9	9	9	**51**
CO5	9	9	9	3	9	9	9	**57**
Total	**45**	**45**	**33**	**15**	**45**	**45**	**39**	**267**

Low-1 Medium-3 High-9

XVA ACADEMIC COUNCIL

Core X - Operating Systems

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 6**
Subject Code: IBITC521 **Credit: 5**

Course Objectives:

1. To understand the services provided by and the design of an operating system.
2. To understand what a process is and how processes are synchronized and scheduled

Unit I **(18 hours)**

Introduction: What is an Operating System -Mainframe systems- desktop systems- Multiprocessor Systems-Distributed systems- Clustered Systems- Real time systems- **Operating System Structure:** System components- Operating System services- System calls- - System structure.

Unit II **(18 hours)**

Processes: Process concept- process scheduling- operations on processes- Inter process Communication**. CPUScheduling**: Basic Concepts- Scheduling Criteria **Process Synchronization**: Background- The critical section problem--semaphores- Monitors.

Unit III **(18 hours)**

Deadlock: System Model-Deadlock Characterization- Methods of Handling Deadlock-Deadlock Prevention- Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock.**Memory Management**: Background- Contiguous memory allocation- Swapping.

Unit IV **(18 hours)**

Virtual Memory: Background- Demand paging-Copy-on-Develop -Page replacement-Thrashing. **File system Interface**: File concepts- access methods- Directory structure. **Mass Storage Structure**: Overview of mass storage structure.

Unit V **(18 hours)**

Protection: Goals of protection- domain of protection- Access matrix- Implementation of Access matrix. **Security:** The security problem- User authentication- Program threats- System threats-securing systems and facilities.

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Remember the structure of operating system and scheduling algorithms
CO2: Apply the concept of process scheduling, deadlocks and its recovery
CO3: Analyze the background of memory with segmentation and paging
CO4: Evaluate file management with file organization, and disk scheduling
CO5: Create Securing systems and facilities

UG ACADEMIC COUNCIL

Text Book:

1.Abraham G Silberschatz, *Operating System***,** Wiley Publisher, Tenth Edition, 2017

Reference Books:

1. Milan Milenkovic, *Operating System Concepts & Design*, Tata McGraw Hill, Second Edition,1997
2. Peter Baer Galvin and Robert Neilson Boyd, *Applied Operating system concepts*, John Wiley & Sons, First Edition, 2000
3. Dhananjay M. Dhamdhere, *Operating System A Concept-Based Approach*, Tata McGraw Hill, Third Edition, 2012
4. W. Stallings, *Operating Systems, Internals & Design Principles*, Prentice Hall of India, Fifth Edition, 2008

E-Resources:

1.https://nptel.ac.in/courses/106/105/106105214/
2.https://nptel.ac.in/courses/106/106/106106144/
3.https://onlinecourses.nptel.ac.in/noc21_cs44/preview
4.https://www.udacity.com/course/introduction-to-operating-systems--ud923
5.https://onlinecourses.nptel.ac.in/noc21_cs72/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	9	9	**45**
CO2	9	3	3	3	9	9	9	**45**
CO3	9	3	9	9	3	9	9	**51**
CO4	9	3	9	3	9	9	9	**51**
CO5	9	3	9	9	9	9	9	**57**
Total	**45**	**15**	**33**	**33**	**33**	**45**	**45**	**249**

Low-1 Medium-3 High-9

Core XI - Data Structures and Algorithms

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 6**
Subject Code: IBITC53 **Credit: 5**

Course Objectives:

1. To understand the fundamental design, analysis, implementation of basic data structures, specificationand analysis of programs
2. To understand about significance of algorithms in the computer field and various aspects of algorithmdevelopment

KK ACADEMIC COUNCIL

Unit I **(18 hours)**

Introduction: History of Algorithms - Data structures and Algorithms - Data structure - Definition and Classification. Stacks: Introduction - stack Operation - Application. **Queues:** Introduction - Operation - circularQueues - Other Types of Queues – Application.

Unit II **(18 hours)**

Linked Lists: Introduction - Singly Linked Lists - Circularly Linked List - Doubly Linked List - Multiply Linked List - Application. **Trees and Binary Trees:** Introduction -Trees: Definition and Basic Terminologies-Representation of Trees -Binary Tree Traversals - Threaded Binary Trees – Applications.

Unit III **(18 hours)**

Graphs: Introduction-Definitions and Basic Terminologies - Representations of Graphs - Graph Traversals - Single-source & All pairs shortest paths problem - Minimum cost spanning trees. Bi**nary Search Trees and AVL Trees**: Introduction - Binary Search Trees: Definition and Operations - AVL Trees: Definition and Operations – Applications.

Unit IV **(18 hours)**

Red-Black Trees and Splay Trees: Red-Black Trees - Applications. Hash Tables: Introduction-Hash Table Structure - Hash Functions - Linear Open Addressing - Chaining - Applications. **Searching** Introduction-Linear Search-Transpose Sequential Search- Interpolation Search - Binary Search - Fibonacci Search - OtherSearch Techniques.

Unit V **(18 hours)**

Internal Sorting: Introduction - Bubble Sort - Insertion Sort - Selection Sort - Merge Sort - Shell Sort - Quick Sort - Heap Sort - Radix Sort - Algorithms: Algorithm Specification - Performance analysis - Asymptotic notation.

Course Outcomes:

After successful completion of this course, the student will be able to

CO1: Explain the basics concept of data structures and algorithm stacks, queues and lists
CO2: Distinguish about knowledge of tree and graphs concepts
CO3: Analyze the concepts about searching and sorting techniques
CO4: Demonstrate the types of trees
CO5: Evaluate about algorithm and step by step approach in solving problems with the help of fundamental data structure

Text Books:

1. Vijayalakshmi Pai G A, *Data structures and Algorithms, Concepts, Techniques and Application,* Tata McGraw-Hill Education, 2008.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, *Fundamentals of Computer Algorithms,* Universities Press, Second Edition, 2008.

MAC ACADEMIC COUNCIL

Reference Books:

1. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, *Data Structures and Algorithms*, Dorling Kindersley(India), 2013.
2. Patel R B, *Expert Data Structures with C*, Khanna Book Publishing, Third Edition, 2000.

E-Resources:

1. http://www.dave-reed.com/csc427.F04/
2. http://www.math.tau.ac.il/~matias/ds03.html
3. https://onlinecourses.nptel.ac.in/noc22_cs26/preview
4. https://nptel.ac.in/courses/106/106/106106127/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	1	1	**19**
CO2	9	3	9	1	9	1	3	**35**
CO3	9	1	9	9	1	1	3	**33**
CO4	9	3	3	3	3	3	3	**27**
CO5	9	1	1	9	9	9	3	**41**
Total	**45**	**11**	**23**	**23**	**25**	**15**	**13**	**155**

Low-1 Medium-3 High-9

DSE I – a) Computer System Architecture

(For Students Admitted from 2024-25)

Semester : V **Hours/week: 4**
Subject Code: IBITE5A **Credit: 4**

Course Objectives:

1. To understand the structure, function and characteristics of computer systems and understand the design of the various functional units and components of computers
2. To identify the elements of modern instructions sets and their impact on processor design, explain the function of each element of a memory hierarchy and identify and compare different methods for computer I/O

Unit I **(12 hours)**

Basic Computer Organization and Design: Instruction Codes – Computer Registers-Computer Instructions-Timing and Control –Instruction Cycle– Memory Reference Instructions – Input-Output and Interrupts.

KANNUR ACADEMIC COUNCIL

Unit II **(12 hours)**

Micro programmed Control: Control Memory – Address Sequencing – Micro program Examples – Designof Control Unit.

Unit III **(12 hours)**

Central Processing Unit: Introduction – General Register Organization – Instruction Formats – Addressing Modes-Data Transfer and Manipulation-Program Control-RISC **Pipeline and Vector Processing:** Parallel Processing-Pipeline-Arithmetic Pipeline-Instruction Pipeline-Vector Processing.

Unit IV **(12 hours)**

Input-Output Organization: Peripheral Devices – I/O interface – Asynchronous Data Transfer – Modes of Transfer -Direct Memory Access – Input Output Processor (Excluding IBM and Intel IOPs).

Unit V **(12 hours)**

Memory Organization: Memory-Main Memory – Auxiliary Memory - Associative Memory – CacheMemory -Virtual Memory-Memory Management Hardware.

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Define the fundamental organization of a computer system
CO2: Explain the concept of sequencing, designing, pipeline and vector processing methods
CO3: Examine the function of input-output organization
CO4: Compare various pipeline concepts
CO5: Distinguish the organization of various parts of a system memory hierarchy

Text Book:

1. Morris Mano M. *Computer System Architecture*. Prentice Hall of India, 2011

Reference Books:

1. William Stallings, *Computer Organization and Architecture*, Pearson Education, Eighth Edition, 2010
2. Morris Mano, *Digital Login and Computer Design*, Prentice Hall of India,2001

E-Resource:

1. https://nptel.ac.in/courses/106/105/106105163/

XX ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	9	3	1	3	3	3	31
CO2	9	3	3	3	9	9	3	39
CO3	3	9	3	3	3	3	3	27
CO4	9	3	9	3	3	3	3	33
CO5	3	9	3	3	9	3	3	33
Total	33	33	21	13	27	21	15	163

Low-1 Medium-3 High-9

DSE I - b) Cloud and Distributed Computing

(For Students Admitted from 2024-25)

Semester: V **Hours/Week: 4**
Subject Code: IBITE51B **Credit: 4**

Course Objectives:

1. To impart the complete understanding of cloud, virtualization and distributed clouds
2. To understand the leader election in cloud and distributed systems

Unit I **(12 hours)**

Introduction to Cloud, Virtualization, and Virtual Machine: Introduction to Cloud Computing - Features of Today's Cloud - Introduction to Virtualization - Mitigation Techniques for VM Migration. **Network Virtualization and Geo-Distributed Clouds:** Introduction - Cloud Computing and Server Virtualization.

Unit II **(12 hours)**

Leader Election in Cloud, Distributed Systems, and Industry Systems: Introduction - Leader Election in Rings (Classical Distributed Algorithms) - Ring Leader Election and Bully Leader Election Algorithms.

Unit III **(12 hours)**

Consensus, Paxo's, and Recovery in Clouds: Introduction – Consensus – Byzantine Agreement – Failures and Recovery approaches in Distributed systems.
Cloud Storage: Key-Value Stores/NoSQL Stores and HBase: Design of Key-Value Stores - Design of HBase.

XX ACADEMIC COUNCIL

Unit IV **(12 hours)**

P2P Systems and Their applications in Industry systems: Introduction – Bitcoin crypto currency system- Block chain technology and its applications beyond bitcoin solutions.Cloud Applications: MapReduce, Spark, and Apache Kafka- MapReduce- Spark-Kafka.

Unit V **(12 hours)**

Cloud-Native Computing: Introduction-Micro services- Docker -Kubernetes - Introduction to Edge Computing. **Software-Defined Networking and Network Function Virtualization:** Introduction - Software-Defined Networking - Applications and Use Cases.

Course Outcomes:

After successful completion of this course, the student will be able to

CO1: Identify the features of cloud computing and virtualization
CO2: Demonstrate the leader election and classical distributed algorithms
CO3: Classify types of consensus, paxos, recovery in clouds and cloud storage
CO4: Justify P2P systems and cloud applications
CO5: Formulate the cloud native computing, software-defined networking and network function virtualization

Text Book:

1. Rajiv Misra and Yashwant Singh Patel, *Cloud and Distributed Computing: Algorithms and Systems*, Wiley Emerging Technology Series, 2020

Reference Books:

1. Chris Dotson, *Practical Cloud Security: A Guide for Secure Design and Deployment*, O'Reilly Media, First Edition, 2019
2. Rajkumar Buyya, Christian Vecchiola and Thamarai Selvi, *Mastering Cloud Computing*, Tata McGrawHill, 2017
3. Rajkumar Buyya, James Broberg, Andrzej Goscinski, *Cloud Computing Principles and Paradigms*, JohnWiley & Sons Publishers, 2011
4. Toby Velte, Anthony Velte and Robert Elsenpeter, *Cloud Computing-A Practical Approach*, TataMcGraw Hill, 2010

E - Resources:

1. https://nptel.ac.in/courses/106/104/106104182/
2. https://www.amazon.in/Cloud-Distributed-Computing-Algorithms-Systems/dp/8126520272?asin=B086V7Q2KW&revisionId=&format=4&depth=1

AK ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	1	3	9	3	1	9	35
CO2	9	1	9	9	3	1	3	35
CO3	9	3	3	9	3	1	9	37
CO4	3	9	9	9	9	3	9	51
CO5	3	9	9	9	9	3	9	51
Total	33	23	33	45	27	9	39	209

Low-1 Medium-3 High-9

DSE II - a) Blockchain Technology

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBITE51C **Credit: 4**

Course Objectives:

1. To understand how blockchain System (Bitcoin and Ethereum) works
2. To integrate ideas from blockchain technology into their own projects

Unit I **(12 hours)**

Introduction of Block chain: Block 101-Distributed Systems-Consensus-The history of block chain- Introduction of block chain-Features of blockchain-Applications of block chain technology-Tiers of Blockchain technology-Consensus in block chain- Benefits and limitations of Blockchain.

Unit II **(12 hours)**

Cryptography and Technical Foundations: Introduction-Mathematics – Cryptography - Confidentiality- Integrity-Authentication-Non repudiation-Accountability-Block Ciphers-DES-AES-Public and Private keys- RSA-hash Functions-Secure hash algorithms-Merkle trees-Patricia trees-DHT-ECDSA.

Unit III **(12 hours)**

Bitcoin: Bitcoin definitions-transactions-types of transactions-What is UTXO-Block chain-The genesis of Block-The bitcoin network-wallets-Alternative coins: Theoretical Foundations-Alternatives of Proof of Work-Proof of stake-Name coin-Litecoin.

Unit IV **(12 hours)**

Ethereum101: Introduction-Ethereum block chain-The consensus mechanism-The world state-the account state-Transactions-Contract creation transaction-Message call transaction-Elements of Ethereum block chain-EVM.

XX ACADEMIC COUNCIL

Unit V **(12 hours)**

Blockchain–Outside of Currencies: Internet of things-IoT Blockchain experiment-Government-Health- Finance-EmergingTrends:ABC's-Enterprise-gradeblockchains-PrivateBlockchains-startups-standardization- Enhancements-Real world Implementations-Consortia-Education in block chain technologies.

Course Outcomes:

After successful completion of this course, the student will be able to

CO1: Explain the fundamental concept of block chain and consensus algorithm
CO2: Apply cryptography algorithms in protecting the block chain
CO3: How transactions held in bitcoin
CO4: Develop an application in ethereum framework
CO5: Design block chain technology in popular fields

Text Book:

1. Imran Bashir, *Mastering Block chain: Deeper insights into decentralization, Cryptography, Bitcoinand Popular block chain frameworks***,** Packt Publishing, 2017

Reference Books:

1. Andreas Antonopoulos, Satoshi Nakamoto, *Mastering Bitcoin*, O'Reilly, 2014
2. Roger Wattenhofer**,** *The Science of the Block chain***,** Create Space Independent Publishing, 2016
3. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, *Bitcoin and Cryptocurrency Technologies:A Comprehensive Introduction*, Princeton University Press, 2016

E-Resources:

1. https://nptel.ac.in/courses/106/104/106104220/#
2. https://www.udemy.com/course/build-your-blockchain-az/
3 .https://www.mygreatlearning.com/academy/learn-for-free/courses/blockchain-basics

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	3	3	9	9	**51**
CO2	9	3	9	9	9	9	9	**57**
CO3	9	3	9	3	9	9	9	**51**
CO4	9	3	9	3	9	9	9	**51**
CO5	9	3	9	3	9	3	9	**45**
Total	**45**	**21**	**45**	**21**	**39**	**39**	**45**	**255**

Low-1 Medium-3 High-9

XYZ ACADEMIC COUNCIL

DSE II - b) Internet of Things

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBITE51D **Credit: 4**

Course Objectives:

1. Students will be explored to the interconnection and integration of the physical world and the cyberspace. They are also able to design & develop IoT devices
2. Make the students to apply IoT data for business solution in various domains in secured manner

Unit I **(12 hours)**

Introduction to IoT: Introduction to IoT- Enabling technologies of IoT - AI and Machine Learning - Physicaland logical design of IoT - IoT Reference Architecture - IoT Functional Architecture.

Unit II **(12 hours)**

IoT and M2M: Introduction to M2M – Difference between IoT and M2M- SDN and NFV for IoT- IoT SystemManagement with NETCONF-YANG- Need for IoT Systems Management-SNMP.

Unit III **(12 hours)**

IoT Platforms Design Methodology: Step 1 to Step 10- Case Study on IoT System for Weather Monitoring-Motivation for Using Python- IoT Systems Logical Design using Python.

Unit IV **(12 hours)**

Installing Python- Python Data Types and Data Structures-Control Flow-Functions-Modules-Packages-File Handling-Date/Time Operations- Classes- Python Packages of Internet for IoT.**IoT Physical Devices and Endpoints:** What is an IoT Device- Exemplary Device: Raspberry Pi- About theboard-Linux and Raspberry Pi.

Unit V **(12 hours)**

IOT Physical Servers and Cloud Offerings: Introduction to Cloud Storage Models and Communication API-WAMP-AutoBahn for IoT-Xively Cloud for IoT-Python Web Application Framework--Amazon Web Services for IoT- Home Automation-Cities-Environment-Agriculture-Productivity Applications.

Course Outcomes:

After successful completion of this course, the student will be able to

CO1: Recall the importance of smart objects and smart environment
CO2: Define IoT and M2M
CO3: Create IoT platforms using design methodology
CO4: Perform WiFi data communications, remote data storage in cloud and handle the data using web applications
CO5: Develop potential problems and solutions using IoT

ACADEMIC COUNCIL

Text Book:

1. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach*, Universities Press, 2015

Reference Books:

1. Charles Platt, *Make Electronics – Learning by discovery*, O'Reilly Media, 2015
2. Michael Miller, *The Internet of Things*, Pearson India, 2015

E-Resources:

1. NPTEL: https://nptel.ac.in/courses/106/105/106105166/
2. https://www.classcentral.com/course/swayam-introduction-to-internet-of-things-10093

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	3	3	9	9	**51**
CO2	9	3	9	9	9	9	9	**57**
CO3	9	3	9	3	9	9	9	**51**
CO4	9	3	9	3	9	9	9	**51**
CO5	9	3	9	3	9	3	9	**45**
Total	**45**	**21**	**45**	**21**	**39**	**39**	**45**	**255**

Low-1 Medium-3 High-9

SEC V - Linux and Shell Programming Lab

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 2**
Subject Code: IBITS54P **Credit: 2**

Course Objectives:

1. To understand and make effective use of linux utilities and shell scripting language to solve problems
2. To develop the skills necessary for systems programming including file system programming, process and signal management and inter-process communication

Program List

Built-in Commands

1. Write a shell program to use who commands
2. Write a shell program to use list commands
3. Write a shell program to use sort commands
4. Write a shell program to use wc commands
5. Write a shell program to use cat commands

AC ACADEMIC COUNCIL

Formula Substitution

6. Write a shell program to find odd or even number
7. Write a shell program to find smallest among three numbers
8. Write a shell program to find the factorial value
9. Write a shell program to display multiplication table

Switch case

10. Write a shell program to use case statement

Functions

11. Write a shell program to display username, pwd using function
12. Find age of a person using set date

Checking

13. To check the given file is a directory or not

String Manipulation

14. Convert lowercase to uppercase using tr statement

Note: - Questions for the Internal/External examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Summarize shell commands, scripts, managing files, pipes and redirections

CO2: Apply appropriate linux commands to make effective use of the environment to solve problems

CO3: Illustrate shell scripts to perform repetitive tasks using while and for loops

CO4: Evaluate shell functions

CO5: Derive command-line arguments

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	9	**49**
CO2	9	9	3	1	9	9	9	**49**
CO3	9	9	3	1	9	9	9	**49**
CO4	9	9	3	1	9	9	9	**49**
CO5	9	9	3	1	9	9	9	**49**
Total	**45**	**45**	**15**	**5**	**45**	**45**	**45**	**245**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core XII - Computer Networks

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 6**
Subject Code: IBITC611 **Credit: 5**

Course Objectives:

1. To build an understanding of the fundamental concepts of computer networking
2. To identify the different types of network topologies and protocols and enumerate the layers of the OSI and TCP/IP model

Unit I **(18 hours)**

Introduction: Uses of Computer Networks-Network Hardware-Network Software- Reference Models-Network Standardization **Physical Layer:** Guided Transmission Media-Wireless transmission.

Unit II **(18 hours)**

Data Link Layer: Data Link Layer Design Issues-Error Detection and Correction-
Medium Access Control Sub layer: Channel Allocation Problem-Multiple Access Protocols-Ethernet-Wireless LANs- Data Link Layer Switching.

Unit III **(18 hours)**

Network Layer: Network layer Design Issues-Routing Algorithms-Congestion Control Algorithms-Qualityof Service- Internetworking-Network Layer in the Internet.

Unit IV **(18 hours)**

Transport Layer: Transport Service-Elements of Transport Protocols-Congestion Control-Internet Transport Protocols: UDP –TCP.

Unit V **(18 hours)**

Application Layer: Domain Name System-Electronic Mail-World Wide Web: HTTP - Streaming Audio and Video.

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Explain the concepts of computer networks
CO2: Apply the protocols of computer networks in network design and implementation
CO3: Analyse functions of each layer in the OSI and TCP/IP reference model
CO4: Compare the working principle of various layer protocols
CO5: Design networks by using protocols of computer networks

Text Book:

1. Andrew S Tanenbaum, David. J. Wetherall, *Computer Networks***,** Pearson Education, Fifth Edition, 2021

ACADEMIC COUNCIL

Reference Books:

1. Behrouz A Forouzan, *Data Communications & Networking*, Tata McGraw Hill, Fourth Edition, 2003
2. Douglas E Comer, *Computer Networks and Internets*, Pearson Education, Fourth Edition, 2004

E-Resources:

1. https://onlinecourses.swayam2.ac.in/ugc19_cs10/preview
2. https://onlinecourses.swayam2.ac.in/cec19_cs07/preview
3. https://nptel.ac.in/courses/106/105/106105081/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	1	3	9	**31**
CO2	9	1	3	3	1	3	9	**29**
CO3	9	1	3	3	1	9	9	**35**
CO4	9	1	3	3	1	9	9	**35**
CO5	9	3	3	3	1	9	9	**37**
Total	**45**	**9**	**15**	**15**	**5**	**33**	**45**	**167**

Low-1 Medium-3 High-9

Core XIII - Programming in Java

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 6**
Subject Code: IBITC621 **Credit: 4**

Course Objectives:

1. To gain knowledge about basic Java language syntax and semantics to develop java programs and useconcepts such as variables, conditional and iterative execution methods etc
2. To understand the fundamentals of object-oriented programming in Java, including defining classes, objects,invoking methods etc and exception handling mechanisms

Unit I **(18 hours)**

Fundamentals of Object Oriented Programming: Introduction, object oriented paradigm – basic concepts of oops – benefits of oops – applications of OOPs**. Overview of Java Language**: simple Java program - moreof Java – application with two classes –Java program structure – Java tokens – Java statements- implementing a Java program - Java virtual machine - command line arguments.

Unit II **(18 hours)**

Constants, Variables, data types: Declaration of variables- giving values to variables- scope of variables –symbolic constants – type casting – getting values of variables- standard default values- **Operators and Expressions**: Arithmetic operators –Relational operators- logical operators –

XXACADEMIC COUNCIL

assignment operators – incrementand decrement operators –conditional operator – bitwise operator – special operators-type conversion in expression – operator precedence and associativity – mathematical functions. **Decision-making and Branching:** if statement – switch –**Decision Making and Looping:** while statement – do statement – for statement – jumps in loops - labeled loops.

Unit III **(18 hours)**

Classes, Objects and Methods: Introduction – defining a class, field declaration–methods declaration –creating objects – accessing class members – constructors – methods overloading – static members – nesting of methods – inheritance – overriding methods – final variables and methods – final classes –finalizer methods-abstract methods and classes –visibility control - **Arrays Strings and Vectors**: one dimensional array – creating an array –two-dimensional arrays –strings – vectors –wrapper classes – **Interfaces, Multiple Inheritance**: defining interfaces – extending interfaces –implementing interfaces – accessing interface variables.

Unit IV **(18 hours)**

Packages, Putting classes together: Introduction - Java API packages: using system packages-naming conventions –creating packages –accessing a package –using a package – adding a class to a package–hiding classes – **Multithreaded Programming**: creating threads- extending the thread class – stopping and blocking a thread - life cycle of a thread- using thread methods -thread exceptions –thread priority – synchronization–implementing the runnable interface.

Unit V **(18 hours)**

Managing Errors and Exception: Introduction – types of errors –exceptions -syntax of exception handling code – multiple catch statements –using finally statement. **Applet Programming:** introduction –how applets differ from applications –building applet code–applet life cycle – creating an executable applet –designing a web page - applet tag – adding applet to html file – running the applet – more about applet tags –passing parameters to Applets –aligning the display.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the importance of java with its data types, control statements and class fundamentals.
CO2: Apply the concepts of inheritance, method overriding and implement packages and interfaces
CO3: Analyze the concept of exception handling and multithreading
CO4: Evaluate string buffer handling functions
CO5: Create applet programming through awt controls, layout managers and menus

Text Book:

1. E. Balaguruswamy, *Programming with JAVA* - A Primer, McGraw Hill Professional, 2015

Reference Books:

1. Herbert Schildt, *Java: The Complete Reference*, McGraw Hill Professional, 2017.
2. Robert Sedgewick & Kevin Wayne *Introduction to Programming in Java*, Addison Wesley, 2017.

ACADEMIC COUNCIL

3. Y. Daniel Liang, *Introduction to Java Programming*, Pearson Education, 2017.

E-Resources:

1.https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=English
2.https://onlinecourses.swayam2.ac.in/aic20_sp13/preview
3.https://spoken-tutorial.org/watch/Java/First+Java+Program/English/
4. https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	9	**49**
CO2	9	9	3	1	9	9	9	**49**
CO3	9	9	3	1	9	9	9	**49**
CO4	9	9	3	1	9	9	9	**49**
CO5	9	9	3	1	9	9	9	**49**
Total	**45**	**45**	**15**	**5**	**45**	**45**	**45**	**245**

Low-1 Medium-3 High-9

Core XIV - Programming in Java Lab

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 5**
Subject Code:IBITC63P **Credit: 4**

Course Objectives:

1. To make the students to understand programming language Java and able to create programs to solve simplecalculations
2. To implement sorting and searching programs, develop the programs for string manipulations (case conversion,reversing, etc.)

List of Programs

Formula Substitution

1. Find the factorial and binomial coefficient
2. Calculate mean, variance and standard deviation
3. Develop the programs for Number conversions

Checking

4. Develop the programs for Number checking (prime, perfect, etc.)

XXA ACADEMIC COUNCIL

Generation

5. Develop the programs for Number generation (prime, perfect, etc.)

Array

6. Arrange numbers and names in order
7. Develop the program for performing matrix addition, subtraction, multiplication & transpose

Searching

8. Develop the programs for implementing linear search and binary search

String

9. Develop the programs for doing String manipulation (case conversion, reversing, etc.)

OOP Concepts

10. Develop the programs for implementing inheritance concepts
11. Develop the programs for implementing exception handling
12. Develop the programs for implementing multithreading

Applet

13. Develop the programs to handle Keyboard events
14. Simulate a calculator (arithmetic operations) using GUI components

Note: - Questions for the external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Outline Java programs that solve simple Mathematical problems, number checking and numbergeneration.

CO2: Demonstrate the concepts of string manipulation, linear search and binary search.

CO3: Illustrate OOP in Java programming like inheritance.

CO4: Evaluate the multi-threaded programs

CO5: Develop exception handling and GUI components.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	3	9	**39**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	9	9	9	9	9	9	**63**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**33**	**27**	**33**	**45**	**33**	**45**	**261**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core XV- Project

(For Students Admitted from 2024-25)

Semester: VI **Hours/Week: 6**
Subject Code: IBITC64PW **Credit: 5**

Course Objectives:

1. To impart the students to implement the project by data collection, tool selection
2. To enhance the students to select the programming language for implementing the project

Students have to undergo an individual project work on campus and appear for the viva voce examination with the software developed and document prepared by her

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Identify goals, constraints, deliverables, performance criteria and resource requirements in consultation with stakeholders

CO2: Apply the plan by executing the code

CO3: Illustrate the various aspects of software development for the total project

CO4: Evaluate the entire software project according to the specific problem

CO5: Develop the software project by executing with the various data.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	9	9	3	9	**57**
CO2	9	3	9	3	9	9	9	**51**
CO3	9	3	9	9	9	9	9	**57**
CO4	9	3	9	9	9	9	9	**57**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**27**	**45**	**39**	**45**	**39**	**45**	**285**

Low-1 Medium-3 High-9

DSE III – a) Artificial Intelligence and Expert System

(For Students Admitted from 2024-25)

Semester: VI **Hours/Week: 4**
Subject Code: IBITE6A **Credits: 4**

Course Objectives:

1. To introduce the basic principles, techniques, and applications of Artificial Intelligence
2. To gain a historical perspective of AI and its foundations

Unit I **(12 hours)**

Introduction to Artificial Intelligence-Intelligent Agents, Approaches in Artificial Intelligence, Definitions of Artificial Intelligence, AI problems, Features of AI Programs, Importance of AI, Advantages and Disadvantages of AI.

XV-ACADEMIC COUNCIL

Unit II **(12 hours)**

Applications of Artificial Intelligence- Finance, Hospitals and Medicine, Robotics, Expert systems, Diagnosis, Pattern Recognition, Natural Language Processing, Game Playing, Image Processing, Data mining, Big Data Mining. Introduction to the state space search- State space search, search techniques, Types of searching techniques.

Unit III **(12 hours)**

Heuristic Search Strategies-Types of Heuristic Search techniques,Hill Climbing Search, Simulated Annealing search, A* Algorithm, AND-OR Graphs, Properties of the Heuristic Search Algorithm, Adversary Search, TheMINIMAX Algorithm.

Unit IV **(12 hours)**

Expert Systems-Definitions of Expert Systems, Features of Good Expert systems, Architecture and Components of Expert systems, Roles of the Individuals who interact with the system, Advantages of Expert systems, Disadvantages of Expert Systems.

Unit V **(12 hours)**

Knowledge Representation-Definitions of Knowledge Representation, Characteristics of Good Knowledge Representation, Basics of Knowledge representation, Properties of the Symbolic representation of knowledge, Properties of the Good knowledge representation systems, Categories of knowledge representation schemes, types of knowledge representation schemes.

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Demonstrate fundamental understanding of the history of artificial intelligence and its foundations

CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning

CO3: Analyze their gaming skills and learn about expert system

CO4: Evaluate the learners for aspiring careers in the field of Artificial Intelligence

CO5: Develop the game playing and planning of expert systems

Text Book:

1. I.Gupta , G.Nagpal,*Artificial Intelligence and Expert Systems* , Laxmi Publications ,2018

Reference Books:

1. V.S. Jankiraman, Foundations *of Artificial Intelligence and Expert Systems*, Laxmi Publications, 2017
2. Joseph C.Giarratano, Gary D.Riley ,*Expert Systems: Principles and Programming*, Fourth Edition ,2018
3. Lavika Goel, Artificial *Intelligence:Concepts and Applications*, Wiley India Private Limited

E-Resource:

1. NPTEL: https://nptel.ac.in/courses/106/102/106102220/

AKACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	1	9	9	3	9	**49**
CO2	9	9	3	9	3	9	1	**43**
CO3	3	9	9	3	9	3	3	**39**
CO4	9	1	3	9	3	9	1	**35**
CO5	9	9	9	9	9	3	3	**51**
Total	**39**	**37**	**25**	**39**	**33**	**27**	**17**	**217**

Low-1 Medium-3 High-9

DSE III - Digital Marketing

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 4**
Subject Code: IBITE61B **Credit: 4**

Course Objectives:

1. To know the fundamental concepts associated with the digital marketing.
2. To understand the concepts of different strategies, search engine, and social media channels utilized in the different marketing systems.

Unit I **(12 hours)**

Introduction to Digital Marketing: Introduction - Evolution of Digital Marketing from traditional to modern era- Role of Internet; Current trends - Drivers of the new marketing environment - Digital marketing strategy; P.O.E.M. framework - Digital marketing plan- Digital marketing models.

Unit II **(12 hours)**

Internet Marketing and Digital Marketing Mix: Internet Marketing - opportunities and challenges - Digital marketing framework - Impact of digital channels on IMC. **Search Engine Advertising:** Pay for Search Advertisements - Ad Placement - Display marketing: Types of Display Ads - Programmable Digital Marketing - YouTube marketing.

Unit III **(12 hours)**

Social Media Marketing: Understanding Social Media Marketing – Social Networking- Role of Influencer Marketing-Modes of Social Media Marketing- Tools & Plan - Facebook Marketing: - Business through Facebook Marketing, Facebook Marketing Tools - LinkedIn Marketing: - Introduction and Importance of LinkedIn Marketing, -Twitter Marketing: Introduction to Twitter Marketing, Mobile Advertising

AK ACADEMIC COUNCIL

Unit IV **(12 hours)**

Introduction to SEO: SEM - Web Analytics - Mobile Marketing - Trends in Digital Advertising - Introduction and need for SEO- How to use internet & search engines; search engine and its working pattern: SEO Tactics - Introduction to SEM Web Analytics: Google Analytics & Google AdWords

Unit V **(12 hours)**

Social Media Channels: Introduction - Key terms and concepts - Traditional media vs Social media - Social networking - Content creation - Tracking social media campaigns **Social Media Strategy:** Introduction - Key terms and concepts - Using social media to solve business challenges - Dealing with opportunities and threats

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Understand the practical factor to improve results in digital marketing.
CO2: Implement a structured digital marketing plan and budget.
CO3: Examine the operations of digital marketing, and track the progress of digital marketing.
CO4: Evaluate the functions of social media marketing, Internet marketing, and social media channels.
CO5: Design and Initialize implement process to conduct digital marketing campaigns.

Text Book:

1. Seema Gupta "Digital Marketing" Mc-Graw Hill 1st Edition – 2017

Reference Books:

1.Damian Ryan, Calvin Jones "Understanding Digital Marketing-Marketing Strategies For Engaging the Digital Generation" Kogan Page - Fourth Edition
2.Teresa Pineiro-Otero and Xabier Martinez-Rolan "Understanding Digital Marketing- Basics and Actions" Springer International Publishing – 2009

E-Resources:

1. https://www.simplilearn.com/tutorials/digital-marketing-tutorial

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	3	3	9	**43**
CO2	9	9	3	3	9	9	9	**51**
CO3	9	3	9	1	9	9	9	**49**
CO4	9	9	3	3	9	1	9	**43**
CO5	9	3	3	1	9	3	9	**37**
Total	**45**	**33**	**27**	**9**	**39**	**25**	**45**	**223**

Low-1 Medium-3 High-9

XVI ACADEMIC COUNCIL

SEC VI – Open Technology Lab

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 2**
Subject Code: IBITS65P **Credits: 2**

Course Objectives:

1. To develop technical solutions for problems using the open source software(s)
2. To learn programming in Python

List of Programs

Display Text

1. To display any given text message

Formula Substitution

2. To display Fibonacci series

Array

3. To count the number of vowel in the string

Function

4. To convert a date read from the user, given in DD/MM/YYYY format into writtenformat. For example, Enter a date in DD/MM/YYYY Format: 16/7/2003 Output: 16 July, 2003
5. To print the contents of a file in uppercase using function
6. To sort the contents of a file using function

Operator Overloading

7. To implement Operator Overloading

Script

8. To implement Arithmetic Quiz
9. To create a button with the text, “Hello World”
10. To create a combo box with three elements. When the selection is changed theselected item is to be printed
11. To create a simple application window with menus and submenus
12. To create a simple application window with displaying lines
13. To create your own website for displaying message
14. To create a simple blog using models

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Recall the basics of displaying numbers and string
CO2: Apply the concepts of control structures and function (Predefined and user defined)
CO3: Analyzing the concept of array and file
CO4: Explain operator overloading
CO5: Create GUI programming and website

ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	9	9	1	9	9	9	55
CO2	9	9	9	1	9	9	9	55
CO3	9	9	9	1	9	9	9	55
CO4	9	9	9	1	9	9	9	55
CO5	9	9	9	1	9	9	9	55
Total	45	45	45	5	45	45	45	275

Low-1 Medium-3 High-9

Extra Credit I -Desktop Publishing Lab

(For Students Admitted from 2024-25)

Semester: II
Subject Code: IBITX21P **Credit: 2**

Course Objectives:

1. To understand the basic concepts of FIGMA
2. To gain knowledge about various tools of FIGMA

FIGMA

1. Create an Animated Text.
2. Create an Animated Image.
3. Create a bouncing ball using interactive component.
4. Design ON/OFF toggle.
5. Create a responsive grid system for web.
6. Create a poster.
7. Create an animation notification.
8. Create an animated card grid.
9. Design a glass morphism.
10. Design an Appreciation certificate.
11. Design a Sign Up page.
12. Create a News page design.

Note:-Questions for internal and external examination will be based on concept learnt

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Describe the concepts of tools and techniques in Figma.
CO2: Apply the concept of creation and modification of objects.
CO3: Simplify the process of designing, editing and animating.
CO4: Create a website screen and any form of certificate.
CO5: Construct and design an application.

ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	3	9	3	9	3	9	45
CO2	9	3	9	3	9	3	9	45
CO3	9	3	9	3	9	3	9	45
CO4	9	1	9	3	9	3	9	43
CO5	9	1	9	3	9	3	9	43
Total	45	11	45	15	45	15	45	221

Low-1 Medium-3 High-9

Extra Credit II -No SQL Lab

(For Students Admitted from 2024-25)

Semester: III

Subject Code: IBITX31P **Credit: 2**

Course Objectives:

1. The students get practical knowledge on developing No SQL database using MongoDB and ability to read or query the collection
2. To understand various advanced methods such as update one MongoDB document in the collection and update many MongoDB documents in the collection

No SQL PROGRAMS:

1. MongoDB installation and configuration in windows
2. Demonstrate how to create and drop a database in MongoDB
3. Developing the collection in MongoDB on the fly
4. Developing collection with options before inserting the documents and drop the collection created
5. MongoDB insert document
   a) Insert single document
   b) Insert multiple documents in collection
6. Querying all the documents in JSON format and Querying based on the criteria
7. MongoDB update document
   a) Using update ( ) method
   b) Using save ( ) method
8. MongoDB delete document from a collection

KU ACADEMIC COUNCIL

a) Using remove ( ) method
b) Remove only one document matching your criteria
c) Remove all documents

9. Develop a MongoDB projection
10. Apply limit ( ), skip ( ), sort ( ) methods in MongoDB
11. MongoDB indexing
    a) Develop index in MongoDB
    b) Finding the indexes in collection
    c) Drop indexes in a collection
    d) Drop all the indexes
12. MongoDB with java and PHP
    a) Develop a simple application that uses MongoDB with JAVA
    b) Develop a simple application that uses MongoDB with PHP
13. Build a social media app using document API and a No SQL Database

Note: - Questions for external examination will be based on concept learnt

Course Outcomes:
After successful completion of the course, the students will be able to
CO1: Installing and configuring MongoDB in windows
CO2: Perform all database operations using MongoDB
CO3: Implement and harness the power of indexes
CO4: Use MongoDB compass to analyze a database
CO5: Develop applications by integrating MongoDB with JAVA/PHP

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Extra Credit III- R Tool Lab

(For Students Admitted from 2024-25)

Semester: IV
Subject Code: IBITX4P **Credit: 2**

Course Objectives:
1. To understand the concept of R Tool
2. To implement statistics analysis

List of Programs
1. Write a Program to implementing correlation analysis
2. Write a Program to implementing regression analysis
3. Write a Program to implementing t-test
4. Write a Program to implementing z-test
5. Write a Program to implementing f-test
6. Write a Program to implementing chi-square test
7. Write a Program to implementing kruskal-wallis test
8. Write a Program to implementing likert scaling techniques
9. Write a Program to implementing analysis of variance (ANOVA)

Note: - Questions for External examination will be based on concepts learnt

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Demonstrate the basics in R programming in terms of constructs, control statements and functions
CO2: Apply data analytics software
CO3: Enhance problem solving, programming and debugging skills
CO4: Plan the R programming from a statistical perspective
CO5: Analyze and implement the various data structures of R

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	3	**43**
CO2	9	3	9	3	9	9	9	**51**
CO3	3	9	1	1	3	1	9	**27**
CO4	9	3	9	1	9	9	3	**43**
CO5	9	1	9	3	9	9	3	**43**
Total	**39**	**25**	**31**	**9**	**39**	**37**	**27**	**207**

Low-1 Medium-3 High-9

XXI ACADEMIC COUNCIL

Extra Credit V-Data Mining Lab

(For Students Admitted from 2024-25)

Semester: VI
Subject Code: IBITX6P **Credit: 2**

Course Objectives:

1. To understand the concept of data mining tool
2. To implement various data mining algorithm

Program List

1. Create data-set in .arff file format. Demonstration of preprocessing on WEKA data-set.
2. Demonstration of Association rule process on data-set contact lenses.arff / supermarket using apriori algorithm.
3. Demonstration of classification rule process on WEKA data-set using j48 algorithm
4. Demonstration of classification rule process on WEKA data-set using Naive Bayes algorithm.
5. Demonstration of clustering rule process on data-set iris.arff using simple k-means.

Note: - Questions for Internal and external examination will be based on concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO 1: Describe Data mining concept.
CO 2: Apply the knowledge of data mining techniques
CO 3: Adapt to new data mining tools.
CO 4: Explore recent trends in data mining such as web mining, spatial-temporal mining
CO5: Build different types of algorithm

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	1	1	**25**
CO2	9	3	3	1	9	1	3	**29**
CO3	9	3	3	3	9	3	3	**33**
CO4	9	3	3	3	9	3	3	**33**
CO5	3	3	9	3	9	3	9	**39**
Total	**39**	**15**	**19**	**11**	**45**	**11**	**19**	**159**

Low-1 Medium-3 High-9

XVI ACADEMIC COUNCIL

B Sc Computer Science

Three Years Regular Programme

(For Students Admitted from 2024-25)

Programme Specific Outcomes:

On completion of this programme, student will be able to gain

PSO 1: Demonstrate the aptitude of Computer Programming and Computer based problem solving skills

PSO2: Display the knowledge of appropriate theory, practices and tools for the specification, design, and implementation

PSO3: Apply the knowledge of Statistics and Operations Research in the development of computational solutions

PSO4: Ability to link knowledge of Computer Science and Mathematics.

PSO5: Ability to formulate, to model, to design solutions, to appreciate emerging technologies and to use software tools

PSO6: Ability to design, develop and implement computer programs to solve real world problems in various domains

PSO7: Ability to pursue higher studies of specialization and to take up technical employment

PREAMBLE

The Board of Studies of Computer Science revamped the curriculum with the following changes

Core Courses

- The syllabus of Programming in C, RDBMS Lab, Operating Systems and Programming in Java courses have been reduced

Ability Enhancement Compulsory Course

- The syllabus for the course Digital Electronics has been reduced

Skill Enhancement Course

- The syllabus of Web Designing Lab (HTML and Scripting Language) course has been reframed

Discipline Specific Elective

- The syllabus of Blockchain Technology course has been reduced
- Cloud and Distributed Computing has been removed and Digital Marketing course has been introduced

Extra Credit Course

- Coral Draw Lab has been removed and Desktop Publishing Lab has been introduced
- Programming in Visual Basic Lab has been removed and NoSQL Lab has been introduced

XI ACADEMIC COUNCIL

PROGRAMME STRUCTURE - PROGRAM CODE: UCS

Sem	Subject Code	Course	Subject Title	Hours / week	Credit	CIA	ESE	Total Marks
I	IBLT112/ IBLA111/ IBLH111	Language I	Tamil I /Arabic I/ Hindi I	5	3	25	75	100
	IBLEI12/ IBLEII12	Language II	English I a or b	5	3	25	75	100
	IBCSC111	Core I	Fundamentals of Computers	4	4	25	75	100
	IBCSC12	Core II	Computer Organization	4	3	25	75	100
	IBCSC131P	Core III	Office Automation Lab	3	2	25	75	100
	IBCSA141	AECC I	**Digital Electronics**	5 (T-3 P-2)	4	25 (T-15 P-10)	75	100
	IBCSS15P	SEC I	Multimedia Lab - I	2	2	-	50	50
			Library/Browsing	1	-	-	-	-
			Remedial/Games	1	-	-	-	-
			Total	**30**	**21**	**150**	**500**	**650**
II	IBLT212/ IBLA211/ IBLH211	Language I	Tamil II /Arabic II /Hindi II	5	3	25	75	100
	IBLEI22/ IBLEII22	Language II	English II a or b	5	3	25	75	100
	IBCSC211	Core IV	○ **Programming in C**	5	5	25	75	100
	IBCSC22P	Core V	Programming in C Lab	4	4	25	75	100
	IBCSA231P	AECC II	IoT Lab	5	4	25	75	100
	IBCSS24P	SEC II	Multimedia Lab - II	2	2	-	50	50
	IBES2	GIC I	Environmental Science	2	2	-	50	50
			Library/Browsing	1	-	-	-	-
			Remedial/Games	1	-	-	-	-
	IBCSX21P/ IBCSX2O	Extra Credit I	***Desktop Publishing Lab***/ *Online Course	-	2	-	100	100
			Total	**30**	**23+2**	**125**	**475 + 100**	**600+ 100**
III	IBLT311/ IBLA31/ IBLH311	Language I	Tamil III /Arabic III / Hindi III	5	3	25	75	100
	IBLEIB32/ IBLEIIA32	Language II	English III a or b	5	3	25	75	100

EX ACADEMIC COUNCIL

	IBCSC311	Core VI	# .NET Programming	4	4	25	75	100
	IBCSC321P	Core VII	.NET Programming Lab	4	4	25	75	100
	IBCSA33	AECC III	Statistics	4	4	25	75	100
	IBCSS341P	SEC III	**Web Designing Lab (HTML and Scripting Language)**	2	2	-	50	50
		OEC		2	2	-	50	50
	IBHR3	GIC II	Human Rights	2	2	-	50	50
	IBXTN3	Extension Activities	NSS / CSS	2	2	100	-	100
	IBCSX31P/ IBCSX3O	Extra Credit II	***NoSQL Lab*** / *Online Course	-	2	-	100	100
			Total	**30**	**26+2**	**225**	**525 + 100**	**750+ 100**
IV	IBLT41/ IBLA41/ IBLH411	Language I	Tamil IV /Arabic IV / Hindi IV	5	3	25	75	100
	IBLEI42/ IBLEII42	Language II	English IV a or b	5	3	25	75	100
	IBCSC41	Core VIII	Data Structures and Algorithms	5	4	25	75	100
	IBCSC421P	Core IX	Data Analytics Using Statistical Methods Lab	4	4	25	75	100
	IBCSA43	AECC IV	Operations Research	5	4	25	75	100
	IBCSS44P	SEC IV	Linux and Shell Programming Lab	2	2	-	50	50
	IBLVE4	GIC III	Life Skills and Value Education	2	2	-	50	50
		OEC		2	2	-	50	50
	IBCSX4P/ IBCSX4O	Extra Credit III	R Tool Lab	-	2	-	100	100
			Total	**30**	**24+2**	**125**	**525 + 100**	**650+ 100**
	IBCSC511	Core X	Software Engineering	5	4	25	75	100
	IBCSC521	Core XI	Cyber Security	5	4	25	75	100
	IBCSC531P	Core XII	Cyber Security Lab	4	4	25	75	100
	IBCSC541P	Core XIII	**RDBMS Lab**	4	3	25	75	100

EX ACADEMIC COUNCIL

V	IBCSE51A/ IBCSE5B	DSE I	**a) Blockchain Technology** b) PHP Programming	4	4	25	75	100
	IBCSE51C/ IBCSE51D	DSE II	a) Computer Networks b) Cryptography and Network security	4	4	25	75	100
	IBCSS55P	SEC V	PHP Programming Lab	2	2	-	50	50
	IBWE5	GIC IV	Women Entrepreneurship	2	2	-	50	50
	IBCSX5/ IBCSX5O	Extra Credit IV	Employability Skills	-	2	100		100
			Total	**30**	**27+2**	**150+ 100**	**550**	**700+ 100**
VI	IBCSC611	Core XIV	**Operating Systems**	5	4	25	75	100
	IBCSC621	Core XV	○ **Programming in Java**	4	3	25	75	100
	IBCSC63P	Core XVI	Programming in Java Lab	4	3	25	75	100
	IBCSC64	Core XVII	Open Technology	4	3	25	75	100
	IBCSC65PW	Core XVIII	Project	6	5	25	75	100
	IBCSE62A/ IBCSE6B	DSE III	**a) Digital Marketing** b) Artificial Intelligence and Expert Systems	4	4	25	75	100
	IBCSS66P	SEC VI	Open Technology Lab	2	2	--	50	50
	IBCSX6P/ IBCSX6O	Extra Credit V	Data Mining Lab / *Online Course	--	2	--	100	100
			Library/Browsing	1	--	--	--	--
			Total	**30**	**24+2**	**150**	**500 + 100**	**650+ 100**
			Grand Total	**180**	**145 +10**	**925+100**	**3075 +40 0**	**4000 +500**

*****For Online Course credit alone will be assigned on submission of certificate obtained by appearing for online examination from EdX, Spoken Tutorial, NPTEL or Coursera etc.

#For internship course, refer www.internshala.com or any online internship course.

○ For online course integration, syllabus will be taken from spoken tutorial, swayam, edx, Udemy, coursera

XX ACADEMIC COUNCIL

AECC - Ability Enhancement Compulsory Course
SEC - Skill Enhancement Course
DSE - Discipline Specific Elective
OEG - Open Elective Course
GIC - General Interest Course

Core I – Fundamentals of Computers

(For Students Admitted from 2024 -25)

Semester: I **Hours/Week 4**
Subject Code: IBCSC111 **Credit: 4**

Course Objectives:

1. To understand the basics of computers
2. To understand the working of input/output interfaces

Unit I **(12hours)**

Computer Basics: Algorithms – Simple Model of a Computer – Characteristics of Computers – Problem Solving Using Computers. **Data Representation:** Representation of Characters in Computers – Representation of Integers – Representation of Fractions – Hexadecimal Representation of Numbers – Decimal to Binary Conversion.

Unit II **(12 hours)**

Input/Output Units: Traditional Computer Input/output Units – Other Input Technologies – Computer Output Devices – Choosing a Printer. **Computer Memory:** Memory Cell – Memory Organization – Read Only Memory – Serial Access Memory – Physical Devices used to construct memories – Magnetic Hard Disk – Compact Disk Read Only memory

Unit III **(12 hours)**

Binary Arithmetic: Binary Addition – Binary Subtraction – Signed Numbers – Two's Complement Representation of Numbers – Addition/ Subtraction of Numbers in 2's Complement Notation – Binary Multiplication – Binary Division – Floating Point Representation of Numbers – Arithmetic Operations with Normalized Floating-Point Numbers.

Unit IV **(12 hours)**

Programming Languages: Why Programming Language? – Assembly language – Higher Level Programming Languages – Compiling a High Level Language Program – Some High Level Languages. **Microcomputers:** Ideal Microcomputer – Actual Microcomputer - Memory Systems for Microcomputers – Reduced Instruction Set Computers. **Computer Generations and Classification:** First Generation of Computers – Second generation – Third Generation – Fourth Generation – Fifth Generation –Classification of Computers.

KU ACADEMIC COUNCIL

Unit V **(12 hours)**

Advanced Input/output Interfaces: Graphical User Interface – Vector Graphics – Raster Graphics – Accelerated Graphics with GPU – Stereo Display Units – Other Visual Displays – Input Devices for Interaction – **Multimedia Data Acquisition and Processing:** Image Acquisition and Storage – Storage formats for pictures – Image Acquisition with a Digital Camera – Capturing a movie image with a Video Camera

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Summarize the basics of computers and its generations
CO2: Illustrate number systems and its conversions
CO3: Analyze the uses of internal and external components of computers
CO4: Select appropriate input and output devices for digital literacy according to its intended use
CO5: Formulate the methods to handle Multimedia Applications

Text Book:

1. V Rajaraman, Neeharika Adabala, *Fundamentals of Computers,* PHI Learning Private Limited, Sixth Edition, 2018.

[

Reference Books:

1. James A. O'Brien, George M. Marakas, *Introduction to Information Systems,* McGraw Hill Company, Fifteenth Edition, 2010.
2. ITL Education Solutions Limited, *Introduction to Information Technology*, Pearson Education, Fourth Edition, 2007.
3. Alexis Leon, Mathews Leon, *Fundamentals of Information Technology*, L&L Consultancy Services Private Limited, Second Edition, 1999.

E-Resources:

1. NPTEL: https://nptel.ac.in/courses/106/105/106105163/
2. https://www.coursera.org/courses?query=computer%20fundamentals
3. https://cstutorialpoint.com/computer-fundamentals-notes/
4. https://ecomputernotes.com/fundamental
5. https://testbook.com/learn/computer-fundamentals/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	3	3	3	9	9	9	9	**45**
CO2	9	1	9	3	9	9	9	**49**
CO3	9	3	3	9	9	9	3	**45**
CO4	9	9	3	9	9	9	9	**57**
CO5	9	3	9	9	9	9	3	**51**
Total	**39**	**19**	**27**	**39**	**45**	**45**	**33**	**247**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core II – Computer Organization

(For Students Admitted from 2024 -25)

Semester: I **Hours/Week: 4**
Subject Code: IBCSC12 **Credit: 3**

Course Objectives:

1. To understand the structure, function and characteristics of computer systems and understand the design of the various functional units and components of computers
2. To identify the elements of modern instructions sets and their impact on processor design

Unit I **(12 hours)**

Basic Computer Organization and Design: Instruction Codes-Computer Registers- Computer Instructions-Timing and Control-Instruction Cycle-Memory Reference Instructions -Input-Output and Interrupts.

Unit II **(12 hours)**

Micro programmed Control: Control Memory- Address Sequencing- Micro program Examples-Design of Control Unit.

Unit III **(12 hours)**

Central Processing Unit: Introduction- General Register Organization - Instruction Formats - Addressing Modes-Data Transfer and Manipulation-Program Control-**RISC Pipeline and Vector Processing:** Parallel Processing-Pipeline-Arithmetic Pipeline-Instruction Pipeline-Vector Processing.

Unit IV **(12 hours)**

Input-Output Organization: Peripheral Devices- /O interface-Asynchronous Data Transfer - Modes of Transfer -Direct Memory Access- Input Output Processor (Excluding IBM and Intel IOPs).

Unit V **(12 hours)**

Memory Organization: Memory-Main Memory- Auxiliary Memory -Associative Memory- Cache Memory -Virtual Memory-Memory Management Hardware.

Course Outcomes:

After successful completion of this course, students will be able to
CO 1: Define the fundamental organization of a computer system
CO 2: Explain the concept of sequencing, designing, pipeline and vector processing methods
CO 3: Examine the function of input-output organization
CO 4: Compare various pipeline concepts
CO 5: Distinguish the organization of various parts of a system memory hierarchy

KU ACADEMIC COUNCIL

Text Book:

1. Morris Mano M, *Computer System Architecture*, Prentice Hall of India, 2011.

Reference Books:

1. William Stallings, *Computer Organization and Architecture*, Pearson Publication, Eighth Edition, 2010.
2. Morris Mano, *Digital Login and Computer Design*, Prentice Hall of India, 2001.

E-Resources:

1. NPTEL: https://nptel.ac.in/courses/106/105/106105163/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	3	3	3	**31**
CO2	9	3	3	3	9	9	3	**39**
CO3	3	9	3	3	3	3	3	**27**
CO4	9	3	9	3	3	3	3	**33**
CO5	3	9	3	3	9	3	3	**33**
Total	**33**	**33**	**21**	**13**	**27**	**21**	**15**	**163**

Low-1 Medium-3 High-9

Core III – Office Automation Lab

(For Students Admitted from 2024 -25)

Semester: I **Hours/Week: 3**
Subject Code: IBCSC131P **Credit: 2**

Course Objectives:

1. To acquire knowledge about word processing, spread sheet, Data base creation and slide preparation
2. To improve creative thinking in presentations

List of Programs

Word Processing

1. Create a word processing document consists two pages in a Book named "XX" and then do the following:
   a. Formatting Text, Alignment and Font Style
   b. Perform Find and Replace
   c. Add Header and Footer option to specify name of the Book Chapter Heading and Page number of total pages

XX ACADEMIC COUNCIL

2. Create a word processing document having details of our College courses using bulleted and number lists. Type the title using Word Art
3. Design an Invitation to felicitate Farewell Address to our seniors with Font Setting/Page Borders/Word Art/Clip Art/Symbols
4. Create a Newsletter Article (using Columns, Drop cap)
5. Create a time table for your Internal Exam Schedule (using Table)
6. Type Business letter and send it to more using Mail Merge

Spreadsheet

1. Create an spreadsheet consists of Student details and then do the following:
    a. Calculate student wise total and subject wise total
    b. Find the Maximum and Minimum marks of the subject
    c. Grade is calculated as
        i.f %>=90, then grade A
        ii. If %>=80 and <90, then grade B
        iii. If %>=70 and <80, then grade C
        iv. If %>=60 and <70, then grade D
        v. If %<60, then grade F
2. Create a spreadsheet having Employee details suitably and then do the following.
    a. Use functions to calculate Net Pay and Gross Pay
    b. Perform conditional formatting and validation

Presentation

1. Create a presentation showing your various activities of the department a Perform slide translation and Setting background designs
2. Create a presentation showing various aspect of your college and perform custom animation and import sound

Database

1. Crate a Student Database having Name, Regno, Tamil, English, Maths, Total, and Average Perform to find total and average and check data entered
2. Create an Inventory database having Item Name, Item no. Quantity and Price. Perform query operation to retrieve data

Note: Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO 1: Illustrate various options of Office Application
CO 2: Demonstrate different types of formats, formulas and transition in office application
CO 3: Develop reports to solve the problems of manual report handling
CO 4: Compare the options of different Microsoft Office Applications to use appropriately
CO 5: Build a presentation, Advertisement, Reports etc. for enterprise

AKTU ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	**45**
CO2	9	9	3	9	9	9	9	**57**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	3	3	9	3	9	**45**
Total	**45**	**39**	**15**	**27**	**45**	**27**	**45**	**243**

Low-1 Medium-3 High-9

AECC I – Digital Electronics

(For Students Admitted from 2024 -25)

Semester: I **Hours/Week: 5 (T: 3 P: 2)**
Subject Code: IBCSA141 **Credit: 4**

Course Objectives:

1. To know the concepts of Combinational circuits
2. To understand the concepts of flip-flops and registers

Unit I **(12 hours)**

Number Systems and Codes: Introduction- binary, octal, decimal, and hexadecimal number system- decimalto binary, octal to binary, hexadecimal to binary – hexadecimal to octal conversions and vice versa-binary arithmetic-1s and 2s complement representations-BCD addition and subtraction.

Unit II **(12 hours)**

Basic Boolean functions: Boolean theorems and laws-use of Boolean algebra for simplification of logical expressions - canonical sum of products and product of sum simplifications-minimization of logical expressions using K-map-logic gates-AND,OR, NOT,EX- OR,NAND,NOR gates.

Unit III **(12 hours)**

Introduction to combinational logic circuits: arithmetic circuits –half adder, full adder, half subtractor, full subtractor, parallel binary adder - subtractor, serial adder, multiplier and divider.

Unit IV **(12 hours)**

Introduction to sequential circuits-flip-flops-SR, JK ,D and T flip-flops-master-slave flip-flops-level and edge triggering-synchronous and asynchronous counters- shift registers - serial in serial out - serial in parallel out, parallel in serial out and parallel in parallel out shift counters.

AXACADEMIC COUNCIL

Unit V **(12 hours)**

Read Only Memory- architecture of ROM, PROM, EPROM, EEPROM- RAM architecture-static and dynamic RAM.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the basic structure of number system methods like binary, octal and hexadecimal
CO2: Apply the functions to simplify the logical expressions
CO3: Analyze the operations of various logical circuits
CO4: Evaluate the functions of the memory organization
CO5: Create the sequential and combinational logic circuits

Text Book:

1. S. Salivahanan, S. Arivazhagan, *Digital Circuits and Design*, Oxford University Press, 2018

Reference Books:

1. M. Morris Mano, Michael D. Ciletti, *Digital Design*, Pearson Education, Fifth Edition, 2014
2. A.Anand Kumar, *Fundamentals of Digital Circuits*, PHI Learning Private Limited, Fourth Edition, 2016
3. Anil K.Maini, *Digital Electronics*, Wiley Publishers, 2014
4. Charles H.Roth., *Fundamentals of Logic Design*, Thomson Learning, Sixth Edition, 2013

E-Resources:

1. https://nptel.ac.in/courses/108/105/108105113/
2. https://www.classcentral.com/course/swayam-digital-electronic-circuits-12953
3. https://onlinecourses.swayam2.ac.in/cec21_cs16/preview
4. https://tutorialsinhand.com/tutorials/digital-electronics-tutorial/digital-electronics-basics/digital-electronics-introduction.aspx
5. https://www.udemy.com/course/introduction-to-digital-electronics/
6. https://www.udemy.com/course/basics-of-digital-electronics/

Digital Electronics (Lab)

Hours/Week: 2

List of Programs

Logic Gates

1. Verification of AND Gate using ICs
2. Verification of OR Gate using ICs
3. Verification of NOT Gate using ICs
4. Verification of NAND Gate using ICs
5. Verification of NOR Gate using ICs
6. Verification of EX-OR Gate using ICs

Universal Gates

7. Universality of NAND gates using IC 7400
8. Universality of NOR gates using IC 7402

AKAMIC COUNCIL

Boolean algebra and Theorem

9. Verification of Boolean Expression using ICs
10. Verification of Demorgan's theorems using ICs

Combinational Logic Circuits

11. Binary half and full adder using ICs
12. Binary half and full subtractor using ICs

Note: - Questions for internal examination will be based on concept learnt

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	3	9	**37**
CO2	9	3	3	1	9	3	9	**37**
CO3	9	3	3	1	9	3	9	**37**
CO4	9	3	3	1	9	3	9	**37**
CO5	9	3	3	1	9	3	9	**37**
Total	**45**	**15**	**15**	**5**	**45**	**15**	**45**	**185**

Low-1 Medium-3 High-9

SEC I – Multimedia Lab – I

(For Students Admitted from 2024-25)

Semester: I **Hours/Week: 2**
Subject Code : IBCSS15P **Credit: 2**

Course Objectives:

1. To understand the basic concepts of GIMP
2. To gain knowledge about various tools of GIMP

List of Programs

1. Design a business card
2. Create a logo
3. Convert an image into pencil drawing
4. Design scenery using various brushes
5. Design a greeting card
6. Create clipping mask – place an image inside text
7. Create passport size photo
8. Animate a still photo
9. Create a shadow effect for an object
10. Create a mirror effect for an image
11. Apply the following tools in an image:

ACADEMIC COUNCIL

i)Smudge ii)Blur/Sharpen iii)Dodge/Burn

12. Create a mosaic photo collage

Note: Questions for the internal/External Examinations shall be based on the concepts learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO 1: Recognize the uses of various tools and effects in GIMP

CO 2: Identify the steps to start designing with images

CO 3: Simplify the process of designing, editing and masking to solve the difficulties of designers

CO 4: Support studios to create passport size photo

CO 5: Design Visiting card, ID card, Birthday card, logo etc.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	9	9	1	**43**
CO2	9	1	9	9	3	9	3	**43**
CO3	9	3	9	9	3	9	9	**51**
CO4	9	1	3	9	3	9	3	**37**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**17**	**39**	**39**	**27**	**45**	**25**	**237**

Low-1 Medium-3 High-9

Core IV – Programming in C

(For Students Admitted from 2024 -25)

Semester: II **Hours/Week: 5**

Subject Code: IBCSC211 **Credit: 5**

Course Objectives:

1. To understand the main features of operators, input/ output statements, control statements and program structure
2. To enhance the students to understand the significance of functions, arrays, strings, pointers and structures

Unit I **(15 hours)**

Introduction to C Programming: C Character Set-Writing first program of C- Identifiers and Keywords - Data types- Constants -Variables and Arrays- Declarations - Expressions- Statements- Symbolic constants. **Operators and Expressions:** Arithmetic Operators-Unary Operators - Relational and logical Operators-Assignment Operators-The conditional Operators.

EX ACADEMIC COUNCIL

Unit II **(15 hours)**

Data Input and Output: The getchar function- The putchar function - The scanf function-The printf function- gets and puts function. **Control Statements-Branching:** The If-else Statement- Looping- while statement- do-while statement- for statement -nested control structures- switch statement - break statement- continue statement- coma operator -goto statement.

Unit III **(15 hours)**

Program Structure: Storage classes – Automatic variables – External variables – Static variables – Multi File programs. **Arrays:** Defining an Array – Processing an Array – Passing arrays to Functions – Multidimensional arrays. **Strings- Functions:** Defining a function - Accessing a function -Function prototypes- Passing arguments to a function- Recursion.

Unit IV **(15 hours)**

Pointers: Fundamentals – Pointer Declarations – Passing pointers to a function – Pointers and one dimensional arrays – Dynamic memory allocation – Operations on pointers - Pointers and multidimensional arrays – Arrays of Pointers - Passing functions to other functions.

Unit V **(15 hours)**

Structures and Unions: Defining a Structure – Processing a Structure – User defined data types – Structures and pointers – Passing structures to functions – Self Referential structures – Unions. **File Handling:** Opening and closing a Data file – Reading and writing a data file – Processing a data file – Unformatted data files – Concept of binary files – Accessing the file randomly.

Course Outcomes:

After successful completion of this course, students will be able to

CO 1: Describe the basic programming knowledge of C, operators and expressions
CO 2: Demonstrate data input and output, control statements & functions
CO 3: Analyse program structure and arrays
CO 4: Evaluate strings and pointers
CO 5: Formulate structures, unions and file handling

Text Book:

1. Byron Gottfried, *Programming with C*, Tata McGraw Hill Education, Fourth Edition, 2018.

Reference Books:

1. Balagurusamy E, *Programming in ANSI C*, Tata McGraw-Hill Publishing Company, Sixth Edition, 2012.
2. Venugopal K R , Sudeep R Prasad, *Programming with C*, Tata McGraw-Hill Publishing Company ,2008.
3. Mullish, Henry Cooper, Herbert, *The Spirit of C - An introduction to modern programming*, Jaico Publishing House, Third Edition, 2006.

E - Resources:

1. NPTEL: https://onlinecourses.nptel.ac.in/noc19_cs42/preview
2. NPTEL: https://nptel.ac.in/courses/106/105/106105171/

ACADEMIC COUNCIL

3. NPTEL: https://onlinecourses.nptel.ac.in/noc21_cs01/preview

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	3	3	9	9	3	9	45
CO2	9	3	3	3	9	3	99	39
CO3	9	3	3	3	9	9	9	45
CO4	9	3	3	3	9	3	9	39
CO5	9	9	9	3	9	9	9	57
Total	45	21	21	21	45	27	45	225

Low-1 Medium-3 High-9

Core V – Programming in C Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/Week: 4**
Subject Code: IBCSC22P **Credit: 4**

Course Objectives:

1. To introduce the field of programming using C language
2. To enhance the analyzing and problem solving skills and use the same for writing programs in C

List of Programs

Formula substitution

1. Develop a C Program to check whether the given number is odd or even
2. Develop a C Program to find sum of the digits and reverse the digits
3. Develop a C Program to generate the Fibonacci series
4. Develop a C Program to generate Prime number within range
5. Develop a C Program to find whether a given number is Armstrong or not
6. Develop a C Program to count the number of positive, negative and zero in the list
7. Develop a C Program to solve the Quadratic Equation
8. Develop a C Program to find the area of various shapes using switch case

Array

9. Develop a C Program to Find Matrix Addition , Subtraction, Multiplication and Transpose of a matrix using switch case
10. Develop a C Program to Check whether the element is present in the given list or not
11. Develop a C Program to sort numbers in ascending and descending order
12. Develop a C Program to sort names in Alphabetical order

Functions & Structures

13. Develop a C Program to find the factorial of a given number using function declaration
14. Develop a C Program to find the factorial of a given number using recursion function
15. Develop a C Program to Prepare student mark list using structure

MYA ACADEMIC COUNCIL

16. Develop a C Program to Prepare electricity bill using structure

String Manipulation

17. Develop a C Program to count the vowels in the given string
18. Develop a C Program to convert the case of given string from upper case to lower case and vice versa

Pointers

19. Develop a C Program to sort numbers in ascending order using pointers
20. Develop a C Program to find average of two numbers using pointers

Note: Questions for Internal and external examination will be based on concept learnt

Course Outcome:

After successful completion of this course, students will be able to

CO 1: Remember the control structures and loops
CO 2: Apply the concepts of functions and pointers
CO 3: Analyze the concepts of Structures and arrays
CO 4: Evaluate string handling functions
CO 5: Create programs with pointers, arrays, structures

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**15**	**5**	**45**	**45**	**45**	**215**

Low-1 Medium-3 High-9

AECC II – IoT Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/Week: 5**
Subject Code: IBCSA231P **Credit: 4**

Course Objectives:

1. To understand Internet of Things concept
2. To provide strong foundation for designing real world applications Arduino

List of Programs

1 Deveop a program to display temperature and humidity
2 Develop a program to implement Automatic Street Light System
3 Develop a program to create automatic irrigation System

KK ACADEMIC COUNCIL

4 Develop a program to create Light Automation & Home Automation
5 Develop a program to create Obstacle Avoiding
6 Develop a program to create Voice Control and Bluetooth Control Robot
7 Develop a program to create Human following Robot

Note: Questions for Internal examination will be based on concept learnt

Course Outcomes:
After successful completion of this course, students will be able to
CO1: Understand the concept of Internet of Things
CO2: Implement interfacing of various sensors with Arduino
CO3: Demonstrate the ability to transmit data wirelessly between different devices
CO4: Show an ability to get the sensor data
CO5: Design different interfacing applications

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	3	9	9	45
CO2	9	3	9	3	9	9	9	51
CO3	9	3	9	9	9	9	9	57
CO4	9	3	3	9	9	9	9	51
CO5	9	3	9	9	9	9	9	57
Total	**45**	**15**	**39**	**33**	**39**	**45**	**45**	**261**

Low-1 Medium-3 High-9

SEC II - Multimedia Lab – II

(For Students Admitted from 2024 -25)

Semester: II **Hours/Week: 2**
Subject Code: IBCSS24P **Credit: 2**

Course Objectives:

1. To understand the basic concepts of animation
2. To gain knowledge about creating animated pictures using Blender

List of programs

1. Create a coffee cup
2. Create a dinner table fork
3. Create a cup with wooden texture
4. Create a wooden table
5. Model a leather couch

AUTONOMOUS ACADEMIC COUNCIL

6. Create a teddy bear
7. Create a photo realistic ring
8. Create a simple character
9. Create a stylized number animation
10. Animate a bouncing ball
11. Animate a shape of an object into another shape

Note: Questions for the internal/external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO 1: Recognize the uses of various tools in Blender
CO 2: Predict the steps that are needed to create animation
CO 3: Critically analyze the required options to create animation with respect to its nature
CO 4: Evaluate the use of 'Motion tween' in the givenconcept
CO 5: Create animated scenes, animated logos, animated cartoon characters etc

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	9	3	**31**
CO2	9	1	9	3	3	9	3	**37**
CO3	9	1	9	3	9	9	9	**49**
CO4	9	1	3	3	9	9	9	**43**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**13**	**33**	**21**	**33**	**45**	**33**	**223**

Low-1 Medium-3 High-9

Core VI – .NET Programming

(For Students Admitted from 2024-25)

Semester: III **Hours/Week: 4**
Subject Code: IBCSC311 **Credit: 4**

Course Objectives:

1. To understand the code solutions and compile C# projects within the .NET Framework
2. To design and develop professional console and window based .NET Application

Unit I **(12 hours)**

The .NET Framework: .Net programming Framework-VB.NET,C#.NET and the .NET Languages-The Common Language Runtime-The .NET Class Library-ASP.NET-Visual Studio .NET.**Learning the .NET Languages:**The .NET Languages-Data Types-Declaring Variables-Scope and Accessibility-Variable Operations.**Objects and Namespaces:** The Basics about classes –Value Types and Reference Types-Advanced Class Programming-Understanding Namespaces and Assemblies.

MX ACADEMIC COUNCIL

Unit II **(12 hours)**

ASP.NET Applications: ASP.NET Applications-Code-Behind-The Global.asax Application File-Understanding ASP.NET Classes-ASP.NET Configuration. **Web Controls:** Stepping Up to Web Controls-Web control Classes-AutoPostBack and Web Control Events.

Unit III **(12 hours)**

Using Visual Studio .NET: The promise of Visual Studio.NET-Starting a Visual Studio.Net Project – The Web form Designer-Writing Code-Visual Studio.NET Debugging.**Working Without Visual Studio.NET Validation and Rich Controls:** Validation-A simple Validation Example-Understanding Regular Expressions-A Validated Customer Form.

Unit IV **(12 hours)**

Tracing, Logging and Error Handling: Common Errors-The .NET Exception Object-Handling exceptions-Throwing Your Own Exceptions-Logging Exceptions-Error Pages-Page Tracing. **Overview of ADO.NET:** Introducing ADO.NET and DataManagement-Characteristics of ADO.Net-The ADO.NET Object Model. **ADO.NET Data Access:** About the ADO.NET Examples-SQL Basics-The SQL Select Statement-Update-Insert-Delete-Accessing Data the Easy Way-Creating a connection-Defining a Select Command .

Unit V **(12 hours)**

Data Binding: Introduction-Single-Value Data Binding-Repeated-Value Data Binding-Data Binding with Databases. **The DataList, DataGrid and Repeater:** Introducing Templates-Using Templates with the DataList-Data Binding with Multiple Templates-Comparing the Template Controls-Selecting Items-Editing Items-Paging with the DataGrid.

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Interpret the basic concepts of .NET, Problem of the state, data, Management Validation and Rich controls

CO2: Determine types, objects and namespaces, Enumerators and Iterators and Error Handling

CO3: Illustrate Table Controls,ASP.Net Applications and the Web Server,Interfaces and Structures

CO4: Evaluate on Exception Handling, Serializing objects,Direct Data Access

CO5: Develop XML classes and XML Validation, web forms and use web controls

Text Book:

1. Matthew MacDonald, *The Complete Reference ASP.NET*, Tata McGraw-Hill Publishing Company, 2017

Reference Books:

1. Dino Esposito, *Programming Microsoft ASP.NET*, Tata McGraw-Hill publishing Company, 2003

XI ACADEMIC COUNCIL

2.Chris Ullman , John Kauffman, Chris Hart, David Sussman, *Beginning ASP.Net* 1.1 with VB.NET , Wiley Publishing ,First Edition, 2003
3.Elliotte Rusty Harold, *XML 1.1 Bible*, Wesley Publications, Third Edition, 2004

E-Resources:
1.NPTEL: https://nptel.ac.in/courses/106/104/106104220/#
2.NPTEL: https://nptel.ac.in/courses/110/105/110105033/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	3	9	**39**
CO2	9	3	3	9	1	1	9	**35**
CO3	3	3	3	9	1	1	9	**29**
CO4	9	1	3	9	1	1	9	**33**
CO5	9	3	1	9	1	3	9	**35**
Total	**39**	**13**	**13**	**45**	**7**	**9**	**45**	**171**

Low-1 Medium-3 High-9

Core VII – .NET Programming Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/Week: 4**
Subject Code : IBCSC321P **Credit: 4**
Course Objectives:

1. To understand .Net IDE Component Framework
2. To create website using ASP.Net Controls

List of Programs

Console Application

1. Calculate the factorial of a number N, assuming the number is more than zero
2. Check a given numbers(prime,perfect,Armstrong etc)
3. Calculate age for a person using properties
4. Sort a given list of numbers and find out the average of a list of numbers.
5. Display how many days are in a given month(check for leap years also)

Windows Application

1. Build a simple calculator
2. Calculate the arithmetic operations using functions
3. Do String manipulation
4. Create notepad

ACADEMIC COUNCIL

Web Application

1. Design an E-mail application form using standard controls and store these details in SQL tables
2. Create a student details form and validate the details using validation controls
3. Display employee details using data grid control

Note: Questions for the internal/external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO 1: Build console applications
CO 2: Perform Windows and web Applications
CO 3: Demonstrate validation controls in web form
CO 4: Illustrate Data Grid control to database in Web application
CO 5: Compose Data Repeater and Data list Controls

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	9	9	**45**
CO2	9	3	3	3	3	9	9	**39**
CO3	3	3	3	3	3	9	9	**33**
CO4	9	1	3	9	3	9	9	**43**
CO5	9	3	1	1	1	9	9	**33**
Total	**39**	**13**	**13**	**25**	**13**	**45**	**45**	**193**

Low-1 Medium-3 High-9

SEC III - Web Designing Lab (HTML and Scripting Language)

(For Students Admitted from 2024 -25)

Semester: III **Hours/week: 2**
Subject Code: IBCSS341P **Credit: 2**

Course Objectives:

1. Analyze a web page and identify its elements and attributes
2. Build dynamic web pages by using script languages

List of Programs

HTML

1. Create a HTML page for displaying the personal information by using various tags such as backgroundcolor, heading tag, font tag

KAC ACADEMIC COUNCIL

2. Create a HTML page, which includes images and audio for any application.
3. Create a HTML page for displaying the Tender notice which is given to you
4. To create a Time Table of your class using HTML
5. Creation of Lists in HTML
6. Design a dictionary using frames. The words are displayed in one frame and when you click the word,the meaning will be displayed on the other frame
7. Design webpage for your company product advertisement using frames

VBScript

8. Write a VBScript program to generate random number
9. Write a VBScript program to check whether the given number is odd or even
10. Write a VBScript program to find the largest of three given integers
11. Write a VBScript program to sort the numbers in ascending order

JavaScript

12. Write a JavaScript program to create a simple Calculator
13. Write a JavaScript program to validate User Login page
14. Write JavaScript program to validate the following fields of the Registration page.
    a. First Name (Name should contains alphabets and the length should not be less than 6 characters)
    b. Password (Password should not be less than 6 characters length).
    c. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
    d. Mobile Number (Phone number should contain 10 digits only)
    e. Last Name and Address (should not be Empty).

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Understand the basics of HTML and Scripting Languages
CO2: Implement webpages using basic tags
CO3: Examine the use of tables in webpages
CO4: Develop a web pages with frames
CO5: Design interactive web pages using VBScript and JavaScript

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	9	9	**45**
CO2	3	3	9	9	3	9	9	**45**
CO3	3	3	9	9	1	9	9	**43**
CO4	3	3	9	9	3	3	3	**33**
CO5	3	3	3	9	1	9	3	**31**
Total	**21**	**15**	**33**	**39**	**17**	**39**	**33**	**197**

Low-1 Medium-3 High-9

XXX ACADEMIC COUNCIL

Core VIII – Data Structures and Algorithms

(For Students Admitted from 2024-25)

Semester: IV **Hours/Week: 5**
Subject Code: IBCSC41 **Credit: 4**

Course Objectives:

1. To understand the fundamental design, analysis, implementation of basic data structures, specification and analysis of programs
2. To understand about Significance of algorithms in the computer field and various aspects of Algorithm Development

Unit I **(15 hours)**

Introduction: History of Algorithms - Data structures and Algorithms - Data structure - Definition and Classification. **Stacks:** Introduction - stack Operation - Application. **Queues:** Introduction - Operation - circular Queues - Other Types of Queues - Application.

Unit II **(15 hours)**

Linked Lists: Introduction - Singly Linked Lists - Circularly Linked List - Doubly Linked List - Multiply Linked List - Application. **Trees and Binary Trees:** Introduction -**Trees:** Definition and Basic Terminologies - Representation of Trees -Binary Tree Traversals - Threaded Binary Trees - Applications.

Unit III **(15 hours)**

Graphs: Introduction-Definitions and Basic Terminologies - Representations of Graphs - Graph Traversals - Single-source & All pairs shortest paths problem - Minimum cost spanning trees. **Binary Search Trees and AVL Trees:** Introduction - **Binary Search Trees:** Definition and Operations - AVL Trees: Definition and Operations - Applications.

Unit IV **(15 hours)**

Red-Black Trees and Splay Trees: Red-Black Trees - Applications. **Hash Tables:** Introduction- Hash Table Structure - Hash Functions - Linear Open Addressing - Chaining - Applications.**Searching:** Introduction-Linear Search-Transpose Sequential Search- Interpolation Search - Binary Search - Fibonacci Search - Other Search Techniques.

Unit V **(15 hours)**

Internal Sorting: Introduction - Bubble Sort - Insertion Sort - Selection Sort - Merge Sort - Shell Sort - Quick Sort - Heap Sort - Radix Sort. **Algorithms:** Algorithm Specification - Performance analysis - Asymptotic notation.

XX ACADEMIC COUNCIL

Course Outcomes:

After successful completion of the course, the students will be able to

CO 1: Explain the basics concept of data structures and Algorithm stacks, queues and lists

CO 2: Distinguish about knowledge of tree and graphs concepts

CO 3: Analyze the concepts about searching and sorting techniques

CO 4: Demonstrate the types of Trees

CO 5: Evaluate about Algorithm and step by step approach in solving problems with the help of fundamental data structure

Text Books:

1. Vijayalakshmi Pai G A, *Data structures and Algorithms, Concepts, Techniques and Application,* Tata McGraw-Hill Education Private Limited, 2008.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, *Fundamentals of Computer Algorithms,* Universities Press, Second Edition, 2008.

Reference Books:

1. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, *Data Structures and Algorithms,* Dorling Kindersley Private Limited, 2013.
2. Patel R B, *Expert Data Structures with C,* Khanna Book Publishing, Third Edition, 2000.

E-Resources:

1. http://www.dave-reed.com/csc427.F04/
2. http://www.math.tau.ac.il/~matias/ds03.html
3. NPTEL: https://onlinecourses.nptel.ac.in/noc22_cs26/preview
4. NPTEL: https://nptel.ac.in/courses/106/106/106106127/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	1	1	19
CO2	9	3	9	1	9	1	3	35
CO3	9	1	9	9	1	1	3	33
CO4	9	3	3	3	3	3	3	27
CO5	9	1	1	9	9	9	3	41
Total	**45**	**11**	**23**	**23**	**25**	**15**	**13**	**155**

Low-1 Medium-3 High-9

XXX ACADEMIC COUNCIL

Core IX – Data Analytics Using Statistical Methods Lab

(For Students Admitted from 2024-25)

Semester: IV **Hours/Week: 4**
Subject Code: IBCSC421P **Credit: 4**

Course Objectives:

1. To understand the statistical methods
2. To know how to develop statistical models

List of programs

1. Develop a program to implement Correlation & Regression Analysis
2. Develop a program to demonstrate t-test
3. Develop a program to demonstrate z-test
4. Develop a program to demonstrate f-test
5. Develop a program to demonstrate chi-square
6. Develop a program to demonstrate kruskal-walli test
7. Develop a program to demonstrate Analysis of variance (ANOVA) one way and two way
8. Develop a program to demonstrate Factor Analysis
9. Develop a program to demonstrate Cluster Analysis
10. Develop a program to demonstrate Optimization Strategy
11. Develop a program to demonstrate Factorization of a Polynomial over a Finite Field
12. Develop a program to demonstrate Predictive Analysis

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of the course, the students will be able to

CO 1: Recall the statistical methods
CO 2: Apply statistics methods to develop models
CO 3: Analyzing the data generated from various statistical methods
CO 4: Evaluate different statistical test methods
CO 5: Derive the predictive analysis result

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	9	9	55
CO2	9	9	9	1	9	9	9	55
CO3	9	9	9	1	9	9	9	55
CO4	9	9	9	1	9	9	9	55
CO5	9	9	9	1	9	9	9	55
Total	**45**	**45**	**45**	**5**	**45**	**45**	**45**	**275**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

SEC IV – Linux and Shell Programming Lab

(For Students Admitted from 2024-25)

Semester: IV **Hours/Week: 2**
Subject Code: IBCSS44P **Credit: 2**

Course Objectives:

1. To understand and make effective use of Linux utilities and shell scripting language to solve problems
2. To develop the skills the necessary for systems programming including file system programming, process and signal management and inter process communication

List of Programs

Built-in Commands

1. Write a shell program to use who commands
2. Write a shell program to use list commands
3. Write a shell program to use sort commands
4. Write a shell program to use wc commands
5. Write a shell program to use cat commands

Formula Substitution

6. Write a shell program to find odd or even number
7. Write a shell program to find smallest among three numbers
8. Write a shell program to find the factorial value
9. Write a shell program to display multiplication table

Switch case

10. Write a shell program to use case statement

Functions

11. Write a shell program to display username, pwd using function
12. Find age of a person using set date

Checking

13. To check the given file is a directory or not

String Manipulation

14. Convert lowercase to uppercase using tr statement

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO 1: Summarize shell commands, scripts, managing files, pipes and redirections
CO 2: Apply appropriate Linux commands to make effective use of the environment to solve problems
CO 3: Illustrate shell scripts to perform repetitive tasks using while and for loops
CO 4: Evaluate shell functions
CO 5: Derive command-line arguments

AC ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	9	3	1	9	9	9	49
CO2	9	9	3	1	9	9	9	49
CO3	9	9	3	1	9	9	9	49
CO4	9	9	3	1	9	9	9	49
CO5	9	9	3	1	9	9	9	49
Total	**45**	**45**	**15**	**5**	**45**	**45**	**45**	**245**

Low-1 Medium-3 High-9

Core X – Software Engineering

(For Students Admitted from 2024-25)

Semester: V **Hours/Week: 5**
Subject Code: IBCSC511 **Credit: 4**

Course Objectives:

1. To understand the basic concepts, applications of database systems, relational database design principlesand SQL queries
2. To understand the different issues involved in the design and implementation of a database system,security, integrity and concurrency

Unit I **(15 Hours)**

Introduction: Software engineering: A layered technology – A process framework – Process models – The waterfall model – Incremental process models – Evolutionary process models.**Software Engineering practice:** Communication practices – Planning practices – Modeling practices – Construction practice.

Unit II **(15 Hours)**

Requirements Engineering: Requirements engineering tasks – Initiating the requirements engineering process – Eliciting requirements – Developing use-cases – Negotiating requirements – Validating requirements .**Design Engineering:** Design process and design quality – Design concepts – The design model.

Unit III **(15 Hours)**

Testing Strategies: A strategic approach to software testing – Test strategies for conventional software – Validation testing – System testing – The art of debugging.**Testing Tactics:** Software testing fundamentals – White-box testing – Basis path testing – Control structure testing – Black-box testing.

KK ACADEMIC COUNCIL

Unit IV **(15 Hours)**

Project Management: The management spectrum – The people – The product – The process – The project.**Risk Management:** Reactive vs proactive risk strategies – Software risks – Risk identification – Risk projection – Risk refinement.

Unit V **(15 Hours)**

Quality Management: Quality concepts – Software quality assurance – Software reviews – Formal technical reviews – The ISO 9000 quality standards – The SQA plan.**Change Management:** Software configuration management – The SCM process.

Course Outcomes:

After successful completion of this course, students will be able to

CO 1 : Classify the varieties of software and models for software development
CO 2 : Know how to gather requirements and design a software
CO 3 : Implement testing strategies to test the software for errors and omissions
CO 4 : Manage the software risks and
CO 5: Ensure the quality of the software developed

Text Book

1.Roger S. Pressman, **Software Engineering A Practitioner's Approach**, Tata McGraw Hill International edition, New Delhi, Sixth Edition 2005.

References

1. Ian Sommerville, **Software Engineering**, Pearson Education, New Delhi,7th edition, 2004
2. Samarjeet kaur, Sandhir Sharma & P.P Singh, **Software Engineering – Complete Course Book**, Deep & Deep Publications Pvt. Ltd., New Delhi , 2006
3. Waman S Jawadekar, **Software Engineering – Principles and Practice**, Tata McGraw Hill Education Private Limited, New Delhi, 2004

E-Resources:

1. NPTEL: https://nptel.ac.in/courses/106/105/106105182/
2. https://www.coursera.org/courses?query=software%20engineering

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	9	3	45
CO2	9	9	9	3	9	9	9	57
CO3	9	9	9	3	9	9	9	57
CO4	9	9	3	3	9	9	9	51
CO5	9	9	9	3	9	9	9	57
Total	**45**	**45**	**33**	**15**	**45**	**45**	**39**	**267**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core XI – Cyber Security

(For Students Admitted from 2024-25)

Semester: V **Hours/Week: 5**
Subject Code : IBCSC521 **Credit: 4**

Course Objective:

1. To practice with an expertise in academics to design and implement security solutions in Organizations
2. To understand key terms and concepts in Cryptography, Rootkit, Cryptology

Unit I **(15 hours)**

Introduction to Cyber security: Computer security-threats-Harm-Vulnerabilities-Control-Authentication- Access Control-Cryptography-Malicious Code-Malware-Countermeasures-The web-User side-Browser Attacks-Email Attacks.

Unit II **(15 hours)**

Security In Operating System & Networks: Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network security attack- Threats to Network Communications - Wireless Network Security -Denial of Service - Distributed Denial-of-Service.

Unit III **(15 hours)**

Database Security: Introduction of Databases-Security Requirements in Databases-Reliabilty and Integrity- Database Disclosure-Data Mining and Big Data-Cloud Compting: Cloud Computing Concepts-Cloud Securitytools and techniques-Securing Iaas.

Unit IV **(15 hours)**

Security Planning:Security Planning-Business Continuity Planning-Handling Incidents-Risk Analysis - Legal Issues and Ethics: Protecting Programs and Data-Information and the Law-Rights of Employees and Employers-Computer Crime-Ethical Issues in Computer Security.

Unit V **(15 hours)**

Cryptography: Cryptology-Symmetric Encryption Algorithms-Message Digests-Quantum Cryptography- Emerging Topics: The Internet of Things-Economics-E-Voting-Cyber Warfare.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Classify the concept of threat, risks and security planning
CO2: Apply theoretical concepts in different security phases
CO3: Analyze security concepts needs in cloud and database
CO4: Examine the concepts and do security in database and organization
CO5: Develop policies and procedures for database and cloud security and design security architecture for anorganization

YVA ACADEMIC COUNCIL

Text Book:

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies, *Security in Computing*, Pearson Education, Fifth Edition, 2015

Reference Books:

1. MarttiLehto, PekkaNeittaanmäki, *Cyber Security: Analytics, Technology and Automation*, Springer International Publishing, 2015
2. Nelson Phillips, EnfingerSteuart, *Computer Forensics and Investigations*, Cengage Learning, 2009

E-Resources:

1. https://www.springboard.com/resources/learning-paths/cybersecurity-foundations/
2. https://www.edx.org/course/cyber-security-basics-a-hands-on-approach

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	9	9	3	9	**57**
CO2	9	3	9	9	3	9	9	**51**
CO3	9	1	3	9	9	9	9	**49**
CO4	9	3	3	9	9	9	9	**51**
CO5	9	9	3	9	9	9	9	**57**
Total	**45**	**25**	**27**	**45**	**39**	**39**	**45**	**265**

Low-1 Medium-3 High-9

Core XII - Cyber Security Lab

(For Students Admitted from 2024-25)

Semester: V **Hours/Week: 4**

Subject Code: IBCSC531P **Credit: 4**

Course Objectives:

1. To understand the cyber security related problems
2. To create website using ASP .Net Controls

List of Programs

Console Application

1. Stop User from viewing certain URLs or Websites
2. To Protect Systems from Malicious Software
3. Signature Based Detection
4. Behavior-Based Detection

AV ACADEMIC COUNCIL

5. To Prevent Threats from Getting on the Network using Sandboxing
6. Key logger Programs
7. Web Application Firewall
8. Website Scraper
9. Log Analyzer

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Build applications for cyber security solutions
CO2: Perform Malware attacks
CO3: Demonstrate corrective measures for computer security breaches
CO4: Illustrate security threats and methodologies
CO5: Develop firewall and web related issues

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	3	9	**39**
CO2	9	3	3	9	1	1	9	**35**
CO3	3	3	3	9	1	1	9	**29**
CO4	9	1	3	9	1	1	9	**33**
CO5	9	3	1	9	1	3	9	**35**
Total	**39**	**13**	**13**	**45**	**7**	**9**	**45**	**171**

Low-1 Medium-3 High-9

Core XIII – RDBMS Lab

(For Students Admitted from 2024 -25)

Semester: V **Hours/Week: 4**
Subject Code: IBCSC541P **Credit: 3**

Course Objectives:

1. The Students get practical knowledge on designing and creating Relational Database Management
2. To understand various advanced queries such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL

List of SQL Programs

DDL

1. Create an address table with fields name , doorno , street & city
   a. describe its structure

KAHACADEMIC COUNCIL

b. alter the table to include pincode
c. alter the table to modify street column
d. drop the table

DML

2. Create a student table with regno, name, age and dept.
   a. insert records
   b. delete the students with age above 20
   c. truncate and drop the table

Functions

3. Create an employee table with fields eno, ename, sex, age & years of experience
   a. find out the no. of female employees
   b. find out the employees with age ranging between 30 and 35
   c. list out the employees who are working more than 5 years
4. Create a library file with field's accno, title, author, cost & no of copies
   a. arrange the books according to accno
   b. find out the TOTAL no. of books available in the library
   c. find out the book of minimum cost
5. Create a player table with fields name, sports (cricket, hockey,etc.),age & country
   a. find out the eldest and youngest player
   b. group players according to sports
   c. list out the Indian players
6. Write the SQL queries to illustrate all number functions
7. Write the SQL queries to illustrate date functions
8. Write the SQL queries to illustrate all string functions
9. Create an item table with field's itemno, itemname, quantity & price and insert records.
10. Illustrate the comparison operators (between, like, in & isnull)
11. Create a table with the fields clientno , clientname & phoneno Illustrate the set operators union , unionall, minus & intersect
12. Create a student table with fields' regno, name and English, Tamil, Maths and TOTAL & insert records
    a. arrange all records according to TOTAL
    b. find the student who got first mark in Maths
    c. list out the students whose name starts with 'S'
13. Create an inventory table with fields' itemno, itemname, qnty, price and reorder level
    a. insert records
    b. update the qnty when it goes less than reorderlevel
    c. list the items with price less than 100
14. Create an employee table with fields ecode,ename,age & salary and create a department table with fields ecode, designation, deptcode & dept. Illustrate joins and sub queries using the above tables.

Constraints

15. Create a vendormaster table with fields vencode,venname,place and phoneno
    Create an ordermaster table with fields item no, itemcode,vencode,qnty and orderdate .

KVACADEMIC COUNCIL

Illustrate the following constraints using the above tables

a. vencode as primary key in vendormaster
b. vencode as foreign key in ordermaster
c. phoneno as unique
d. place as notnull &
e. qnty > 100

TCL

16. SQL queries to illustrate TCL commands (savepoint, rollback and commit)

PL / SQL

Formula Substitution

1. PL / SQL block to find out the largest among three numbers
2. PL/SQL block to print the multiplication table for given multiplier

Functions

3. Write a PL/SQL block to find the sum of digits of a given number. Use function
4. Write a PL/SQL block to find the factorial of a given number using a function

Cursor

5. Create a library table with fields such as acc no, title author and price & insert records, write a PL/SQL block to illustrate implicit cursor

Procedure

6. Create a student table with fields regno,name, maths ,physics&biology and insert records ,write a PL/SQL block to find the TOTAL , average & grade using procedure

7. Create an electricity bill table with fields Custcode, custname, custtype, prevreading, currreading, UNITs, costperUNIT & TOTALamount. write a PL/SQL block to find the TOTAL amount for all customers using the following condition

Cust type	Cost per Unit
i) Domestic	Rs. 3 /-
ii) Office	Rs. 4/-
iii) Factory	Rs. 6/-

Exception Handling

8. Write a PL/SQL block to illustrate the following predefined exceptions
   a. too_many_rows
   b. no_data_found

9. Create a table with fields itemno, itemname, qntyordered & qntydelivered, write a PL/SQL block using userdefined exception to indicate when more items have been delivered than ordered

Triggers

10. Creating and executing triggers

Note: Questions for internal and external examination will be based on concept learnt

ACADEMIC COUNCIL

Course Outcomes:
After successful completion of the course, the students will be able to
CO 1: Build DDL, DML and TCL Commands
CO 2: Make use of implementing constraints in tables
CO 3: Apply to create block structure programming language
CO 4: Create the concepts of functions
CO 5: Develop the procedures, exceptions, triggers in PL/SQL block

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low-1 Medium-3 High-9

DSE I - a) Blockchain Technology

(For Students Admitted from 2024 -25)

Semester: V **Hours/week: 4**
Subject Code: IBCSE51A **Credit: 4**

Course Objectives:

1. To understand how blockchain System (Bitcoin and Ethereum) works
2. To integrate ideas from blockchain technology into their own projects

Unit I **(12 hours)**

Introduction of Block chain: Block 101-Distributed Systems-Consensus-The history of block chain- Introduction of block chain-Features of blockchain-Applications of block chain technology-Tiers of Blockchain technology-Consensus in block chain- Benefits and limitations of Blockchain.

Unit II **(12 hours)**

Cryptography and Technical Foundations: Introduction-Mathematics – Cryptography - Confidentiality- Integrity-Authentication-Non repudiation-Accountability-Block Ciphers-DES-AES-Public and Private keys- RSA-hash Functions-Secure hash algorithms-Merkle trees-Patricia trees-DHT-ECDSA.

Unit III **(12 hours)**

Bitcoin: Bitcoin definitions-transactions-types of transactions-What is UTXO-Block chain-The genesis of Block-The bitcoin network-wallets-Alternative coins: Theoretical Foundations-Alternatives of Proof of Work-Proof of stake-Name coin-Litecoin.

XI ACADEMIC COUNCIL

Unit IV **(12 hours)**

Ethereum101: Introduction-Ethereum block chain-The consensus mechanism-The world state-the account state-Transactions-Contract creation transaction-Message call transaction-Elements of ethereum block chain-EVM.

Unit V **(12 hours)**

Blockchain–Outside of Currencies: Internet of things-IoT Block chain experiment-Government-Health- Finance-EmergingTrends:ABC's-Enterprise-gradeblockchains-PrivateBlockchains-startups-standardization- Enhancements-Real world Implementations-Consortia-Education in block chain technologies.

Course Outcomes:

After successful completion of this course, the student will be able to

CO1: Explain the fundamental concept of block chain and consensus algorithm
CO2: Apply cryptography algorithms in protecting the block chain
CO3: How transactions held in bitcoin
CO4: Develop an application in ethereum framework
CO5: Design block chain technology in popular fields

Text Book:

1. Imran Bashir, *Mastering Block chain: Deeper insights into decentralization, Cryptography, Bitcoinand Popular block chain frameworks***,** Packt Publishing, 2017

Reference Books:

1. Andreas Antonopoulos, Satoshi Nakamoto, *Mastering Bitcoin*, O'Reilly, 2014
2. Roger Wattenhofer**,** *The Science of the Block chain***,** Create Space Independent Publishing, 2016
3. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, *Bitcoin and Cryptocurrency Technologies:A Comprehensive Introduction*, Princeton University Press, 2016

E-Resources:

1. https://nptel.ac.in/courses/106/104/106104220/#
2. https://www.udemy.com/course/build-your-blockchain-az/
3 .https://www.mygreatlearning.com/academy/learn-for-free/courses/blockchain-basics

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	3	3	9	9	**51**
CO2	9	3	9	9	9	9	9	**57**
CO3	9	3	9	3	9	9	9	**51**
CO4	9	3	9	3	9	9	9	**51**
CO5	9	3	9	3	9	3	9	**45**
Total	**45**	**21**	**45**	**21**	**39**	**39**	**45**	**255**

Low-1 Medium-3 High-9

XVI ACADEMIC COUNCIL

DSE I – b) PHP Programming

(For Students Admitted from 2024-25)

Semester: V **Hours/Week: 4**
Subject Code: IBCSE5B **Credit: 4**

Course Objectives:

1. To learn and use open-source server, array, functions and objects
2. To create dynamic web pages and websites

Unit I **(12 hours)**

Introduction to Dynamic Web Content: HTTP and HTML-The Request/Response Procedure-The Benefits of PHP, MySQL, JavaScript, CSS, and HTML5-HTML5-The Apache Web Server-Handling Mobile Devices-Open Source-Bringing It All Together.

Unit II **(12 hours)**

Setting Up a Development Server: WAMP, MAMP, or LAMP-Installing AMPPS on Windows-Installing AMPPS on macOS-Installing a LAMP on Linux-Working Remotely-Using a Program Editor-Using an IDE.

Unit III **(12 hours)**

Introduction to PHP: Incorporating PHP within HTML-The Structure of PHP-Using Comments-Basic Syntax-Variables-Operators-Variable Assignment-Multiple-Line Commands-Variable Typing-Constants-Predefined Constants-The Difference Between the echo and print Commands-Functions-Variable Scope.

Unit IV **(12 hours)**

Expressions and Control Flow in PHP: Expressions-Operators-Conditionals-Looping-Implicit and Explicit Casting-PHP Dynamic Linking-Dynamic Linking in Action. **PHP Functions and Objects:** PHP Functions-Including and Requiring Files-PHP Version Compatibility-PHP Objects.

Unit V **(12 hours)**

PHP Arrays: Basic Access-The foreach as Loop-Multidimensional Arrays-Using Array Functions. **Practical PHP:** Using printf-Date and Time Functions-File Handling-System Calls-XHTML or HTML5

Course Outcomes:

After successful completion of this course, students will be able to

CO 1: Remember variables, data types, operator, control flow, array and file
CO 2: Apply scripting, style sheet and object concepts
CO 3: Analyze the server, function, condition and looping
CO 4: Explain control structure, looping, arrays, user defined functions, files and databases
CO 5: Develop interactive web pages

SEX ACADEMIC COUNCIL

Text Book:

1. Robin Nixon, *Learning PHP, MySQL & JavaScript*, O'Reilly Media, Fifth Edition, 2018.

Reference Books:

1. Vikram Vaswani, *PHP: A Beginner's Guide*, Tata McGraw-Hill, Second Edition, 2009.
2. Steven Holzner, *PHP: The Complete Reference*, Tata McGraw-Hill, Second Edition, 2007.
3. Larry Ullman, *PHP Advanced and Object-Oriented Programming: Visual QuickPro Guide*, Pearson Education, Third Edition, 2013.

E-Resources:

1. https://www.tutorialspoint.com/php/index.htm
2. https://www.codecademy.com/catalog/language/php

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	3	3	9	**37**
CO2	9	9	3	1	3	9	9	**43**
CO3	9	3	3	1	9	3	9	**37**
CO4	9	9	3	1	9	9	9	**49**
CO5	9	9	3	1	9	9	9	**49**
Total	**45**	**39**	**15**	**5**	**33**	**33**	**45**	**215**

Low-1 Medium-3 High-9

DSE II – a) Computer Networks

(For Students Admitted from 2024-25)

Semester: V **Hours/Week: 4**
Subject Code: IBCSE51C **Credit: 4**

Course Objectives:

1. To understand and describe the layered protocol model
2. To describe and analyse datalink, network, and transport layer protocols

Unit I **(12 hours)**

Introduction: Uses of Computer Networks-Network Hardware-Network Software- Reference Models-Network Standardization **Physical Layer:** Guided Transmission Media-Wireless transmission.

Unit II **(12 hours)**

Data Link Layer: Data Link Layer Design Issues-Error Detection and Correction-**Medium Access Control Sub layer:** Channel Allocation Problem-Multiple Access Protocols-Ethernet- Wireless LANs- Data Link Layer Switching.

KA ACADEMIC COUNCIL

Unit III **(12 hours)**

Network Layer: Network layer Design Issues-Routing Algorithms-Congestion Control Algorithms-Qualityof Service- Internetworking-Network Layer in the Internet.

Unit IV **(12 hours)**

Transport Layer: Transport Service-Elements of Transport Protocols-Congestion Control-Internet Transport Protocols: UDP –TCP.

Unit V **(12 hours)**

Application Layer: Domain Name System-Electronic Mail-World Wide Web: HTTP - Streaming Audio and Video.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the concepts of computer networks
CO2: Apply the protocols of computer networks in network design and implementation
CO3: Analyse functions of each layer in the OSI and TCP/IP reference model
CO4: Compare the working principle of various layer protocols
CO5: Design networks by using protocols of computer networks

Text Book:

1. Andrew S Tanenbaum, David. J. Wetherall, *Computer Networks*, Pearson Education, Fifth Edition, 2021.

Reference Books:

1. Behrouz A Forouzan, *Data Communications & Networking*, Tata McGraw Hill, Fourth Edition, 2003.
2. Douglas E Comer, *Computer Networks and Internets*, Pearson Education, Fourth Edition, 2004.

E-Resources:

1. NPTEL: https://nptel.ac.in/courses/106/105/106105081/
2. SWAYAM: https://onlinecourses.swayam2.ac.in/ugc19_cs10/preview
3. SWAYAM: https://onlinecourses.swayam2.ac.in/cec19_cs07/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	1	3	9	**31**
CO2	9	1	3	3	1	3	9	**29**
CO3	9	1	3	3	1	9	9	**35**
CO4	9	1	3	3	1	9	9	**35**
CO5	9	3	3	3	1	9	9	**37**
Total	**45**	**9**	**15**	**15**	**5**	**33**	**45**	**167**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

DSE II – b) Cryptography and Network Security

(For Students Admitted from 2024-25)

Semester: V **Hours/Week: 4**
Subject Code: IBCSE51D **Credit: 4**

Course Objectives:

1. To understand the basics of Cryptography and Network Security
2. To learn about how to maintain the Confidentiality, Integrity and Availability of a data

Unit I **(12 hours)**

Computer and Network Security concept: Computer security concepts-The OSI security Architecture-Security Attacks- Security Services-Security Mechanisms. **Number Theory:** The Euclidean Algorithm-Modular Arithmetic - Fermat's Euler's Theorem.

Unit II **(12 hours)**

Symmetric Ciphers: Classical Encryption Techniques: Symmetric Chippers Model- Substitution Techniques-Transposition Techniques-Traditional Block Cipher Structure. **Finite Fields:** Groups-Rings-Fields-Finite Fields of the FormGF(p).

Unit III **(12 hours)**

Advanced Encryption Standard: Finite Field Arithmetic-AES Structure-AES Transformation Functions-AES Key Expansion. **Asymmetric Ciphers:** The RSA Algorithm.

Unit IV **(12 hours)**

Other Public-Key Cryptosystem: Diffie-Hellman Key Exchange-Elgamal cryptographic system-Elliptic curve Crptography. **Digital Signature:** Digital signature-Elgamal Digital Signature Scheme-Schnorr Digital Scheme.

Unit V **(12 hours)**

Wireless Network Security: Wireless Security-Mobile Device Security-IEEE802.11 Wireless LAN Overview. **Electronic Mail Security:** Internet Mail Architecture-Email Formats-Email Threats and compressive Email Security-S/MIME –Sender policy Framework-Domain Keys.

Text Book:

1. William Stallings, *Cryptography and Network Security Principles and Practice*, Pearson Education, Seventh Edition, 2017

Reference Books:

1. Wade Trappe, Lawrence C Washington, *Introduction to Cryptography with Coding Theory*, Pearson Education, Second Edition, 2007
2. W.Mao, *Modern Cryptography – Theory and Practice*, Pearson Education, Second Edition, 2007

E- Resource:

1. https://nptel.ac.in/courses/106/105/106105162/

ACADEMIC COUNCIL

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Compare various Cryptographic Techniques
CO2: Applying various data encryption techniques
CO3: Classify the encryption standard and asymmetric ciphers
CO4: Implement Hashing and Digital Signature techniques
CO5: Explain the various Security Application

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	45
CO2	9	9	3	9	9	3	9	51
CO3	3	9	3	9	9	3	9	45
CO4	9	9	3	3	9	3	9	45
CO5	9	9	3	9	9	3	9	51
Total	**39**	**45**	**15**	**33**	**45**	**15**	**45**	**237**

Low-1 Medium-3 High-9

SEC V – PHP Programming Lab

(For Students Admitted from 2024-25)

Semester: V **Hours/Week: 2**
Subject Code: IBCSS55P **Credit: 2**

Course Objectives:

1. To understand the concepts of regular expressions including modifiers, operators and metacharacters
2. To develop PHP programs that use various PHP library functions and that manipulate files and directories

List of programs

1. Develop a PHP program to print Sum of digits
2. Develop a PHP program to print factorial of a number
3. Develop a PHP program to display count, from 10 to 20 using loop
4. Develop a PHP program to print prime number
5. Develop a PHP program to check Armstrong number
6. Develop a PHP program to check Palindrome number
7. Develop a PHP program to swap two numbers with and without using third variable
8. Develop a PHP program to find if the given year is leap year or not
9. Develop a PHP program to reverse the number with strrev ()

ACADEMIC COUNCIL

10. Develop a PHP program to show day of the week (for eg: Monday) based on numbers using Switch/case statements
11. Develop a PHP program to print number triangle
12. Develop a PHP program to print alphabet triangle
13. Develop a PHP program to check student grade based on the marks using if-else statement
14. Develop a PHP program Using nested for loop that creates a chess board

Note: Questions for Internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Describe the fundamentals of PHP Language in trivial problem solving
CO2: Determine solution to a problem and apply control structures
CO3: Simplify the use of Strings and String Handling functions
CO4: Justify real time applications using PHP language features
CO5: Build skill on problem solving by constructing algorithms

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	1	1	**25**
CO2	9	3	3	3	9	3	3	**33**
CO3	9	3	1	3	9	9	3	**37**
CO4	9	3	3	3	9	9	3	**39**
CO5	9	3	3	3	9	9	3	**39**
Total	**45**	**15**	**11**	**13**	**45**	**31**	**13**	**173**

Low-1 Medium-3 High-9

Core XIV – Operating Systems

(For Students Admitted from 2024 -25)

Semester: VI **Hours/Week: 5**
Subject Code: IBCSC611 **Credit: 4**

Course Objectives

1. To understand the services provided by and the design of an operating system
2. To understand what a process is and how processes are synchronized and scheduled

Unit I **(15 hours)**

Introduction: What is an Operating System -Mainframe systems- desktop systems- Multiprocessor Systems-Distributed systems- Clustered Systems- Real time systems- **Operating System Structure:** System components- Operating System services- System calls- - System structure.

KAACADEMIC COUNCIL

Unit II **(15 hours)**

Processes: Process concept- process scheduling- operations on processes- Inter process Communication**. CPUScheduling**: Basic Concepts- Scheduling Criteria **Process Synchronization**: Background- The critical section problem--semaphores- Monitors.

Unit III **(15 hours)**

Deadlock: System Model-Deadlock Characterization- Methods of Handling Deadlock-Deadlock Prevention- Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock .**Memory Management**: Background- Contiguous memory allocation- Swapping.

Unit IV **(15 hours)**

Virtual Memory: Background- Demand paging-Copy-on-Develop -Page replacement-Thrashing.**FileSystem Interface**: File concepts- access methods- Directory structure.**Mass Storage Structure**: Overview of mass storage structure.

Unit V **(15 hours)**

Protection: Goals of protection- domain of protection- Access matrix- Implementation of Access matrix. **Security:** The security problem- User authentication- Program threats- System threats-securing systems and facilities.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the structure of operating system and scheduling algorithms
CO2: Apply the concept of process scheduling, deadlocks and its recovery
CO3: Analyze the background of memory with segmentation and paging
CO4: Evaluate file management with file organization, and disk scheduling
CO5: Create Securing systems and facilities

Text Book:

1.Abraham G Silberschatz, *Operating System***,** Wiley Publisher, Tenth Edition, 2017

Reference Books:

1. Milan Milenkovic, *Operating System Concepts & Design*, Tata McGraw Hill, Second Edition,1997
2. Peter Baer Galvin and Robert Neilson Boyd, *Applied Operating system concepts*, John Wiley & Sons, First Edition, 2000
3. Dhananjay M. Dhamdhere, *Operating System A Concept-Based Approach*, Tata McGraw Hill, Third Edition, 2012
4. W. Stallings, *Operating Systems*, *Internals & Design Principles*, Prentice Hall of India, Fifth Edition, 2008

ACADEMIC COUNCIL

E-Resources:

1.https://nptel.ac.in/courses/106/105/106105214/ 2.https://nptel.ac.in/courses/106/106/106106144/
3.https://onlinecourses.nptel.ac.in/noc21_cs44/preview
4.https://www.udacity.com/course/introduction-to-operating-systems--ud923
5.https://onlinecourses.nptel.ac.in/noc21_cs72/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	9	9	**45**
CO2	9	3	3	3	9	9	9	**45**
CO3	9	3	9	9	3	9	9	**51**
CO4	9	3	9	3	9	9	9	**51**
CO5	9	3	9	9	9	9	9	**57**
Total	**45**	**15**	**33**	**33**	**33**	**45**	**45**	**249**

Low-1 Medium-3 High-9

Core XV - Programming in Java

(For Students Admitted from 2024 -25)

Semester: VI **Hours/week: 4**
Subject Code: IBCSC621 **Credit: 3**

Course Objectives:

1. To gain knowledge about basic Java language syntax and semantics to develop java programs and useconcepts such as variables, conditional and iterative execution methods etc
2. To understand the fundamentals of object-oriented programming in Java, including defining classes, objects,invoking methods etc and exception handling mechanisms

Unit I **(12 hours)**

Fundamentals of Object Oriented Programming: Introduction, object oriented paradigm – basic concepts of oops – benefits of oops – applications of OOPs**. Overview of Java Language**: simple java program - moreof java – application with two classes –java program structure – java tokens – java statements- implementing a java program - java virtual machine - command line arguments.

Unit II **(12 hours)**

Constants, Variables, data types: Declaration of variables- giving values to variables- scope of variables –symbolic constants – type casting – getting values of variables- standard default values- **Operators and Expressions**: Arithmetic operators –Relational operators- logical operators – assignment operators – incrementand decrement operators –conditional operator – bitwise operator

KAC ACADEMIC COUNCIL

– special operators-type conversion in expression – operator precedence and associativity – mathematical functions. Decision making and Branching: if statement – switch
–Decision Making and Looping: while statement – do statement – for statement – jumps in loops-labeled loops.

Unit III **(12 hours)**

Classes, Objects and Methods: Introduction – defining a class, field declaration–methods declaration –creating objects – accessing class members – constructors – methods overloading – static members – nesting of methods – inheritance – overriding methods – final variables and methods – final classes –finalizer methods-abstract methods and classes –visibility control - **Arrays Strings and Vectors**: one dimensional array – creating an array –two-dimensional arrays –strings – vectors –wrapper classes – **Interfaces, Multiple Inheritance**: defining interfaces – extending interfaces –implementing interfaces – accessing interface variables.

Unit IV **(12 hours)**

Packages, Putting classes together: Introduction - java API packages: using system packages-naming conventions –creating packages –accessing a package –using a package – adding a class to a package–hiding classes – **Multithreaded Programming**: creating threads- extending the thread class – stopping and blocking a thread - life cycle of a thread- using thread methods -thread exceptions –thread priority – synchronization–implementing the runnable interface.

Unit V **(12 hours)**

Managing Errors and Exception: Introduction – types of errors –exceptions -syntax of exception handling code – multiple catch statements –using finally statement. **Applet Programming:** introduction –how applets differ from applications –building applet code–applet life cycle – creating an executable applet –designing a web page - applet tag – adding applet to html file – running the applet – more about applet tags –passing parameters to Applets –aligning the display.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the importance of java with its data types, control statements and class fundamentals.
CO2: Apply the concepts of inheritance, method overriding and implement packages and interfaces
CO3: Analyze the concept of exception handling and multithreading
CO4: Evaluate string buffer handling functions
CO5: Create applet programming through awt controls, layout managers and menus

Text Book:

1. E. Balaguruswamy, *Programming with JAVA* - A Primer, McGraw Hill Professional, 2015

Reference Books:

1. Herbert Schildt, *Java: The Complete Reference*, McGraw Hill Professional, 2017.
2. Robert Sedgewick & Kevin Wayne *Introduction to Programming in Java*, Addison Wesley, 2017.
3.Y. Daniel Liang, *Introduction to Java Programming*, Pearson Education, 2017.

KSP ACADEMIC COUNCIL

E-Resources:

1.https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=English
2.https://onlinecourses.swayam2.ac.in/aic20_sp13/preview
3.https://spoken-tutorial.org/watch/Java/First+Java+Program/English/
4. https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	9	**49**
CO2	9	9	3	1	9	9	9	**49**
CO3	9	9	3	1	9	9	9	**49**
CO4	9	9	3	1	9	9	9	**49**
CO5	9	9	3	1	9	9	9	**49**
Total	**45**	**45**	**15**	**5**	**45**	**45**	**45**	**245**

Low-1 Medium-3 High-9

Core XVI – Programming in Java Lab

(For Students Admitted from 2024-25)

Semester: VI **Hours/Week: 4**
Subject Code : IBCSC63P **Credit: 3**

Course Objectives:

1. To make the students to understand programming language Java
2. To create programs to solve simple calculations, check whether the given number is prime, perfect or Armstrong, etc

List of Programs

Formula Substitution

1. Find the factorial and binomial coefficient
2. Calculate mean, variance and standard deviation
3. Develop the programs for Number conversions Checking
4. Develop the programs for Number checking (prime, perfect, etc.) Generation
5. Develop the programs for Number generation (prime, perfect, etc.)

Array

6. Arrange numbers and names in order
7. Develop the program for performing matrix addition, subtraction, multiplication & transpose

Searching

8. Develop the programs for implementing linear search and binary search

String

KAA ACADEMIC COUNCIL

9. Develop the programs for doing String manipulation (case conversion, reversing, etc.)

OOPs Concept

10. Develop the programs for implementing inheritance concepts
11. Develop the programs for implementing exception handling
12. Develop the programs for implementing multithreading

Applet

13. Develop the programs to handle Keyboard events
14. Simulate a calculator (arithmetic operations) using GUI components

Note: Questions for the internal/external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Outline Java programs that solve simple Mathematical problems, number checking and number generation

CO2: Demonstrate the concepts of String Manipulation, Linear Search and Binary Search

CO3: Illustrate OOP in Java programming like inheritance

CO4: Evaluate the multi-threaded programs

CO5: Develop Exception handling and GUI components

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	3	9	39
CO2	9	3	3	3	9	3	99	39
CO3	9	9	3	9	9	9	9	57
CO4	9	9	9	9	9	9	9	63
CO5	9	9	9	9	9	9	9	63
Total	**45**	**33**	**27**	**33**	**45**	**33**	**45**	**261**

Low-1 Medium-3 High-9

Core XVII – Open Technology

(For Students Admitted from 2024-25)

Semester: VI **Hours/Week: 4**

Subject Code: IBCSC64 **Credit: 3**

Course Objectives:

1. To introduce Open Source methodologies
2. To make the students to gain experience using open source tools, languages and frameworks to prepare for careers in software development

EXAMINATION COUNCIL

Unit I **(12 hours)**

Learn to write programs: Writing a program-Introduction to program-The building blocks of programs-What could possibly go wrong?-Debugging. **Variables, expressions, and statements:** Values and type-Variables-Variable names and keywords-Statements-Operators and operands-Expressions-Order of operations-Modulus operator-String operations.

Unit II **(12 hours)**

Conditional execution: Boolean expressions-Logical operators-Conditional execution-Alternative execution-Chained conditionals-Nested conditionals-Catching exceptions using try and except-Short-circuit evaluation of logical expressions-Debugging. **Functions:** Function calls-Built-in functions-Type conversion functions-Math functions-Random numbers-Adding new functions-Definitions and uses-Flow of execution-Parameters and arguments-Fruitful functions and void functions-Why functions?-Debugging.

Unit III **(12 hours)**

Iteration: Updating variables-The while statement-Infinite loops-Finishing iterations with continue-Definite loops using for-Loop patterns-Debugging. **Strings:** A string is a sequence-Getting the length of a string using len-Traversal through a string with a loop-String slices-Strings are immutable-Looping and counting-The in operator-String comparison-String methods-Parsing strings-Format operator-Debugging.

Unit IV **(12 hours)**

Files: Persistence-Opening files-Text files and lines-Reading files-Searching through a file-Letting the user choose the file name-Using try, except, and open-Writing files-Debugging. **Lists:** A list is a sequence-Lists are mutable-Traversing a list-List operations-List slices-List methods-Deleting elements-Lists and functions-Lists and strings-Parsing lines-Objects and values-Aliasing-List arguments-Debugging.

Unit V **(12 hours)**

Using Database and SQL: Database Definition-Database concepts-Database Browser for SQLite-Creating a database table-Structured Query Language summary-Spidering Twitter using a database-Basic data modeling-Programming with multiple tables-Three kinds of keys-Using JOIN to retrieve data. **Visualizing data:** Building an OpenStreetMap from geocoded data-Visualizing networks and interconnections-Visualizing mail data.

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Remember the concepts of data types, operators, expression, function, control structure and file

CO2: Make use of operator; continue statement and list

CO3: Analyzing the order of operations, flow of execution and list types

CO4: Evaluate the expression, loop and iteration

CO 5: Create database to store data in SQL

KAACADEMIC COUNCIL

Text Book:

1. Dr. Charles R. Severance, *Python for Everybody Exploring Data Using Python 3*, Shroff Publisher & Distributors , 2016.

Reference Books:

1. E.Balagurusamy, *Problem Solving and Python Programming*, McGraw-Hill, First Edition.
2. Martin C. Brown, *PYTHON:The Complete reference*, McGraw-Hill, 2001.

E-Resources:

1. https:/.tutorialspoint.com/python/index.htm
2. https://www.learnpython.org/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	3	9	**43**
CO2	9	9	3	1	9	9	9	**49**
CO3	9	9	3	1	9	9	9	**49**
CO4	9	9	3	1	9	9	9	**49**
CO5	9	9	3	1	9	9	9	**49**
Total	**45**	**45**	**15**	**5**	**45**	**39**	**45**	**239**

Low-1 Medium-3 High-9

Core XVIII – Project

(For Students Admitted from 2024-25)

Semester : VI **Hours/Week: 6**
Subject Code: IBCSC65PW **Credit: 5**

Course Objectives:

1. To impart the students to understand the data collection for the project
2. To enhance the students to select the programming language for implementing the project

Students have to undergo an individual project work on campus and appear for the viva voce examination with the software developed and document prepared by her

Course Outcomes:

After successful completion of this course, students will be able to**:**

CO1: Identify goals, constraints, deliverables, performance criteria and resource requirements in consultation with stakeholders
CO2: Apply the plan by executing the code
CO3: Illustrate the various aspects of software development for the total project
CO4: Evaluate the entire software project according to the specific problem
CO5: Develop the software project by executing with the various data

AUTONOMOUS ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	9	9	3	9	57
CO2	9	3	9	3	9	9	9	51
CO3	9	3	9	9	9	9	9	57
CO4	9	3	9	9	9	9	9	57
CO5	9	9	9	9	9	9	9	45
Total	**45**	**27**	**45**	**39**	**45**	**39**	**45**	**285**

Low-1 Medium-3 High-9

DSE III – a) Digital Marketing

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 4**
Subject Code: IBCSE62A **Credit: 4**

Course Objectives:

1. To know the fundamental concepts associated with the digital marketing.
2. To understand the concepts of different strategies, search engine, and social media channels utilized in the different marketing systems.

Unit I **(12 hours)**

Introduction to Digital Marketing: Introduction - Evolution of Digital Marketing from traditional to modern era- Role of Internet; Current trends - Drivers of the new marketing environment - Digital marketing strategy; P.O.E.M. framework - Digital marketing plan- Digital marketing models.

Unit II **(12 hours)**

Internet Marketing and Digital Marketing Mix: Internet Marketing - opportunities and challenges - Digital marketing framework - Impact of digital channels on IMC. **Search Engine Advertising:** Pay for Search Advertisements - Ad Placement - Display marketing: Types of Display Ads - Programmable Digital Marketing - YouTube marketing.

Unit III **(12 hours)**

Social Media Marketing: Understanding Social Media Marketing – Social Networking- Role of Influencer Marketing-Modes of Social Media Marketing- Tools & Plan - Facebook Marketing: - Business through Facebook Marketing, Facebook Marketing Tools - LinkedIn Marketing: - Introduction and Importance of LinkedIn Marketing, -Twitter Marketing: Introduction to Twitter Marketing, Mobile Advertising

AX ACADEMIC COUNCIL

Unit IV **(12 hours)**

Introduction to SEO: SEM - Web Analytics - Mobile Marketing - Trends in Digital Advertising - Introduction and need for SEO- How to use internet & search engines; search engine and its working pattern: SEO Tactics - Introduction to SEM Web Analytics: Google Analytics & Google AdWords

Unit V **(12 hours)**

Social Media Channels: Introduction - Key terms and concepts - Traditional media vs Social media - Social networking - Content creation - Tracking social media campaigns **Social Media Strategy:** Introduction - Key terms and concepts - Using social media to solve business challenges - Dealing with opportunities and threats

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Understand the practical factor to improve results in digital marketing.
CO2: Implement a structured digital marketing plan and budget.
CO3: Examine the operations of digital marketing, and track the progress of digital marketing.
CO4: Evaluate the functions of social media marketing, Internet marketing, and social media channels.
CO5: Design and Initialize implement process to conduct digital marketing campaigns.

Text Book:

1.Seema Gupta "Digital Marketing" Mc-Graw Hill 1st Edition – 2017

Reference Books:

1.Damian Ryan, Calvin Jones "Understanding Digital Marketing-Marketing Strategies For Engaging the Digital Generation" Kogan Page - Fourth Edition
2.Teresa Pineiro-Otero and Xabier Martinez-Rolan "Understanding Digital Marketing- Basics and Actions" Springer International Publishing – 2009

E-Resources:

https://www.simplilearn.com/tutorials/digital-marketing-tutorial

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	3	3	9	**43**
CO2	9	9	3	3	9	9	9	**51**
CO3	9	3	9	1	9	9	9	**49**
CO4	9	9	3	3	9	1	9	**43**
CO5	9	3	3	1	9	3	9	**37**
Total	**45**	**33**	**27**	**9**	**39**	**25**	**45**	**223**

Low-1 Medium-3 High-9

XYZ ACADEMIC COUNCIL

DSE III – b) Artificial Intelligence and Expert Systems

(For Students Admitted from 2024-25)

Semester: VI **Hours/Week: 4**
Subject Code: IBCSE6B **Credit: 4**

Course Objectives:

1. To introduce the basic principles, techniques, and applications of Artificial Intelligence
2. To gain a historical perspective of AI and its foundations. Explore the current scope, potential, limitations, and implications of intelligent systems

Unit I **(12 hours)**

Introduction to Artificial Intelligence-Intelligent Agents, Approaches in Artificial Intelligence, Definitions of Artificial Intelligence, AI problems, Features of AI Programs, Importance of AI, Advantages and Disadvantages of AI.

Unit II **(12 hours)**

Applications of Artificial Intelligence- Finance, Hospitals and Medicine, Robotics, Expert systems, Diagnosis, Pattern Recognition, Natural Language Processing, Game Playing, Image Processing, Data mining, Big Data Mining. Introduction to the state space search- State space search, search techniques, Types of searching techniques.

Unit III **(12 hours)**

Heuristic Search Strategies-Types of Heuristic Search techniques,Hill Climbing Search, Simulated Annealing search, A* Algorithm, AND-OR Graphs, Properties of the Heuristic Search Algorithm, Adversary Search, The MINIMAX Algorithm.

Unit IV **(12 hours)**

Expert Systems-Definitions of Expert Systems, Features of Good Expert systems, Architecture and Components of Expert systems, Roles of the Individuals who interact with the system, Advantages of Expert systems, Disadvantages of Expert Systems.

Unit V **(12 hours)**

Knowledge Representation-Definitions of Knowledge Representation, Characteristics of Good Knowledge Representation, Basics of Knowledge representation, Properties of the Symbolic representation of knowledge, Properties of the Good knowledge representation systems, Categories of knowledge representation schemes, types of knowledge representation schemes.

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Demonstrate fundamental understanding of the history of artificial intelligence and its foundations

AX ACADEMIC COUNCIL

CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
CO3: Analyze their gaming skills and learn about Expert system
CO4: Evaluate the learners for aspiring careers in the field of Artificial Intelligence
CO5: Develop the game playing and planning of expert systems

Text Book:
1. I.Gupta & G.Nagpal, *Artificial Intelligence and Expert Systems*, Laxmi Publications, 2018.

Reference Books:
1. V.S. Jankiraman, *Foundations of Artificial Intelligence and Expert Systems*, Laxmi Publications ,2017.
2. Joseph C.Giarratano, Gary D.Riley, Expert *Systems: Principles and Programming*, Fourth Edition, 2018.
3. Lavika Goel, Artificial *Intelligence: Concepts and Applications*, Wiley India Private Limited.

E-Resources:
1. NPTEL:https://nptel.ac.in/courses/106/102/106102220/
2. NPTEL:https://nptel.ac.in

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	1	9	9	3	9	**49**
CO2	9	9	3	9	3	9	1	**43**
CO3	3	9	9	3	9	3	3	**39**
CO4	9	1	3	9	3	9	1	**35**
CO5	9	9	9	9	9	3	3	**51**
Total	**39**	**37**	**25**	**39**	**33**	**27**	**17**	**217**

Low-1 Medium-3 High-9

SEC VI– Open Technology Lab

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 2**
Subject Code: IBCSS66P **Credit: 2**

Course Objectives:
1. To develop technical solutions for problems using the open-source software(s) readily available at free of cost
2. To learn programming in Python

KA ACADEMIC COUNCIL

List of programs

Display Text

1. Write a python program to display any given text message

Formula Substitution

2. Write a python program to display Fibonacci series

Array

3. Write a python program to count the number of vowel in the string

Function

4. Write a python program to convert a date read from the user, given in DD/MM/YYYY format into written format.

For example, Enter a date in DD/MM/YYYY Format: 16/7/2003 Output: 16 July, 2003

5. Write a python program to print the contents of a file in uppercase using function
6. Write a python program to sort the contents of a file using function

Operator Overloading

7. Write a python program to implement Operator Overloading

Script

1. Write a python script that implements the Arithmetic Quiz
2. Write a python script to create a button with the text, "Hello World"
3. Write a python script that creates a combo box with three elements. When the selection is changed the selected item is to be printed
4. Write a python script that creates a simple application window with menus and submenus
5. Write a python script that creates a simple application window with displaying lines
6. Write a python program to create your own website for displaying message
7. Write a python program to create a simple blog using models

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Recall the basics of displaying numbers and string

CO2: Apply the concepts of control structures and function (Predefined and user defined)

CO3: Analyzing the concept of array and file

CO4: Explain operator overloading

CO5: Create GUI programming and website

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	9	9	**55**
CO2	9	9	9	1	9	9	9	**55**
CO3	9	9	9	1	9	9	9	**55**
CO4	9	9	9	1	9	9	9	**55**
CO5	9	9	9	1	9	9	9	**55**
Total	**45**	**45**	**45**	**5**	**45**	**45**	**45**	**275**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Extra Credit I - Desktop Publishing Lab

(For Students Admitted from 2024-25)

Semester: II
Subject Code: IBCSX21P **Credit: 2**

Course Objectives:

1. To understand the basic concepts of FIGMA
2. To gain knowledge about various tools of FIGMA

FIGMA

1. Create an Animated Text.
2. Create an Animated Image.
3. Create a bouncing ball using interactive component.
4. Design ON/OFF toggle.
5. Create a responsive grid system for web.
6. Create a poster.
7. Create an animation notification.
8. Create an animated card grid.
9. Design a glass morphism.
10. Design an Appreciation certificate.
11. Design a Sign Up page.
12. Create a News page design.

Note: Questions for external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe the concepts of tools and techniques in Figma.
CO2: Apply the concept of creation and modification of objects.
CO3: Simplify the process of designing, editing and animating.
CO4: Create a website screen and any form of certificate.
CO5: Construct and design an application.

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	3	9	3	9	3	9	45
CO2	9	3	9	3	9	3	9	45
CO3	9	3	9	3	9	3	9	45
CO4	9	1	9	3	9	3	9	43
CO5	9	1	9	3	9	3	9	43
Total	45	11	45	15	45	15	45	221

Low-1 Medium-3 High-9

XXX ACADEMIC COUNCIL

Extra Credit II -NoSQL Lab

(For Students Admitted from 2024-25)

Semester: III

Subject Code: IBCSX31P **Credit: 2**

Course Objectives:

1. The students get practical knowledge on developing No SQL database using MongoDB and ability to read or query the collection
2. To understand various advanced methods such as update one MongoDB document in the collection and update many MongoDB documents in the collection

Program List

1. MongoDB installation and configuration in windows
2. Demonstrate how to create and drop a database in MongoDB
3. Developing the collection in MongoDB on the fly
4. Developing collection with options before inserting the documents and drop the collection created
5. MongoDB insert document
   a) Insert single document
   b) Insert multiple documents in collection
6. Querying all the documents in JSON format and Querying based on the criteria
7. MongoDB update document
   a) Using update ( ) method
   b) Using save ( ) method
8. MongoDB delete document from a collection
   a) Using remove ( ) method
   b) Remove only one document matching your criteria
   c) Remove all documents
9. Develop a MongoDB projection
10. Apply limit ( ), skip ( ), sort ( ) methods in MongoDB
11. MongoDB indexing
    a) Develop index in MongoDB
    b) Finding the indexes in collection
    c) Drop indexes in a collection
    d) Drop all the indexes
12. MongoDB with java and PHP
    a) Develop a simple application that uses MongoDB with JAVA
    b) Develop a simple application that uses MongoDB with PHP

X ACADEMIC COUNCIL

13. Build a social media app using document API and a No SQL Database

Note: - Questions for external examination will be based on concept learnt

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Installing and configuring MongoDB in windows
CO2: Perform all database operations using MongoDB
CO3: Implement and harness the power of indexes
CO4: Use MongoDB compass to analyze a database
CO5: Develop applications by integrating MongoDB with JAVA/PHP

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low-1 Medium-3 High-9

Extra Credit III- R Tool Lab

(For Students Admitted from 2024-25)

Semester: IV
Subject Code: IBCSX4P **Credit: 2**

Course Objectives:

1. To understand the concept of R Tool
2. To implement the statistics analysis

List of Programs

1. Write a Program to implementing correlation analysis
2. Write a Program to implementing regression analysis
3. Write a Program to implementing t-test
4. Write a Program to implementing z-test
5. Write a Program to implementing f-test
6. Write a Program to implementing chi-square test
7. Write a Program to implementing kruskal-wallis test
8. Write a Program to implementing likert scaling techniques
9. Write a Program to implementing analysis of variance (ANOVA)

Note: - Questions for External examination will be based on concepts learnt

ACADEMIC COUNCIL

Course Outcomes

After successful completion of this course, students will be able to

CO1: Demonstrate the basics in R programming in terms of constructs, control statements and functions

CO2: Apply data analytics software

CO3: Enhance problem solving, programming and debugging skills

CO4: Plan the R programming from a statistical perspective

CO5: Analyze and implement the various data structures of R

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	3	**43**
CO2	9	3	9	3	9	9	9	**51**
CO3	3	9	1	1	3	1	9	**27**
CO4	9	3	9	1	9	9	3	**43**
CO5	9	1	9	3	9	9	3	**43**
Total	**39**	**25**	**31**	**9**	**39**	**37**	**27**	**207**

Low-1 Medium-3 High-9

Extra Credit V - Data Mining Lab

(For Students Admitted from 2024-25)

Semester: VI

Subject Code: IBCSX6P **Credit: 2**

Course Objectives:

1. To understand the concept of Data Mining Tool
2. To implement the various data mining algorihms

List of Programs

1. Create data-set in .arff file format. Demonstration of preprocessing on WEKA data-set
2. Demonstration of Association rule process on data-set contact lenses.arff /supermarket using apriori algorithm
3. Demonstration of classification rule process on WEKA data-set using j48 algorithm
4. Demonstration of classification rule process on WEKA data-set using Naive Bayes algorithm
5. Demonstration of clustering rule process on data-set iris.arff using simple k-means

Note: - Questions for external examination will be based on concepts learnt

AYA ACADEMIC COUNCIL

Course Outcomes:

After successful completion of this course, students will be able to

CO 1: Describe Data mining concept

CO 2: Apply the knowledge of data mining techniques

CO 3: Adapt to new data mining tools

CO 4: Explore recent trends in data mining such as web mining, spatial-temporal mining

CO 5: Build different types of algorithm

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	1	1	**25**
CO2	9	3	3	1	9	1	3	**29**
CO3	9	3	3	3	9	3	3	**33**
CO4	9	3	3	3	9	3	3	**33**
CO5	3	3	9	3	9	3	9	**39**
Total	**39**	**15**	**19**	**11**	**45**	**11**	**19**	**159**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

B Sc CYBER SECURITY

(Three-Year Regular Programme)
(For Students Admitted from 2024-25)

Programme Specific Outcomes (PSO):

On completion of this programme, student will be able to gain

PSO1: Ability to design, implement, and evaluate a security system that capable of identify, prevent and protect from malware attack

PSO2: Ability to Design and Develop Secure Structured Network Mode

PSO3: Make the graduates to become Software Developer, Web Programmer, Mobile Application Developer and Cyber Security Analyst, Cyber Security Penetration Tester

PSO4: Analyze and evaluate the cyber security risks

PSO5: Ability to Identify Network vulnerabilities, detect attacks, and resolve them

PSO6: Ability to analyze a problem, and identify and define the security related issues appropriate to its solution

PSO7: Understand the needs of society and sensitivity to societal responsibilities

PREAMBLE

The Board of Studies of Computer Science revamped the curriculum with the following changes

Core courses

- Fundamentals of Computers &.NET Programming Lab syllabus has been removed
- Python Programming and Python Programming Lab course has been introduced
- Cyber Forensics and Cloud Computing and Security shifted from Discipline specific Courses to Core courses and reduced the syllabus

Discipline Specific Elective

- Ethical Hacking , Wireless Security shifted from core courses to Discipline Specific Courses and reduced the syllabus

Extra Credit Course

- Coral Draw Lab has been removed and Desktop Publishing Lab has been introduced
- Programming in Visual Basic Lab has been removed and NoSQL Lab has been introduced

PROGRAMME STRUCTURE - PROGRAM CODE: UCY

Sem	Subject Code	Course	Subject Title	Hours / week	Credit	CIA	ESE	Total Marks
	IBLT112/ IBLA111/ IBLH111	Language I	Tamil I/ Arabic I/ Hindi I	5	3	25	75	100

XX ACADEMIC COUNCIL

I	IBLEI12/ IBLEII12	Language II	English I a or b	5	3	25	75	100
	IBCYC112	**Core I**	**Principles of Cyber Security**	**4**	**4**	**25**	**75**	**100**
	IBCYC121	Core II	○ Programming in C	4	3	25	75	100
	IBCYA132	AECC I	Numerical Methods	5	4	25	75	100
	IBCYC141P	Core III	Programming in C Lab	3	2	25	75	100
	IBCYS151P	SEC I	Office Automation Lab	2	2	-	50	50
			Library/Browsing	1	-	-	-	-
			Remedial/Games	1	-	-	-	-
			Total	**30**	**21**	**150**	**500**	**650**
II	IBLT212/ IBLA211/ IBLH211	Language I	Tamil II/Arabic II/Hindi II	5	3	25	75	100
	IBLEI22/ IBLEII22	Language II	English II a or b	5	3	25	75	100
	IBCYC211	Core IV	Data Structures	5	5	25	75	100
	IBCYC22P	Core V	Data Structures using C Lab	4	4	25	75	100
	IBCYA23	AECC II	Digital Electronics	5	4	25	75	100
	IBCYS24P	SEC II	Linux and Shell Programming Lab	2	2	-	50	50
	IBES2	GIC I	Environmental Science	2	2	-	50	50
			Library/ Browsing	1	-	-	-	-
			Remedial/ Games	1	-	-	-	-
	IBCYX21P / IBCYX2O	Extra Credit I	**Desktop Publishing Lab** / *Online Course	-	2	-	100	100
			Total	**30**	**23+2**	**125**	**475+ 100**	**600+ 100**
III	IBLT311/ IBLA31/ IBLH311	Language I	Tamil III/ Arabic III/ Hindi III	5	3	25	75	100
	IBLEIB32/ IBLEIIA32	Language II	English III a (or) b	5	3	25	75	100
	IBCYC31	Core VI	#Database Security	4	4	25	75	100
	IBCYC32P	Core VII	RDBMS Lab	4	4	25	75	100
	IBCYA33	AECC III	Statistics	4	4	25	75	100
	IBCYS34P	SEC III	Web Designing Lab (HTML and Scripting Language)	2	2	-	50	50
		OEC		2	2	-	50	50

XX ACADEMIC COUNCIL

	IBHR3	GIC II	Human Rights	2	2	-	50	50
	IBXTN3	Extension Activities	NSS / CSS	2	2	100	-	100
	IBCYX31P/ IBCYX3O	Extra Credit II	**NoSQL Lab** / *Online Course	-	2	-	100	100
			Total	**30**	**26+2**	**225**	**525+ 100**	**750+ 100**
IV	IBLT41/ IBLA41/ IBLH411	Language I	Tamil IV/Arabic IV/ Hindi IV	5	3	25	75	100
	IBLEI42/ IBLEII42	Language II	English IV a or b	5	3	25	75	100
	IBCYC411	**Core VIII**	**Python Programming**	**5**	**4**	**25**	**75**	**100**
	IBCYC421P	**Core IX**	**Python Programming Lab**	**4**	**4**	**25**	**75**	**100**
	IBCYA43	AECC IV	Operations Research	5	4	25	75	100
	IBCYS44P	SEC IV	Graphics and Animation Lab (Flash)	2	2	-	50	50
	IBLVE4	GIC III	Life Skills and Value Education	2	2	-	50	50
		OEC		2	2	-	50	50
	IBCYX4P/ IBCYX4O	Extra Credit III	R Tool Lab / # Internship	-	2	-	100	100
			Total	**30**	**24+2**	**125**	**525+ 100**	**650+ 100**
V	IBCYC51	Core X	Programming in Java	6	5	25	75	100
	IBCYC52P	Core XI	Programming in Java Lab	6	5	25	75	100
	IBCYC531	**Core XII**	**Cyber Forensics**	**6**	**5**	**25**	**75**	**100**
	IBCYE5A/ IBCYE51B	DSE I	a) Mobile Computing/ b) Malware Analysis	4	4	25	75	100
	IBCYE5C/ **IBCYE52D**	**DSE II**	a) Operating System Security **b) Ethical Hacking**	**4**	**4**	**25**	**75**	**100**
	IBCYS54P	SEC V	PHP Programming Lab	2	2	-	50	50

XII ACADEMIC COUNCIL

	IBWE5	GIC IV	Women Entrepreneurship	2	2	-	50	50
	IBCYX5/ IBCYX5O	Extra Credit IV	Employability Skills	-	2	100	-	100
			Total	**30**	**27+2**	**125+ 100**	**475**	**600+ 100**
VI	**IBCYC611**	**Core XIII**	**Cloud Computing and Security**	**6**	**4**	**25**	**75**	**100**
	IBCYC62	Core XIV	Cyber Law	5	4	25	75	100
	IBCYC63	Core XV	Cryptography and Network Security	6	5	25	75	100
	IBCYC64PW	Core XVI	Project	6	5	25	75	100
	IBCYE62A/ IBCYE61B	**DSE III**	**a) Wireless Security** b) Intellectual Property Rights	**4**	**4**	**25**	**75**	**100**
	IBCYS65P	SEC VI	Cryptography and Network Security Lab	2	2	--	50	50
	IBCYX6P/ IBCYX6O	Extra Credit V	Data Mining Lab/ *Online Course	--	2	--	100	100
			Library/Browsing	1	--	--	--	--
			Total	**30**	**24+2**	**125**	**425+ 100**	**550 +100**
			GRAND TOTAL	**180**	**145+ 10**	**875+ 100**	**2925 +400**	**3800+ 500**

*****For Online Course credit alone will be assigned on submission of certificate obtained by appearing for online examination from EdX, Spoken Tutorial, NPTEL or Coursera etc.

\# For internship course, refer www.internshala.com or any online internship course.

- For online course integration, syllabus will be taken from spoken tutorial, swayam, edx, Udemy, coursera

AECC-Ability Enhancement Compulsory Course
SEC-Skill Enhancement Course
DSE-Discipline Specific Elective
OEC-Open Elective Course
GIC – General Interest Course

BOX ACADEMIC COUNCIL

Core I - Principles of Cyber Security

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 4**
Subject Code: IBCYC112 **Credit: 4**

Course Objective:

1. To practice with an expertise in academics to design and implement security solutions in organizations
2. To understand key terms and concepts in Cryptography, Rootkit, Cryptology

Unit I **(12 hours)**

Introduction to Cyber security: Computer security-threats-Harm-Vulnerabilities-Control-Authentication- Access Control-Cryptography-Malicious Code-Malware-Countermeasures-The web-User side-Browser Attacks-Email Attacks.

Unit II **(12 hours)**

Security In Operating System & Networks: Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network security attack- Threats to Network Communications - Wireless Network Security -Denial of Service - Distributed Denial-of-Service.

Unit III **(12 hours)**

Database Security: Introduction of Databases-Security Requirements in Databases-Reliability and Integrity- Database Disclosure-Data Mining and Big Data-Cloud Compting: Cloud Computing Concepts-Cloud Securitytools and techniques-Securing Iaas.

Unit IV **(12 hours)**

Security Planning: Security Planning-Business Continuity Planning-Handling Incidents-Risk Analysis - Legal Issues and Ethics: Protecting Programs and Data-Information and the Law-Rights of Employees and Employers-Computer Crime-Ethical Issues in Computer Security.

Unit V **(12 hours)**

Cryptography: Cryptology-Symmetric Encryption Algorithms-Message Digests-Quantum Cryptography- Emerging Topics: The Internet of Things-Economics-E-Voting-Cyber Warfare.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Classify the concept of threat, risks and security planning
CO2: Apply theoretical concepts in different security phases
CO3: Analyze security concepts needs in cloud and database
CO4: Examine the concepts and do security in database and organization
CO5: Develop policies and procedures for database and cloud security and design security architecture for an organization

ACADEMIC COUNCIL

Text Book:

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, Jonathan Margulies, *Security in Computing*, Pearson Education, Fifth Edition, 2015.

Reference Books:

1. MarttiLehto, PekkaNeittaanmäki, *Cyber Security: Analytics, Technology and Automation*, Springer International Publishing, 2015.
2. Nelson Phillips , EnfingerSteuart, *Computer Forensics and Investigations*, Cengage Learning, 2009.

E-Resources:

1. https://www.springboard.com/resources/learning-paths/cybersecurity-foundations/
2. https://www.edx.org/course/cyber-security-basics-a-hands-on-approach

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	9	9	3	9	**57**
CO2	9	3	9	9	3	9	9	**51**
CO3	9	1	3	9	9	9	9	**49**
CO4	9	3	3	9	9	9	9	**51**
CO5	9	9	3	9	9	9	9	**57**
Total	**45**	**25**	**27**	**45**	**39**	**39**	**45**	**265**

Low-1 Medium-3 High-9

Core II – Programming in C

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 4**
Subject Code: IBCYC121 **Credit: 3**

Course Objectives:

1. To understand the main features of operators, input/ output statements, control statements and program structure
2. To understand the significance of functions, arrays, strings, pointers and structures

Unit I **(12 hours)**

Introduction to C Programming: C Character Set – Writing first program of C – Identifiers and Keywords -A more useful C Program – Entering the program into the computer – Data types – Constants – Variables and Arrays – Declarations – Expressions – Statements – Symbolic constants **Operators and Expressions**: Arithmetic Operators – Unary Operators – Relational and logical Operators – Assignment Operators – The conditional Operators – Library functions.

XX ACADEMIC COUNCIL

Unit II **(12 hours)**

Data Input and Output: Preliminaries – The getchar function – The putchar function – The scanf function The printf function – gets and puts function – Interactive programming **Control Statements:** Preliminaries – Branching: The If-else Statement - Looping – while statement – do-while statement – for statement – nested control structures – switch statement – break statement – continue statement.**Functions:** A brief overview – Defining a function – Accessing a function - Function prototypes

Unit III **(12 hours)**

Program Structure: Storage classes – Automatic variables – External variables – Static variables – Multi File programs – More about library functions. **Arrays:** Defining Array – Processing an Array – Passing arrays to Functions – Multidimensional arrays.

Unit IV **(12 hours)**

Strings: Defining a String – NULL Character – Initialization of Strings – Reading and writing a string – Processing strings – Character arithmetic – Searching and sorting of strings **Pointers:** Fundamentals – Pointer Declarations – Passing pointers to a function – Pointers and one dimensional arrays – Dynamic memory allocation – Operations on pointers - Pointers and multidimensionalarrays

Unit V **(12 hours)**

Structures and Unions: Defining a Structure – Processing a Structure – User defined data types – Structuresand pointers – Passing structures to functions – Self Referential structures – Unions. **File Handling:** Why Files - Opening and closing a Data file – Reading and writing a data file – Processinga data file

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe the basic programming knowledge of C, operators and expressions
CO2: Demonstrate data input and output, control statements & functions
CO3: Analyze program structure and arrays
CO4: Evaluate strings and pointers
CO5: Formulate structures, unions and file handling

Text Book:

1. Byron Gottfried, *Programming with C*, Tata McGraw Hill Education, Fourth Edition, 2018.

Reference Books:

1.Balagurusamy E, *Programming in ANSI C*, Tata McGraw-Hill Publishing Company, Sixth Edition, 2012.
2.Venugopal K R , Sudeep R Prasad, *Programming with C*, Tata McGraw-Hill Publishing Company, 2008.

EX ACADEMIC COUNCIL

3.Mullish, Henry Cooper, Herbert, *The Spirit of C - An introduction to modern programming*, Jaico Publishing House, Third Edition, 2006.

E - Resources:

1. NPTEL: https://onlinecourses.nptel.ac.in/noc19_cs42/preview
2.NPTEL:https://nptel.ac.in/courses/106/105/106105171/
3.NPTEL:https://onlinecourses.nptel.ac.in/noc21_cs01/preview
4.SpokenTutorial:https://spokentutorial.org/tutorialsearch/?search_foss=C+and+Cpp&search_language=English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	9	3	9	**45**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	9	3	9	9	9	**57**
Total	**45**	**21**	**21**	**21**	**45**	**27**	**45**	**225**

Low-1 Medium-3 High-9

Core III – Programming in C Lab

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 3**
Subject Code: IBCYC141P **Credit: 2**

Course Objectives:

1. To introduce the field of programming using C language
2. To enhance the analyzing and problem solving skills and use the same for writing programs in C

List of Programs

Formula substitution

1. Write a C Program to check whether the given number is odd or even
2. Write a C Program to find sum of the digits and reverse the digits
3. Write a C Program to generate the Fibonacci series
4. Write a C Program to generate Prime number within range
5. Write a C Program to find whether a given number is Armstrong or not
6. Write a C Program to find the area of various shapes using switch case

Array

7. Write a C Program to Find Matrix Addition , Subtraction, Multiplication and Transpose of a matrix using switchcase

ACADEMIC COUNCIL

8. Write a C Program to sort names in Alphabetical order

Functions & Structures

9. Write a C Program to find the factorial of a given number using function declaration
10. Write a C Program to Prepare electricity bill using structure

String Manipulation

11. Write a C Program to count the vowels in the given string
12. Write a C Program to convert the case of given string from upper case to lower case and vice versa

Pointers

13. Write a C Program to sort numbers in ascending order using pointers
14. Write a C Program to find average of two numbers using pointers

Note: Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the control structures and loops
CO2: Apply the concepts of functions and pointers
CO3: Analyze the concepts of Structures and arrays
CO4: Evaluate string handling functions
CO5: Create programs with pointers, arrays, structures

E-Resource:

1. SpokenTuroial:https://spokentutorial.org/tutorialsearch/?search_foss=C+and+Cpp&search_language=English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**15**	**5**	**45**	**45**	**45**	**215**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

SEC I - Office Automation Lab

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 2**
Subject Code: IBCYS151P **Credit: 2**

Course Objectives:

1. To acquire knowledge about word processing, spread sheet, Data base creation and slide preparation
2. To improve creative thinking in presentations

List of Programs

Word Processing

1. Create a word processing document consists two pages in a Book named "XX" and then do the following:
   a. Formatting Text, Alignment and Font Style
   b. Perform Find and Replace
   c. Add Header and Footer option to specify name of the Book Chapter Heading andPage number of total pages.
2. Create a word processing document having details of our College courses using bulleted and number lists
   a. Type the title using Word Art
   b. Design a Letter to felicitate Farewell Address to our seniors with Font Setting/Page Borders/Word Art/Clip Art/Symbols
3. Create a Newsletter Article (using Columns, Drop cap)
4. Create a time table for your Internal Exam Schedule (using Table)

Spreadsheet

1. Create an spreadsheet consists of Student details and then do the following:
   a. Calculate student wise total and subject wise total
   b. Find the Maximum and Minimum marks of the subject
   c. Grade is calculated as
      i. if %>=90, then grade A
      ii. If %>=80 and <90, then grade B
      iii. If %>=70 and <80, then grade C
      iv. If %>=60 and <70, then grade D
      v. If %<60, then grade F
2. Create a spreadsheet having Employee details suitably and then do the following
   a. Use functions to calculate Net Pay and Gross Pay
   b. Perform conditional formatting and validation

Presentation

1. Create a presentation showing your various activities of the department a Performslide translation and Setting background designs
2. Create a presentation showing various aspect of your college and perform custom animation and importsound.

KAKATIYA ACADEMIC COUNCIL

Database

1. Crate a Student Database having Name, Regno, Tamil, English, Maths, Total, and Average Perform tofind total and average and check data entered
2. Create an Inventory database having Item Name, Item no. Quantity and Price. Perform query operation to retrieve data.

Note: Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Illustrate various options of Office Application
CO2: Demonstrate different types of formats, formulas and transition in office application
CO3: Develop reports to solve the problems of manual report handling
CO4: Compare the options of different Microsoft Office Applications to use appropriately
CO5: Build a presentation, Advertisement, Reports etc for enterprise

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	**45**
CO2	9	9	3	9	9	9	9	**57**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	3	3	9	3	9	**45**
Total	**45**	**39**	**15**	**27**	**45**	**27**	**45**	**243**

Low-1 Medium-3 High-9

Core IV -Data Structures

(For Students Admitted from 2024-25)

Semester: II **Hours/Week: 5**
Subject Code: IBCYC211 **Credit: 5**

Course Objectives:

1. To introduce the various data structures and their implementations
2. To learn various sorting algorithms

Unit I **(15 hours)**

Introduction - Overview of C - Sample program - constants - Variables - Data Types - **Input and Output Operations** - Operator and Expressions - Control Statements**.**

Unit II **(15 Hours)**

Arrays - Strings - Built-in Functions - User defined Functions - **Structures** - Unions – Pointers.

XX ACADEMIC COUNCIL

Unit III **(15 hours)**

Introduction to Algorithms and Data Structures: Introduction to Algorithm - Asymptotic Notation-Introduction to Data Structures-Types of Data Structures-Data Structure Operations.**Linked Lists:** Introduction to Linked list-Basic concept-Linked list Implementation - Types of LinkedLists- Circular Linked List - Doubly Linked List.

Unit IV **(15 hours)**

Stacks: Introduction to Stacks – Stack Operations – Stack Implementation. **Queues:** Introduction of Queues– Queues-Basic concepts – Queue Operations – Queue Implementation.**Trees:** Introduction to Trees – Basic Concepts – Binary Tree - Binary Tree Representations – Binary Tree Traversal - Binary Search Tree.

Unit V **(15 hours)**

Graphs: Introduction – Basic Concept – Graph Terminology – Graph Traversal .**Sorting and Searching:** Introduction - Sorting Techniques – Searching Techniques.

Course Outcomes:

After successful completion of this course, student will be able to

CO 1: Remember the basic concepts of C Language, structure and algorithm
CO 2: Make use of operator, structure, union and pointers
CO 3: Compare Stack, Queue, Tree, Graph, linked list and its operations
CO 4: Explain control statements, types of data structure, data structure operations, types of linked list, stack, queue, tree and graph
CO 5: Elaborate tree traversal, searching and sorting techniques

Text Book:

1. E Balagurusamy, *Data Structures using C*, McGraw Hill Education (India) Private Limited, 2013.

Reference Books:

1. Reema Thareja, *Data Structures Using C*, Oxford University Press, Second Edition, 2014.
2. Aaron M. Tenenbaum, Data Structures Using C, Pearson Education, First Edition, 1998.

E-Resources:

1. https://www.mygreatlearning.com/blog/data-structures-using-c/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	1	1	**19**
CO2	9	3	9	1	9	1	3	**35**
CO3	9	1	9	9	1	1	3	**33**
CO4	9	3	3	3	3	3	3	**27**
CO5	9	1	1	9	9	9	3	**41**
Total	**45**	**11**	**23**	**23**	**25**	**15**	**13**	**155**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core V-Data Structures using C Lab

(For those who joined since 2024-25)

Semester: II **Hours/week: 4**
Subject Code: IBCYC22P **Credit: 4**

Course Objectives:

1. To introduce the various data structures and their implementations
2. To learn various sorting algorithms

List of Programs

1. Array and Linked list implementation of List ADT
2. Array and Linked list implementation of Stack ADT
3. Array and Linked list implementation of Queue ADT
4. Applications of List, Stack and Queue ADTs
5. Implementation of Binary trees and operations of Binary trees
6. Implementation of Binary Search Trees
7. Implementation of AVL Trees
8. Implementation of Heaps using Priority Queues
9. Graph representation and Traversal algorithms
10. Applications of Graphs
11. Implementation of searching and sorting algorithms
12. Hashing – any two collision techniques

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Recall linear and non-linear data structures
CO2: Illustrate non-linear data structures
CO3: Perform the different operations of search trees
CO4: Relate graph traversal algorithms
CO5: Create sorting and searching algorithms

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	1	9	3	1	3	1	27
CO2	1	1	3	9	1	3	3	21
CO3	3	3	3	9	3	1	3	25
CO4	3	3	3	9	3	1	3	25
CO5	9	3	1	1	1	3	3	21
Total	25	11	19	31	9	11	13	119

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

AECC II-Digital Electronics

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 5**
Subject Code:IBCYA23 **Credit: 4**

Course Objectives:

1. To know the concepts of Combinational circuits
2. To understand the concepts of flipflops, registers and counters

Unit I **(15 hours)**

Number Systems and Codes: Introduction- binary, octal, decimal, and hexadecimal number system-decimal to binary, octal to binary, hexadecimal to binary – hexadecimal to octal conversions and vice versa-binary arithmetic-1s and 2s complement representations-BCD addition and subtraction-weighted and un- weighted codes- alphanumeric codes.

Unit II **(15 hours)**

Basic Boolean functions: AND,OR,NOT Functions- Boolean theorems and laws-use of Boolean algebra for simplification of logical expressions- minterm and maxterm- canonical sum of products and product of sum simplifications- minimization of logical expressions using K-map-logic gates-AND,OR,NOT,EX- OR,NAND,NOR gates.

Unit III **(15 hours)**

Introduction to combinational logic circuits: arithmetic circuits –half adder, full adder, half subtractor, full subtractor, parallel binary adder - subtractor, serial adder, multiplier and divider-encoder, decoder.

Unit IV **(15 hours)**

Introduction to sequential circuits-flipflops-SR,JK,D and T flipflops-master-slave flipflops-level and edge triggering-synchronous and asynchronous counters- up/down counters- modulo-n-counters- shift registers- serial in serial out-serial in parallel out,parallel in serial out and parallel in parallel out shift counters- ring counters.

Unit V **(15 hours)**

Read only memory- architecture of ROM, PROM, EPROM, EEPROM, ROM applications-RAM-RAM architecture-static and dynamic RAM.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the basic structure of number system methods like binary, octal and hexadecimal
CO2: Apply the functions to simplify the logical expressions
CO3: Analyze the operations of various logical circuits
CO4: Evaluate the functions of the memory organization
CO5: Create the sequential and combinational logic circuits

ACADEMIC COUNCIL

Text Book:

1. S. Salivahanan And S. Arivazhagan, *Digital Circuits And Design*, Oxford University Press, 2018.

Reference Books:

1. M. Morris Mano and Michael D. Ciletti, *Digital Design*, Pearson Education, Fifth Edition, 2014.
2. A.Anand Kumar, *Fundamentals of Digital Circuits*, PHI Learning Private Limited, Fourth Edition, 2016.
3. Anil K.Maini, *Digital Electronics*, Wiley Publications, 2014.
4. Charles H.Roth, Fundamentals *of Logic Design*, Thomson Learning, Sixth Edition, 2013.

E-Resources:

1. https://nptel.ac.in/courses/108/105/108105113/ 2.https://www.classcentral.com/course/swayam-digital-electronic-circuits-12953 3.https://onlinecourses.swayam2.ac.in/cec21_cs16/preview 4.https://tutorialsinhand.com/tutorials/digital-electronics-tutorial/digital-electronics-basics/digital-electronics-introduction.aspx
5.https://www.udemy.com/course/introduction-to-digital-electronics/
6.https://www.udemy.com/course/basics-of-digital-electronics/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	3	9	**37**
CO3	9	3	3	1	9	3	9	**37**
CO4	9	3	3	1	9	3	9	**37**
CO5	9	3	3	1	9	3	9	**37**
Total	**45**	**15**	**15**	**5**	**45**	**21**	**45**	**191**

Low-1 Medium-3 High-9

SEC II - Linux and Shell Programming Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/week:2**
Subject Code: IBCYS24P **Credit:2**

Course Objectives:

1. To understand and make effective use of Linux utilities and shell scripting language to solve problems
2. To develop the skills the necessary for systems programming including file system programming, processand signal management and interprocess communication

PX ACADEMIC COUNCIL

List of Programs

Built-in Commands

1. Write a shell program to use who commands
2. Write a shell program to use list commands
3. Write a shell program to use sort commands
4. Write a shell program to use wc commands
5. Write a shell program to use cat commands

Formula Substitution

6. Write a shell program to find odd or even number
7. Write a shell program to find smallest among three numbers
8. Write a shell program to find the factorial value
9. Write a shell program to display multiplication table

Switch case

10. Write a shell program to use case statement

Functions

11. To display username, pwd using function
12. Find age of a person using set date

Checking

13. To check the given file is a directory or not

String Manipulation

14. Convert lowercase to uppercase using tr statement

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Summarize shell commands, scripts, managing files, pipes and redirections

CO2: Apply appropriate Linux commands to make effective use of the environment to solve problems

CO3: Illustrate shell scripts to perform repetitive tasks using while and for loops

CO4: Evaluate shell functions

CO5: Derive command-line arguments

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	9	**49**
CO2	9	9	3	1	9	9	9	**49**
CO3	9	9	3	1	9	9	9	**49**
CO4	9	9	3	1	9	9	9	**49**
CO5	9	9	3	1	9	9	9	**49**
Total	**45**	**45**	**15**	**5**	**45**	**45**	**45**	**245**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core VI - Database Security

(For Students Admitted from 2024-25)

Semester: III **Hours/Week: 4**
Subject Code: IBCYC31 **Credit: 4**

Course Objectives:

1. To understand the fundamentals of security, and how it relates to information Systems
2. To provide an overview of database security concepts and techniques and describe new directions of databasesecurity in the context of information technology

Unit I **(12 hours)**

Security and Information Technology: Need of Database Security - A Secure Data Environment - Database Security Objectives - Who Are We Securing Ourselves Against - Hackers - Network and Database Administrators-E-Mails. **Malware**: Computer Viruses -Worms-Trojan Viruses-Bots. **Security Architecture:** Assessment and Analysis-Design and Modeling -Deployment-Management and Support.

Unit II **(12 hours)**

Global Policies for the Database Environment: Security Policies- Update and Upgrade Management- BackupManagement Plan- The Disaster Plan. **Database Review**: Database Structure Components - Database Models-Database Types-Database Management Systems.

Unit III **(12 hours)**

Oracle Architecture: The Instance and the Database- The Physical Structure- The Memory Structure- The Processes. **Password, Profiles, Privileges, and Roles**: Authentication - Authorization. **Security Auditing**: Security Auditing - Audit Classification - The Goal of an Audit - The Auditing Process.

Unit IV **(12 hours)**

Database Auditing: Preparation and Planning for a Database Security Audit-The Database Audit-Reporting a Database Security Audit-Vendor-Specific Auditing Information.

Unit V **(12 hours)**

Security Testing: Security Testing Classification- The Goal of Security Testing. **Testing Methodology:** Planning and Preparation Phase- Execution Phase- Escalating Privileges- Reporting Phase.

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Describe the concepts of Database security and access control
CO2: Demonstrate the database systems structure
CO3: Analyze security auditing and security testing
CO4: Determine Database issues in Trust Management
CO5: Build skill for solving complex problems in a team of database workers

KU ACADEMIC COUNCIL

Text Book:

1. Alfred Basta , Melissa Zgola, *Database Security*, Course Technology, Cengage Learning, 2012.

Reference Books:

1. Alan Williams , Angeline Janet Dhanarani , Ashok Swaminathan , Bettina Schäumer , Manish Choudhary , Michael Mesaros, *Securing the Oracle Database A technical Primer*,Oracle Press ,Fourth Edition,2021.
2. Michael Gertz, SushilJajodia George Mason, *Handbook of Database Security Applications and Trends*, Springer Science Business Media, LLC, 2008.

E- Resources

1. NPTEL: https://nptel.ac.in/courses/106/104/106104135/
2. https://www.careers360.com/courses-certifications/swayam-database-management-courses-brp-org

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	3	9	1	3	**29**
CO2	9	3	1	1	9	1	1	**25**
CO3	9	3	3	3	9	3	3	**33**
CO4	9	3	1	1	9	3	3	**29**
CO5	9	3	9	3	9	9	3	**45**
Total	**45**	**15**	**15**	**11**	**45**	**17**	**13**	**161**

Low-1 Medium-3 High-9

Core VII – RDBMS Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/Week:4**
Subject Code: IBCYC32P **Credit: 4**

Course Objectives:

1. To get practical knowledge on designing and creating Relational Database Management
2. To understand various advanced queries such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL

SQL PROGRAMS

DDL

1. Create an address table with fields name , doorno , street & city
   - describe its structure
   - alter the table to include pincode
   - alter the table to modify street column
   - drop the table

XX ACADEMIC COUNCIL

DML

2. Create a student table with regno, name, age and dept.
   - insert records
   - delete the students with age above 20
   - truncate and drop the table

Functions

3. Create an employee table with fields eno , ename , sex ,age & years of experience
   - find out the no. of female employees
   - find out the employees with age ranging between 30 and 35
   - list out the employees who are working more than 5 years
4. Create a library file with fields accno,title,author,cost & no of copies
   - arrange the books according to accno
   - find out the TOTAL no. of books available in the library
   - find out the book of minimum cost
5. Create a player table with fields name,sports(cricket,hockey,etc.),age & country
   - find out the eldest and youngest player
   - group players according to sports
   - list out the Indian players
6. Write the SQL queries to illustrate all number functions
7. Write the SQL queries to illustrate date functions
8. Write the SQL queries to illustrate all string functions
9. Create an item table with field's itemno, itemname, quantity & price and insert records
10. Illustrate the comparison operators (between, like, in & isnull)
11. Create a table with the fields clientno , clientname & phoneno Illustrate the set operatorsunion ,unionall, minus & intersect
12. Create a student table with fields' regno, name, English, Tamil, Maths and TOTAL
    - insert records
    - arrange all records according to TOTAL
    - find the student who got first mark in Maths
    - list out the students whose name starts with 'S'
13. Create an inventory table with fields' itemno, itemname, qnty, price and reorder level
    - insert records
    - update the qnty when it goes less than reorderlevel
    - list the items with price less than 100
14. Create an employee table with fields ecode,ename,age & salary and create a department table with fields ecode, designation, deptcode & dept. Illustrate joins and sub queries using the above tables

Constraints

15. Create a vendormaster table with fields vencode, venname, place and phoneno
    Create an ordermaster table with fields item no, itemcode, vencode, qnty and orderdate Illustrate the following constraints using the above tables
    - vencode as primary key in vendormaster

EXACADEMIC COUNCIL

- vencode as foreign key in ordermaster
- phoneno as unique
- place as notnull &
- qnty > 100

TCL

15. SQL queries to illustrate TCL commands (savepoint, rollback andcommit)

PL / SQL PROGRAMS

Formula Substitution

1. PL / SQL block to find out the largest among three numbers
2. PL/SQL block to print the multiplication table for given multiplier

Functions

3. Write a PL/SQL block to find the sum of digits of a given number.Use function
4. Write a PL/SQL block to find the factorial of a given number using a function

Cursor

5. Create a library table with fields acc no, title author and price & insert records, write a PL/SQL block to illustrate implicit cursor

Procedure

6. Create a student table with fields regno, name, maths, physics & biology and insert records. write a PL/SQL block to find the TOTAL , average & grade using procedure
7. Create an electricity bill table with fields Custcode, custname, custtype, prevreading, currreading, UNITs, costperUNIT & TOTALamount. write a PL/SQL block to find the TOTAL amount for all customers using the following condition

Cust type	Cost per Unit
1. Domestic	Rs. 3 /-
2. Office	Rs. 4/-
3. Factory	Rs. 6/-

Exception Handling

8. Write a PL/SQL block to illustrate the following predefined exceptions
   a. too_many_rows b.no_data_found
9. Create a table with fields itemno, itemname, qntyordered & qntydelivered, write a PL/SQL block using user defined exception to indicate when more items have been delivered than ordered

Triggers

10. Creating and executing triggers

Note: Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, the students will be able to

CO 1: Build DDL, DML and TCL Commands
CO 2: Make use of implementing constraints in tables
CO 3: Apply to create block structure programming language
CO 4: Create the concepts of functions.
CO 5: Develop the procedures, exceptions, triggers in PL/SQL block

ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low-1 Medium-3 High-9

SEC III - Web Designing Lab (HTML and Scripting Language)

(For Students Admitted from 2024-25)

Semester: III **Hours/week:2**

Subject Code: IBCYS34P **Credit:2**

Course Objectives:

1. To Design web pages using various HTML tags
2. To Write simple programs in Java Script

List of Programs

HTML

1. Create a HTML page to illustrate all basic tags
2. Create a HTML page to display study time table for end semester examination
3. Create a HTML page to display a menu list for bakery
4. Create a HTML page to use all stylesheets
5. Create a HTML page to demonstrate frame
6. Create a HTML page to use hyperlink for both text and image
7. Create a HTML page to demonstrate forms

Java Script

1. Create a HTML page to check leap year
2. Create a HTML page to convert temperature from Fahrenheit to Celsius
3. Create a HTML page to create login form
4. Create a HTML page to demonstrate validation for gmail registration
5. Build college website
6. Build website for online shopping

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, the students will be able to

CO1: Explain the basics of all HTML tags to create the static web page

CO2: Apply the concepts of table and list in HTML

CO3: Examine the use of style sheets, frames and hyperlinks

ACADEMIC COUNCIL

CO4: Evaluate the concept of validation using Javascript
CO5: Create a dynamic website

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	9	9	1	9	9	9	55
CO2	9	9	9	1	9	9	9	55
CO3	9	9	9	1	9	9	9	55
CO4	9	9	9	1	9	9	9	55
CO5	9	9	9	1	9	9	9	55
Total	45	45	45	5	45	45	45	275

Low-1 Medium-3 High-9

Core VIII -Python Programming

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 5**
Subject Code: IBCYC411 **Credit: 4**

Course Objectives:

1. To know lists, tuples and dictionaries in Python programs.
2. To understand exception handling in Python applications for error handling.

Unit I **(15 hours)**

Getting Started: Is Python a "Scripting Language" –Who uses python today –What can I do with Python – How is Python supported – What are Python's Technical strength **How Python Runs Program:** Program Execution – Execution Model Variations. **How you Run Programs:** The Interactive Prompt- System Command Lines and Files- Clicking the File Icons – Module Imports and Reloads – Using exec to Run Modules Files- The IDLE User Interface

Unit II **(15 hours)**

Types and Operations: Introducing Python Object Types- Why use Built-in Types: Python Core Data Types-Numbers-Strings-Lists-Dictionaries-Tuples-Files -Other Core Types **Numeric Types:** Numeric Type basics – Numbers in Actions – Other Numeric Types- Numeric Extensions.

Unit III **(15 hours)**

Strings: String literals- Strings in Action – String Methods – String Formatting Expressions – String Formatting Method Calls. **List and Dictionaries:** Lists-Lists in Actions- Dictionaries-Dictionaries in Action. **Tuples, Files and Everything Else:** Tuples- Tuples in Action-Why Lists and Tuples- Files- Opening Files- Using Files- Files in Action – Other File Tools

EXACADEMIC COUNCIL

Unit IV **(15 hours)**

Statements and Syntax: Python Program Structure Revisited – A Tale of Two ifs – A Quick Example: Interactive Loops. **Assignment, Expressions, and Prints:** Assignment Statements – Expression Statements- Print operations- **if Tests and Syntax Rules:** if Statements – Python Syntax Rules. **While and for Loops:** while loops- break, continue, pass, and the Loop else- for Loops – Loop Coding techniques. **Functions and Scopes:** Function Basics- Scopes Basics- Arguments

Unit V **(15 hours)**

Modules, Module Coding Basics: Why Use Module? –Python Program Architecture- How Imports work- The Module Search path- Module Creation- Module Usage- Module Namespaces- Reloading modules- Module Packages. **Classes and OOP:** OOP: Why Use Classes? – Class Coding Basics- A More Realistic Example- Class Coding Details. **Exceptions and Tools:** Exception Basics- Exception Coding Details- Exception Objects- Designing with Exceptions.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Outline lists, tuples, and dictionaries in Python programs
CO2: Demonstrate the concepts of loops and decision statements in Python
CO3: Illustrate functions and pass arguments in Python
CO4: Design object-oriented programs with Python classes
CO5: Develop Python applications.

Text Book:

1. Mark Lutz, *Programming Python*, O'Reilly, 2010

Reference Books:

1. John Hearty, *Advanced Machine Learning with Python*, Packt, 2016
2. Charles R. Severance Python for Everybody, Exploring Data Using Python 3
3. Tim Hall and J-P Stacey, *Python 3 for Absolute Beginners*, Apress,2009
4. Wesley J. Chun, Core Python Programming, 2006

E-Resources:

1.https://onlinecourses.nptel.ac.in/noc22_cs32/preview
2.https://onlinecourses.nptel.ac.in/noc22_cs31/preview

Course Outcome	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	1	9	9	9	**49**
CO2	9	3	9	1	9	9	9	**49**
CO3	9	3	9	1	9	9	9	**49**
CO4	9	3	9	1	9	9	9	**49**
CO5	9	3	9	1	9	9	9	**49**
Total	**45**	**15**	**45**	**5**	**45**	**45**	**45**	**245**

Low-1 Medium-3 High-9

XVI ACADEMIC COUNCIL

Core IX- Python Programming Lab

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 4**
Subject Code: IBCYC421P **Credit: 4**

Course Objectives:

1. To learn the basic programming constructs in python
2. To understand about Functions, Modules and Regular Expressions in Python Programming

List of Programs:

Display Text

1. Write a python program to display any given text message

Checking

2. Write a python program to check whether the given string is palindrome or not
3. Write a python program to check a number is positive or negative using if-else

Formula Substitution

4. Write a python program to display Fibonacci series
5. Write a python program to find factorial of a given number
6. Write a python program to find first N Natural numbers and sum

Array

7. Write a python program to count the number of vowel in the string

String

8. Write a python program to perform string functions

Function

9. Write a python program to convert a date read from the user, given in DD/MM/YYYY format into written format. For example, Enter a date in DD/MM/YYYY Format: *16/7/2003* *Output: 16 July, 2003*
10. Write a python program to print the contents of a file in uppercase using function
11. Write a python program to sort the contents of a file using function

Operator Overloading

12. Write a python program to implement Operator Overloading

Script

13. Write a python script that implements the Arithmetic Quiz
14. Write a python script to create a button with the text, "Hello World"
15. Write a python script that creates a combo box with three elements. When the selection is changed, the selected item is to be printed
16. Write a python script that creates a simple application window with menus and submenus

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Develop and execute simple python programs

KU ACADEMIC COUNCIL

CO2: Perform formula substitution and checking in programs
CO3: Demonstrate array and strings in python
CO4: Compose scripts and applications in python script
CO5: Deploy function to execute python programs

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	3	9	**39**
CO2	9	3	3	9	1	1	9	**35**
CO3	3	3	3	9	1	1	9	**29**
CO4	9	1	3	9	1	1	9	**33**
CO5	9	3	1	9	1	3	9	**35**
Total	**39**	**13**	**13**	**45**	**7**	**9**	**45**	**171**

Low-1 Medium-3 High-9

SEC IV –Graphics and Animation Lab (Flash)

(For Students Admitted from 2024-25)

Semester: IV **Hours/week:2**
Subject Code: IBCYS44P **Credit: 2**

Course Objectives:

1. To understand the basic concepts of animation
2. To gain knowledge about creating animated pictures

List of Programs

1. Create a ball bouncing animation
2. Create a melting candle animation
3. Animate a Doll
4. Draw a bird to lay an egg and to hatch it with animation
5. Animate the working of Solar System
6. Design a running clock with animation
7. Draw a natural scenery along with the movement of bird
8. Create a moving car animation
9. Animate the life cycle of a butterfly
10. Animate the scene “Tree growing from the seed”
11. Animate the scene “Leaves falling down from the tree”
12. Illustrate the text effect animation in flash
13. Draw the multicolored fishes and animate them to jump in and out of water in the tank
14. Create a kite flying animation

ACADEMIC COUNCIL

15. Animate the scene of transforming a circle into a square

Note: Questions for the external examination will be based on the concepts learnt

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Recognize the uses of various tools in macromedia flash
CO2: Predict the steps that are needed to create animation
CO3: Critically analyze the required options to create animation with respect to its nature
CO4: Evaluate the use of 'Insert Motion tween'
CO5: Create animated scenes, animated logos, animated cartoon characters etc

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	9	3	**31**
CO2	9	1	9	3	3	9	3	**37**
CO3	9	1	9	3	9	9	9	**49**
CO4	9	1	3	3	9	9	9	**43**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**13**	**33**	**21**	**33**	**45**	**33**	**223**

Low-1 Medium-3 High-9

Core X - Programming in Java

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 6**
Subject Code: IBCYC51 **Credit: 5**

Course Objectives:
1. To gain knowledge about basic Java language
2. To understand the fundamentals of object-oriented programming in Java, including defining classes,objects, invoking methods etc and exception handling mechanisms

Unit I **(18 hours)**

Fundamentals of Object Oriented Programming: Introduction, object oriented paradigm- basic concepts of oops - benefits of oops- applications of OOPs. **Java Evolution**: features-java Versus C and C++ - Java and internet- java and WWW- web browsers - **Overview of Java Language:** simple Java program - more of Java – application with two classes –Java program structure -tokens – statements-implementing a Java program - Java virtual machine - command line arguments.

XX ACADEMIC COUNCIL

Unit II **(18 hours)**

Constants, Variables, Data types: Declaration of variables- giving values to variables – scope of variables-symbolic constants- type casting -getting values of variables - standard default values- **Operators and Expressions**: Arithmetic operators-Relational operators- logical operators – assignment operators – incrementand decrement operators –conditional operator- bitwise operator- special operators –arithmetic expressions--evaluation of expressions-precedence of arithmetic operators-type conversion in expression –operator precedence and associativity – mathematical functions.- **Decision making and Branching**: if statement –switch-? : Operator –Decision Making and Looping: while statement -do statement – for - jumps in loops-labeled loops.

Unit III **(18 hours)**

Classes, Objects and Methods: Introduction – defining a class, field declaration–methods declaration – creating objects – accessing class members – constructors – methods overloading – static members – nesting of methods-inheritance – overriding methods – final variables and methods – final classes –finalizer methods-abstract methods and classes –visibility control – **Arrays, Strings and Vectors:** one dimensional array – creating an array –two dimensional arrays –strings –vectors –wrapper classes – **Interfaces, Multiple Inheritance**: defining interfaces – extending interfaces – implementing interfaces – accessing interface variables.

Unit IV **(18 hours)**

Packages, Putting Classes together: Introduction - java **API packages**: using system packages – naming conventions –creating packages –accessing a package –using a package – adding a class to a package–hiding classes – **Multithreaded Programming**: creating threads – extending the thread class – stopping and blocking a thread - life cycle of a thread – using thread methods – thread exceptions –thread priority –synchronization–implementing the runnable interface.

Unit V **(18 hours)**

Managing Errors and Exception: Introduction-types of errors –exceptions -syntax of exception handling code-multiple catch statements –using finally statement –throwing our own exceptions – using exceptions for debugging- **Applet Programming**: introduction –how applets differ from applications-building applet code-applet life cycle – creating an executable applet –designing a web page- applet tag- adding applet to html file-–running the applet – more about applet tags –passing parameters to Applets –aligning the display.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the importance of java with its data types, control statements and class fundamentals

CO2: Apply the concepts of inheritance, method overriding and implement packages and interfaces

CO3: Analyze the concept of exception handling and multithreading

CO4: Evaluate string buffer handling functions

CO5: Create applet programming through awt controls, layout managers and menus

KU ACADEMIC COUNCIL

Text Book:

1. E. Balaguruswamy, *Programming with JAVA - A Primer*, McGraw Hill Professional, 2015.

Reference Books:

1. Herbert Schildt, *Java: The Complete Reference*, McGraw Hill Professional, 2017.
2. Robert Sedgewick& Kevin Wayne, Introduction *to Programming in Java, Addison* Wesley Publishing, 2017.
3. Y. Daniel Liang, *Introduction to Java Programming*, Brief Version Pearson Education, 2017.

E-Resources:

1. https://spoken-tutorial.org/tutorial- search/?search_foss=Java&search_language=English
2. https://onlinecourses.swayam2.ac.in/aic20_sp13/preview
3. https://spoken-tutorial.org/watch/Java/First+Java+Program/English/
4. https://onlinecourses.nptel.ac.in/noc19_cs84/preview
5. https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**15**	**5**	**45**	**45**	**45**	**215**

Low-1 Medium-3 High-9

Core XI - Programming in Java Lab

(For Students Admitted from 2024-25)

Semester: V **Hours/week:6**
Subject Code: IBCYC52P **Credit: 5**

Course Objectives:

1. To make the students to understand programming language Java
2. To able to create programs to solve simple calculations, check whether the given number is prime, perfect or armstrong, etc

List of Programs

Formula Substitution

1. Find the factorial and binomial coefficient
2. Calculate mean, variance and standard deviation

KYA ACADEMIC COUNCIL

3. Develop the programs forNumber conversions

Checking

4. Develop the programs for Number checking (prime, perfect, etc.)

Generation

5. Develop the programs forNumber generation(prime, perfect, etc.)

Array

6. Arrange numbers and names in order
7. Develop the program for performing matrix addition, subtraction, multiplication & transpose

Searching

8. Develop the programs for implementing linear search and binary search

String

9. Develop the programs for doing String manipulation (case conversion, reversing, etc.)

OOP Concepts

10. Develop the programs for implementing inheritance concepts
11. Develop the programs for implementing exception handling
12. Develop the programs for implementing multithreading

Applet

13. Develop the programs to handle keyboard and mouse events
14. Develop the programs for handling window events
15. Simulate a calculator (arithmetic operations) using GUI components

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Outline Java programs that solve simple Mathematical problems, number checking and number generation

CO2: Demonstrate the concepts of String Manipulation, Linear Search and Binary Search.

CO3: Illustrate OOP concepts in Java programming like inheritance

CO4: Evaluate the multi-threaded programs

CO5: Develop Exception handling and GUI components

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	3	9	**39**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	9	9	9	9	9	9	**63**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**33**	**27**	**33**	**45**	**33**	**45**	**261**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core XII - b) Cyber Forensics

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 6**
Subject Code: IBCYC531 **Credit: 5**

Course Objectives:

1. To understand the cyber forensics concepts
2. To gain knowledge in identifying digital evidence

Unit I **(18 hours)**

Understanding the Digital Forensics Profession and Investigations: An Overview of Digital Forensics- Preparing for Digital Investigations- Maintaining Professional Conduct- Preparing a Digital Forensics Investigation- Understanding Data Recovery Workstations and Software- Conducting an Investigation. **The Investigator's Office and Laboratory**: Understanding Forensics Lab Accreditation Requirements- Determining the Physical Requirements for a Digital Forensics Lab.

Unit II **(18 hours)**

Data Acquisition- Understanding Storage Formats for Digital Evidence- Determining the Best Acquisition Method- Contingency Planning for Image Acquisitions- Validating Data Acquisitions- Performing RAID Data Acquisitions- Using Other Forensics Acquisition Tools. **Processing Crime and Incident Scenes**: Identifying Digital Evidence- Collecting Evidence in Private-Sector Incident Scenes.

Unit III **(18 hours)**

Working with Windows and CLI Systems - Understanding File Systems- Exploring Microsoft File Structures- Examining NTFS Disks- Understanding the Windows Registry- Understanding Microsoft Startup Tasks. **Current Digital Forensics Tools**: Digital Forensics Software Tools- Digital Forensics Hardware Tools- Validating and Testing Forensics Software. **Linux and Macintosh File Systems:** Understanding Macintosh File Structures.

Unit IV **(18 hours)**

Digital Forensics Analysis and Validation: Determining what data to collect and analyze- Validating Forensic data. **E-mail and Social Media Investigations**: Investigating E-mail Crimes and Violations- Understanding E- mail Servers- Using Specialized E-mail Forensics Tools.

Unit V **(18 hours)**

Cloud Forensics: Legal Challenges in Cloud Forensics- Technical Challenges in Cloud Forensics- **Report Writing for High-Tech Investigations**: Understanding the Importance of Reports- Guidelines for Writing Reports - Generating Report Findings with Forensics Software Tools.

XX ACADEMIC COUNCIL

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Explain investigation tools and techniques, analysis of data
CO2: Present evidence, Technical Aspects & Legal Aspects related to cyber crime.
CO3: Associate to maintain digital evidence
CO4: Support to solve social media and email crimes
CO5: Generate forensic reports with forensic software tools

Text Book:
1. Bill Nelson, Amelia Phillips, Chris Steuart, *Guide to Computer Forensics and Investigations,* Cengage Learning, Sixth Edition, 2019.

Reference Books:
1. John R.Vacca, *Computer Forensics: Computer Crime Scene Investigation*, Charles River Media, 2002.
2. Richard E.Smith, *Internet Cryptography*, Pearson Education, Third Edition, 2008.
3. Kevin Mandia, Chris Prosise, *Incident Response and Computer Forensics*, Tata Mcgraw Hill Publishing, 2006.

E-Resources:
1. https://onlinecourses.swayam2.ac.in/cec22_ge09/preview
2. Https://Www.Coursera.Org/Lecture/Digital-Forensics-Concepts/Computer-Forensics-And-The-Role-Of-The- examiner-YlX8a
3. https://www.coursera.org/lecture/digital-forensics-concepts/collection-of-digital-evidence NuaX7
4. https://www.hackingarticles.in/best-of-computer-forensics-tutorials
5. https://www.tutorialspoint.com/python_digital_forensics/python_digital_forensics_tutorial.pdf

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	3	9	9	**49**
CO2	9	9	9	9	9	9	3	**57**
CO3	9	3	9	9	9	9	9	**57**
CO4	9	9	9	9	3	9	9	**57**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**39**	**45**	**37**	**33**	**45**	**39**	**283**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

DSE I - a) Mobile Computing

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBCYE5A **Credit: 4**

Course Objectives:

1. To define mobile technologies in terms of hardware, software, and communications
2. To evaluate the effectiveness of different mobile computing frameworks

Unit I **(12 hours)**

Introduction: Mobile Computing- Middleware and Gateways-Developing Mobile Computing Applications- Security in Mobile Computing – **Architecture of Mobile Computing**-Three-Tier Architecture-Design Consideration for Mobile Computing-Mobile Computing through Internet-Mobile Computing through Telephone-Developing an IVRApplications.

Unit II **(12 hours)**

Bluetooth and GSM: Bluetooth- Features and working of RFID -Wireless Broadband (WiMAX)-Mobile IP-IPV6- IPV4 Vs IPV6 –Global System for Mobile Communications – GSM Architecture – Call Routing in GSM – GSM Addresses and Identifiers – Network Aspects in GSM – GSM Frequency Allocation –Authentication and Security- Mobile Computing Over SMS – SMS- Value Added Services throughSMS.

Unit III **(12 hours)**

GPRS, 3G and 4G Networks: GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in GPRS- Applications for GPRS – Limitations of GPRS- Spread Spectrum Technology- CDMA Versus GSM – Features of 3G Networks – Architecture of 3G- Applications of 3G - Features of 4G- Architecture of 4G - Wireless Technologies Used in 4G- Merits and Demerits of 4G.

Unit IV **(12 hours)**

Mobile Ad-hoc Networks: MOBILE Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues-Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad HocNetworks (VANET) – MANET Vs VANET – Security of VANET and MANET - **Open Source Tools for Mobile Testing**: Appium - Katalon Studio – Monkey Talk – IOS Driver – Robotium Calabash.

Unit V **(12 hours)**

Overview of Kotlin-Installation of Android Studio-Getting started with Hello World app-Creating a Registration form-Adding Radio Buttons-Adding spinner and Image-Creating a search App-URL Request- Display Search Result-Playing video using YouTube API.

Course Outcomes:

After successful completion of this course, student will be able to

AY ACADEMIC COUNCIL

CO1: Explain the principles of mobile technologies like GPRS, GSM, CDMA and TDMA and the concepts of Bluetooth and GSM, Mobile Ad-hoc networks
CO2: Apply the features of Android programming for developing Android Applications
CO3: Analyze technology of 1G, 2G, 3G and 4G for gaining the working knowledge of four generation Wireless technologies and Analyze the architecture, merits and demerits of Wireless technologies like Infra-Red, blue tooth, Wi-Fi, RFID and Wi-Max
CO4: Compare the characteristics and techniques MANET with VANET
CO5: Derive wireless communication systems with 3G and 4G technologies

Text Books:

1. Asoke K. Talukder, Hasan Ahmed, Roopa R Yavagal, *and Mobile Computing: Technology, Applications, And Service Creation,* Tata McGraw Hill, 2017.
2. Stefano Basagni, Marco Conti , Silvia Giordano , Ivan IvanStojmenovic, *Mobile Ad Hoc Networking:Cutting Edge Directions,* Wiley-IEEE Press, 2015.

Reference Books:

1. Sunilkumar S. Manvi, Mahabaleshwar S. Kakkasageri, *Wireless and Mobile Networks Concepts and Protocols*, Wiley Publications, 2016.
2. James C. Sheusi, Android Application Development for Java Programmers, Cengage Learning, 2013.
3. Peter Spath , *Learn Kotlin for Android Development*, A Press Publications,2019.
4. Charles E.Perkins, *Ad Hoc Networking*, Addison-WesleyPublications, 2008.

E-Resources:

1.www.cse.iitk.ac.in/users/rkg/Talks/mobile_main.pdf
2.pl.cs.jhu.edu/oose/resources/android/Android-Tutorial.pdf
3.SWAYAM:https://swayam.gov.in/nd1_noc19_ee48/preview
4.SWAYAM:https://onlinecourses.swayam2.ac.in/aic20_sp02/preview
5.http://172.16.25.76/course/view.php?id=2224
6. https://spoken-tutorial.org/tutorial- search/?search_foss=Android+app+using+Kotlin &search_language=English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	9	9	**55**
CO2	9	9	9	1	9	9	9	**55**
CO3	9	9	9	1	9	9	9	**55**
CO4	9	9	9	1	9	9	9	**55**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**45**	**45**	**13**	**45**	**45**	**45**	**283**

Low – 1 Medium – 3 High – 9

XX ACADEMIC COUNCIL

DSE I - b) Malware Analysis

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBCYE51B **Credit: 4**

Course Objectives:

1. To gain insight about the practical learning of malware analysis
2. To develop simple android based malware

Unit I **(12 hours)**

Introduction: Introduction to malware analysis, OS security concepts, malware threats, evolution of malware, malware types viruses, worms, rootkits, Trojans, bots, spyware, adware, logic bombs, malware analysis, staticmalware analysis, dynamic malware analysis**.**

Unit II **(12 hours)**

Static Analysis: Determining the file type- Fingerprinting the malware-Multiple Anti-virus scanning- Extracting strings-Determining file obfuscation- Inspecting PE header information-Comparing and Classifying the malware. **Dynamic Analysis:** Lab environment overview- System and network monitoring- Dynamic analysis tools- Dynamic analysis steps-Dynamic link library analysis

Unit III **(12 hours)**

Debugging malicious binaries: General debugging concepts- Debugging a binary using x64dbg-Debugging a binary using IDA- Debugging a binary using .NET application. **Malware Functionality**: Downloader, Dropper, Keylogger, Credential Stealers, Persistence Mechanisms, Privilege Escalation, Covert malware launching- Launchers, Process Injection, Process Replacement, Hook Injection, Detours, APC injection

Unit IV **(12 hours)**

Malware-Focused Network Signatures: Network Countermeasures-Safely Investigate an Attacker Online-Content-Based Network Countermeasures-Combining Dynamic and Static Analysis Techniques. **Anti-Disassembly:** Understanding Anti-Disassembly-Defeating Disassembly Algorithms-Anti-Disassembly Algorithms- Anti-Disassembly Techniques.

Unit V **(12 hours)**

Anti-Debugging: Windows Debugger Detection-Identifying Debugger Behavior-Interfering with Debugger Functionality-Debugger Vulnerabilities. **Anti-Virtual Machine Techniques:** VMware Artifacts-Vulnerable Instructions-Tweaking Settings-Escaping the Virtual Machine.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the skills necessary to carry out independent analysis of modern malware samples using bothstatic and dynamic analysis techniques

CO2: Illustrate the executable formats Windows and API, and analysis techniques

ACADEMIC COUNCIL

CO3: Analyze investigative leads from host and network based indicators associated with a maliciousprogram
CO4: Create malware detection techniques in future malware samples
CO5: Compose dynamic malware analysis

Text Books:
1. Monnappa K A, *Learning Malware Analysis*, Packt Publishing, 2018.
2. Michael Sikorski, *Practical Malware Analysis – The Hands–On Guide to Dissecting Malicious Software*, No Starch Press, First Edition, 2012.

Reference Books:
1. Victor Marak, *Windows Malware Analysis Essentials*, Packt Publishing, 2015.
2. KenDunham, *Android Malware and Analysis*, CRC Press, 2015.

E-Resources:
1.https://www.hackingtutorials.org/category/malware-analysis-tutorials/
2.https://ethicalhackingguru.com/the-complete-malware- analysis-tutorial/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	1	3	3	9	3	1	1	**21**
CO2	9	3	9	9	3	9	3	**45**
CO3	9	9	9	3	1	9	9	**49**
CO4	9	3	9	9	3	9	3	**45**
CO5	3	3	9	1	1	1	9	**27**
Total	**31**	**21**	**39**	**31**	**11**	**29**	**25**	**187**

Low-1 Medium-3 High-9

DSE II - a) Operating System Security

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBCYE5C **Credit: 4**

Course Objectives:
1.To gain insight about the architecture and enabling technologies of operating system
2.To develop simple OS applications for different domains

Unit I **(12 hours)**

Introduction to OS: Operating System Structure- Layered structure, System Components, Operating system functions, Classification of Operating systems- Batch, Interactive, Time sharing,

XI-ACADEMIC COUNCIL

Real Time System, Multiprocessor Systems - Multiuser Systems - Multi process Systems, Multithreaded Systems, Operating System services, Re-entrant Kernels, Monolithic and Microkernel Systems.

Unit II **(12 hours)**

Concurrent Processes: Process Concept, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution, Semaphores, Test and Set operation, Classical Problem in Concurrency- Dining Philosopher Problem, Sleeping Barber Problem, Inter Process Communication models and Schemes, Process generation.

Unit III **(12 hours)**

CPU Scheduling: Scheduling Concepts, Performance Criteria, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Algorithms, Multiprocessor Scheduling. **Deadlock:** System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

Unit IV **(12 hours)**

Memory Management: Basic bare machine, Resident monitor, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation, Paged segmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.

Unit V **(12 hours)**

Understanding OS Security: Threats and Security Controls – System and network threats- Intrusion Detection and prevention –Malwares and Related Threats – DOS Attacks Firewalls – Firewall Types-Configuration and Implementation - Firewall Forensics - Services and Limitations- Testing and validating operating system security – Improving operating system security - Implementing security defenses-Firewalling to protect systems and networks- Computer security classifications- Cryptography as a security tool

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain main components, services, types and structure of operating systems.

CO2: Perform the various algorithms and techniques to handle the various concurrency control issues.

CO3: Compare and contrast various CPU scheduling algorithms for process execution.

CO4: Select occurrence of deadlock and justify ways to handle it.

CO5: Derive network threats and its possible security measures are designed.

Text Books:

1.Abraham Silberschatz, Peter B. Galvin, Greg Gagne, *Operating Systems Concepts*,Wiley Publication, 2018

2.SibsankarHalder and Alex A Arvind, *Operating Systems*, Pearson Education ,2015

XX ACADEMIC COUNCIL

3.William Stallings, *Cryptography And Network Security* – Principles and Practices, Pearson Education, Sixth Edition,2013

Reference Books:

1.Keith Martin, *Everyday Cryptography: Fundamental Principles and Applications*, Second Edition, Oxford, 2017
2.Joseph MiggaKizza, *Guide to Computer Network Security*, Second Edition, Springer, 2010

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	1	9	1	3	1	9	3	**27**
CO2	3	1	3	3	1	9	3	**23**
CO3	9	9	9	3	1	1	1	**33**
CO4	3	1	3	3	3	1	1	**15**
CO5	3	1	9	9	3	1	3	**29**
Total	**19**	**21**	**25**	**21**	**9**	**21**	**11**	**127**

Low-1 Medium-3 High-9

DSE II - Ethical Hacking

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBCYE52D **Credit: 4**

Course Objectives:

1. To understand the issues related to ethical Hacking
2. To understand foot Printing and Hacking Web Servers

Unit I **(12 hours)**

Ethical Hacking Overview: Introduction to Ethical Hacking-What you can do legally- What you cannot do legally -**TCP/IP Overview**: Overview of TCP/IP-Addressing-Overview of Numbering Systems - **Network and Computer Attacks**: Malicious Software-Intruder Attacks on Networks and Computers-Addressing physical security.

Unit II **(12 hours)**

Foot printing and Social Engineering: Using Web Tools for Foot printing-Conductive Competitive Intelligence-Using Domain Name System Zone Transfers-Introduction of Social Engineering. **Port Scanning**:Introduction to Port Scanning-Using Port Scanning Tools-Conducting Ping Sweeps-Understanding Scripting.

KX ACADEMIC COUNCIL

Unit III **(12 hours)**

Enumeration: Introduction to Enumeration-Enumerating Windows Operating System-Enumerating the Unix Operating System. **Programming for Security Professionals**: Anatomy of a C Program-Understanding the HTML Basics-Understanding Perl.

Unit IV **(12 hours)**

Hacking Web Servers: Understanding Web Applications-Understanding web Application Vulnerabilities- Tools for Web Attackers and Security Testers. **Hacking Wireless Networks:** Wireless Technology-Wireless Network Standards-Understanding Authentication-Understanding War driving-Understanding Wireless Hacking.

Unit V **(12 hours)**

Cryptography: Cryptography Basics-Understanding Symmetric and Asymmetric Algorithms-Understanding Public Key Infrastructure. **Network Protection Systems**: Understanding Routers-Understanding Firewalls.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Summarize the concepts and terminologies used in ethical hacking and enumeration
CO2: Identify security threats and develop a security tools to prevent and find the hacking technology
CO3: Examine the programming languages and tools for security professionals
CO4: Importance of web servers and networks in hacking
CO5: Design and develop algorithms and firewall for hacking

Text Book:

1.Michael T. Simpson, Kent Backman, James E. Corley, *Hands-On Ethical Hacking and Network Defense*,Cengage Learning, 2013.

Reference Books:

1. Ec-Council, *Ethical Hacking and Countermeasures: Attack Phases*, Delmar Cengage Learning, 2009.
2. Kimberly Graves,*Certified Ethical HackerStudy Guide*, Wiley Publishing, 2010.

E-Resources:

1. https://www.udemy.com/topic/ethical-hacking/
2. https://www.coursera.org/courses?query=ethical%20hacking
3. https://www.hackerone.com/ethical-hacker/useful-online-resources-new-hackers
4. https://www.eccouncil.org/ethical-hacking/

XX ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	9	9	**45**
CO2	9	3	3	3	9	9	9	**45**
CO3	9	3	9	9	3	9	9	**51**
CO4	9	3	9	3	9	9	9	**51**
CO5	9	3	9	9	9	9	9	**57**
Total	**45**	**15**	**33**	**33**	**33**	**45**	**45**	**249**

Low-1 Medium-3 High-9

SEC V – PHP Programming Lab

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 2**
Subject Code: IBCYS54P **Credit: 2**

Course Objectives:

1. To understand the concepts of regular expressions including modifiers, operators and meta characters
2. To develop PHP programs that use various PHP library functions and that manipulate files and directories

List of Programs

1. Develop a PHP program to print Sum of digits.
2. Develop a PHP program to print factorial of a number.
3. Develop a PHP program to display count, from 10 to 20 using loop.
4. Develop a PHP program to print prime number.
5. Develop a PHP program to check Armstrong number.
6. Develop a PHP program to check Palindrome number.
7. Develop a PHP program to swap two numbers with and without using third variable.
8. Develop a PHP program to find if the given year is leap year or not.
9. Develop a PHP program to reverse the number with strrev ().
10. Develop a PHP program to show day of the week (for eg: Monday) based on numbers usingSwitch/case statements
11. Develop a PHP program to print number triangle
12. Develop a PHP program to print alphabet triangle
13. Develop a PHP program to check student grade based on the marks using if-else statement
14. Develop a PHP program Using nested for loop that creates a chess board

Note: Questions for the internal and external examination will be based on the concepts learnt

ACADEMIC COUNCIL

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Describe the fundamentals of PHP language in trivial problem solving
CO2: Determine solution to a problem and apply control structures
CO3: Simplify the use of strings and string handling functions
CO4: Justify real time applications using PHP language features
CO5: Build skill on problem solving by constructing algorithms

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	1	1	**25**
CO2	9	3	3	3	9	3	3	**33**
CO3	9	3	1	3	9	9	3	**37**
CO4	9	3	3	3	9	9	3	**39**
CO5	9	3	3	3	9	9	3	**39**
Total	**45**	**15**	**11**	**13**	**45**	**31**	**13**	**173**

Low-1 Medium-3 High-9

Core XIII -Cloud Computing and Security

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 6**
Subject Code: IBCYC611 **Credit: 4**

Course Objectives:
1. To identify the technical foundations of cloud systems architectures
2. To apply principles of best practice in cloud application design and management

Unit I **(18 hours)**

Cloud Computing Essentials - Introduction to cloud computing -Characteristics of Cloud computing - Cloud computing models - Cloud services and technologies. Overview of Cloud Computing **Network requirements forcloud computing**. Cloud Security Baselines - Introduction - An overview of computer security - Vulnerabilities and attacks - Privacy and security in cloud storage services Multiclouds

Unit II **(18 hours)**

Cloud Security, Privacy, and Trust Baselines – Introduction - Understanding the threats - Classification and countermeasures - Threats assessment - Trusting the cloud Infrastructure as a Service (IaaS) **Risk and Trust Assessment** – Introduction - risk analysis, assessment, and management - Top threats for the cloud - Cloud risk assessment - Risk and trust models for the cloud.

SXC ACADEMIC COUNCIL

Unit III **(18 hours)**

Managing Risk in the Cloud – Introduction - The risk management framework - Cloud provider's risk management process - Cloud consumer's risk management process. **Cloud Security Risk Management** – Introduction of risk - Definitions of risk - Risk and cloud - Cloud computing risk assessment and management.

Unit IV **(18 hours)**

Secure Cloud Risk Management – Introduction - What are my risks? - Cloud acronyms - What makes cloud risks more or less risky? **Cryptographic Key Management for Data Protection** – Introduction – Background - Key management lifecycle - Key management system design choices - Drivers for cloud key management design.

Unit V **(18 hours)**

Cloud Security Access Control – Introduction - Layers of security needs– Multilevel authentication – Encryption - Password management - Distributed servers.
Advanced Security Architectures for Cloud Computing – Introduction - Public cloud security - Public cloud architecture - Advanced security architectures.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Recall the components of cloud computing showing how business agility in an organization can becreated
CO2: Determine the deployment of web services from cloud architecture
CO3: Categorize the consistency of services deployed from a cloud architecture
CO4: Compare and contrast the economic benefits delivered by various cloud models based on applicationrequirements, economic constraints and business requirements
CO5: Generate case studies to derive the best practice model to apply when developing and deploying cloudbased applications

Text Book:

1. John R Vacca, *Cloud computing security: foundations and challenges,* CRC Press, Second Edition, 2021

Reference Books:

1.Gautam Shroff, *Enterprise Cloud Computing Technology Architecture Applications*, Cambridge\ University Press,First Edition, 2010
2. TobyVelte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach, McGraw-Hill Publishing Company, First Edition, 2009
3. Dimitris N. Chorafas, *Cloud Computing Strategies,* CRC Press, 2010

E-Resources:

1. https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=English
2. NPTEL: https://nptel.ac.in/courses/106/105/106105167/

ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	**45**
CO2	9	9	3	9	9	3	9	**51**
CO3	3	9	3	9	9	3	9	**45**
CO4	9	9	3	3	9	3	9	**45**
CO5	9	9	3	9	9	3	9	**51**
Total	**39**	**45**	**15**	**33**	**45**	**1**	**45**	**237**

Low-1 Medium-3 High-9

Core XIV - Cyber Law

(For Students Admitted from 2024-25)

Semester: VI **Hours/Week: 5**
Subject Code: IBCYC62 **Credit: 4**

Course Objectives:

1. To understand the cyber world and cyber laws in general
2. To clarify the intellectual property issues in the cyber space and the growth and development of the law inthis regard

Unit I **(15 hours)**

Introduction: Basic Concepts– Internet and Advantages and Disadvantages of Internet Technology- Networkand Network Security-Cyber Space and Netizen.

Unit II **(15 hours)**

Cyber Law & Components of Cyber Law: Cyber Law in India - An Overview of Information Technology Act,2000 - Cryptography, Encryption Technique & Algorithm and Digital Signature & Electronic Signature.

Unit III **(15 hours)**

E-Governance: E-Commerce- E-Governance- E-Record & E-Contract-Regulator Certifying Authority- Electronic Signature Certificates – Subscriber.

Unit IV **(15 hours)**

Cyber Crimes: Cyber Contraventions - Cyber Offences- Power of Investigation & Search - Power of Investigation & Search - E-Evidence and Computer Forensic - Grey Areas of Information Technology Act, 2000- Cyber Jurisdiction.

AX ACADEMIC COUNCIL

Unit V **(15 hours)**

Intellectual Property Rights (IPRs): Copyright Issues and Digital Medium- Patent Issues in Digital Medium- Domain Name Dispute & Resolution and Trademark Issues in Digital Medium- Spamming and Phishing.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Summarize the concepts of cyber security and cyberlaws
CO2: Demonstrate the strategies for cyber security
CO3: Analyze the problems arising out of online transactions and provoke them to find Solutions
CO4: Evaluate the intellectual property issues in the cyberspace and the growth and development of the laws
CO5: Analyze the problems arising out of online transactions and provoke them to find solutions

Text Book:

1. Justice Yatindra Singh , *Cyber Laws Paperback – 1* , Universal Law Publishing, 2016.

Reference Books:

1. Bhansali, *Information Technology Act, 2000*, University Book House, 2003.
2. Julie Yen, Summer Fellow, I*ntellectual Property And Cyberlaw* ,Cambridge, 2013.

E- Resources:

1. https://www.researchgate.net/publication/301894978_CYBER_LAW_AND_INFORMATION_SECURITY
2. https://taxguru.in/wp-content/uploads/2012/10/cyber-laws-overview.pdf
3. NPTEL: https://nptel.ac.in/courses/106/106/106106129/
4. NPTEL: https://nptel.ac.in/courses/110/105/110105139/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	1	3	**27**
CO2	9	3	1	1	9	1	1	**25**
CO3	9	1	3	3	9	3	3	**31**
CO4	9	3	3	3	9	3	3	**33**
CO5	9	3	3	3	9	9	3	**39**
Total	**45**	**13**	**11**	**11**	**45**	**17**	**13**	**155**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core XV-Cryptography and Network Security

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 6**
Subject Code: IBCYC63 **Credit: 5**

Course Objectives:

1. To understand basics of cryptography and network security
2. To learn about how to maitain the confidentiality, integrity and availability of a data

Unit I **(18 hours)**

Computer and Network Security concept: Computer security concepts-The OSI security Architecture-Security Attacks- Security Services-Security Mechanisms. **Number Theory**: The Euclidean Algorithm-Modular Arithmetic-Prime Numbers- Fermat's Euler's Theorem-Discrete Logarithms.

Unit II **(18 hours)**

Symmetric Ciphers: Classical Encryption Techniques: Symmetric Chippers Model- Substitution Techniques- Transposition Techniques-Traditional Block Cipher Structure-Block Cipher Design Principles. **Finite Fields**: Groups-Rings-Fields-Finite Fields of the FormGF(p).

Unit III **(18 hours)**

Advanced Encryption Standard: Finite Field Arithmetic-AES Structure-AES Tranformation Functions-AES Key Expansion. **Asymmetric Ciphers** : Principles of public –key cryptosystems-The RSA Algorithm.

Unit IV **(18 hours)**

Other Public-Key Cryptosystem: Diffie-Hellman Key Exchange-Elgmal cryptographic system-Elliptic curve arithmetic- Elliptic curve Crptography. **Digital Signature**:Digital signature-Elgmal Digital Signature Scheme-Schnorr Digital Scheme-NIST Digital signature algorithm.

Unit V **(18 hours)**

Wireless Network Security: Wireless Security-Mobile Device Security-IEEE802.11 Wireless LAN Overview- IEEE802.11 Wireless LAN Security. **Electronic Mail Security**: Internet Mail Architecture-Email Formats- Email Threats and compressive Email Security-S/MIME –DNSSEC-Sender policy Framework-Domain KeysIdentify Mail.

Text Book:

1.William Stallings, *Cryptography and Network Security Principles and Practice,* Pearson Education ,Seventh Edition, 2017.

Reference Books:

1. Wade Trappe, Lawrence C Washington, *Introduction to Cryptography with coding theory,*

AC ACADEMIC COUNCIL

Pearson Education, Second Edition, 2007.
2. William Stallings, *Cryptography and Network security Principles and Practice*, Pearson Education, Fourth Edition,2006.
3.W. Mao, *Modern Cryptography – Theory and Practice*, Pearson Education, Second Edition, 2007.

E- Resource:
1.NPTEL: https://nptel.ac.in/courses/106/105/106105162/

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Compare various cryptographic techniques
CO2: Apply various data encryption techniques
CO3: Classify the encryption standard and asymmetric ciphers
CO4: Implement hashing and digital signature techniques
CO5: Explain the various security application

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	**45**
CO2	9	9	3	9	9	3	9	**51**
CO3	3	9	3	9	9	3	9	**45**
CO4	9	9	3	3	9	3	9	**45**
CO5	9	9	3	9	9	3	9	**51**
Total	**39**	**45**	**15**	**33**	**45**	**15**	**45**	**237**

Low-1 Medium-3 High-9

Core XVI – Project

(For Students Admitted from 2024-25)

Semester: VI **Hours/Week: 6**
Subject Code: IBCYC64PW **Credit: 5**

Course Objectives:
1. To impart the students to implement project by collecting the data and selecting the software tool
2. To enhance the students to select the programming language for implementing the project

Students have to undergo an individual project work on campus and appear for the viva-voce examination with the software developed and document prepared by her

AUTONOMOUS ACADEMIC COUNCIL

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Identify goals, constraints, deliverables, performance criteria and resource requirements in consultationwith stakeholders

CO2: Apply the plan by executing the code

CO3: Illustrate the various aspects of software development for the total project

CO4: Evaluate the entire software project according to the specific problem

CO5: Develop the software project by executing with the various data

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	9	9	3	9	**57**
CO2	9	3	9	3	9	9	9	**51**
CO3	9	3	9	9	9	9	9	**57**
CO4	9	3	9	9	9	9	9	**57**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**27**	**45**	**39**	**45**	**39**	**45**	**285**

Low-1 Medium-3 High-9

DSE III – a) Wireless Security

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 4**

Subject Code: IBCYE62A **Credit: 4**

Course Objectives:

1. To comprehend the fundamental concepts of mobile and wireless network security
2. To identify security threats in wireless networks and design strategies to manage network Security

Unit I **(12 hours)**

Security Issues in Mobile Communication: Mobile Communication History, Security- Wired Vs Wireless, Security Issues in Wireless and Mobile Communications, Security Requirements in Wireless and Mobile Communications, Security for Mobile Applications, Advantages and Disadvantages of Application –level Security- Importance of Authentication and Authorization-Challenges of Cybersecurity.

Unit II **(12 hours)**

Security of Device, Network, and Server Levels: Basic cyber security concepts- How to write a security policy- IT staff and end user education- Physical security implementation-Client traffic analytics-Perimeter security implementation-Password management-how to eliminate unnecessary

KAC ACADEMIC COUNCIL

services-Data in transit security-Data Backup solutions-Wireless technology fundamentals-Wireless security policy basics-How to create or refine wireless policies.

Unit III **(12 hours)**

Application Level Security in Cellular Networks: Generations of Cellular Networks, Security Issues and attacks in cellular networks, GSM Security for applications, GPRS Security for applications, UMTS security for applications, 3G security for applications, Some of Security and authentication Solutions. **802.11 dedicatedarchitectures**: Introduction, Adhoc networks (hotspot), Wireless Intrusion Detection System (WIDS), Honeypots - Understanding 5G networks.

Unit IV **(12 hours)**

Application Level Security in MANETs: MANETs, Some applications of MANETs, MANET Features, Security Challenges in MANETs, Security Attacks on MANETs, External Threats for MANET applications, Internal threats for MANET Applications, Some of the Security Solutions. Ubiquitous Computing, Need for Novel Security Schemes for UC, Security Challenges for UC.

Unit V **(12 hours)**

Wireless Security: Wireless networks Attacks – Active, passive attacks, DoS attacks, TCP, Trojan and Dictionary Attacks, Security risks in IEEE 802.11 standards, Security in 802.1x, 802.11i- **WiMAX and LTE Security**: Introduction, WiMAX architecture and OFDM, Security risks involved in 802.16-2004, Security risks involved in 802.16e Security in GSM, UMTS.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Illustrate with the issues and technologies involved in designing a wireless and mobile system that is robust against various attacks

CO2: Determine of the various ways in which wireless networks can be attacked and trade-offs in protecting networks

CO3: Simplify the state-of-the-art and open problems in wireless and mobile security, thus enhancing their potential to do research or pursue a career in this rapidly developing area.

CO4: Build various security issues related to GPRS, 3G and 5G

CO5: Invent various security issues involved in WiMAX and LTE

Text Books:

1. Hugo Hoffman, *Ethical Hacking Bible: Cybersecurity, Cryptography, Network Security, WirelessTechnology and Wireless Hacking with Kali Linux, 2020*.
2. M. Au, R. Choo and G. Kessler, *Mobile security and privacy,* Cambridge, MA: Syngress, 2017.

Reference Books:

1. PallapaVenkataram, SatishBabu, *Wireless and Mobile Network Security,* , Tata McGraw Hill Publishing Company , First Edition , 2010.
2. Frank Adelstein, K.S.Gupta, Fundamentals *of Mobile and Pervasive Computing*, Tata McGraw Hill Publishing Company, First Edition, 2005.
3. Randall k. Nichols, Panos C. Lekkas ,*Wireless Security Models, Threats and Solutions*, Tata McGraw Hill Publishing Company, First Edition, 2006.

ACADEMIC COUNCIL

4. Bruce Potter and Bob Fleck, 802.11 *Security*, O'REILLY Media, First Edition, 2005.
5. J. Joshi, *Network Security*. New York: Elsevier, 2009.
6. J. Harrington, *Network security*. Morgan Kaufmann Publishers, 2005.

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc21_cs16/preview
2. https://onlinecourses.nptel.ac.in/noc21_cs16/preview
3. https://blog.rsisecurity.com/what-is-the-mobile-security-framework/
4. https://wimaxforum.org/
5. https://www.coursera.org/lecture/security-awareness-training/mobile-devices-andsecurity-EMjmM

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	9	3	9	**45**
CO2	3	3	3	9	1	3	3	**25**
CO3	3	1	9	9	3	1	3	**29**
CO4	9	3	9	3	3	3	3	**33**
CO5	9	3	9	3	3	3	3	**33**
Total	**33**	**13**	**33**	**33**	**19**	**13**	**21**	**165**

Low-1 Medium-3 High-9

DSE III - b) Intellectual Property Rights

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 4**
Subject Code: IBCYE61B **Credit: 4**

Course Objectives

1. To recognize the importance of IP and to educate the pupils on basic concepts of Intellectual Property Rights
2. To identify the significance of practice and procedure of patents and to make the students to understand the statutory provisions of different forms of IPRs in simple forms

Unit I **(12 hours)**

Overview of Intellectual Property : Introduction and the need for intellectual property right (IPR)-Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varietiesand Layout Design-Genetic Resources and Traditional Knowledge-Trade Secret - **IPR in India** : Genesis and development – IPR in abroad-Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, the Berne Convention, 1886, the Universal Copyright Convention, 1952, the WIPO Convention, 1967,the Patent Co-operation Treaty, 1970, the TRIPS Agreement, 1994.

EX ACADEMIC COUNCIL

Unit II **(12 hours)**

Patents : Elements of Patentability: Novelty , Non Obviousness (Inventive Steps), Industrial Application – Non Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties - Patent office and Appellate Board.

Unit III **(12 hours)**

Copyrights: Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership ofcopyright, Assignment and licence of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights.

Unit IV **(12 hours)**

Trademarks: Concept of Trademarks - Different kinds of marks (brand names, logos, signatures, symbols, wellknown marks, certification marks and service marks) - Non Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties -Trademarks registry and appellate board. **Current Contour :** India`s New National IP Policy, 2016 – Govt. of India step towards promoting IPR – Govt. Schemes in IPR – Career Opportunities in IP - IPR in current scenariowith case studies.

Unit V **(12 hours)**

Other forms of IP: Design- meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection Geographical Indication (GI) Geographical indication: meaning, and difference between GI and trademarks - Procedure for registration, effect of registration and term of protection.**Plant variety protection**: meaning and benefit sharing and farmers' rights – Procedure for registration, effect of registration and term of protection. **Layout Design protection**: meaning – Procedure for registration, effect of registration and term of protection.

Course Outcomes:

After suceesful completion of this course, student will be able to

CO1: To introduce fundamental aspects of Intellectual property rights to students who are going to play amajor role in development and management of innovative projects in industries

CO2: To disseminate knowledge on patents, patent regime, registration aspects in India & abroad

CO3: To disseminate knowledge on copyrights and its related rights and registration aspects

CO4: To disseminate knowledge on trademarks and registration aspects

CO5: To disseminate knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects

Text Book:

1. Nithyananda K V, Intellectual Property Rights: Protection and Management, Cengage Learning Private Limited,2019.

ACADEMIC COUNCIL

Reference Books:

1. Neeraj.P, Khusdeep.D, *Intellectual Property Rights*, PHI Learning Private Limited, 2014.
2. Virendra Kumar Ahuja, *Law relating to Intellectual Property Rights*, Lexis Nexis Butterworths, 2017.

E-Resources:

1. https://www.tutorialspoint.com/information_security_cyber_law/intellectual_property_right.htm
2. https://www.icsi.edu/media/website/IntellectualPropertyRightLaws&Practice.pdf
3. https://nptel.ac.in/courses/110/105/110105139/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	3	**43**
CO2	9	3	9	3	9	9	9	**51**
CO3	3	9	1	1	3	1	9	**27**
CO4	9	3	9	1	9	9	3	**43**
CO5	9	1	9	3	9	9	3	**43**
Total	**39**	**25**	**31**	**9**	**39**	**37**	**27**	**207**

Low -1 Medium – 3 High - 9

SEC VI – Cryptography and Network Security Lab

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 2**
Subject Code: IBCYS65P **Credits: 2**

Course Objectives

1. To learn the fundamental principles and theories underlying cryptographic algorithms, including themathematical foundations of cryptography
2. To apply cryptography to solving data security problems and introduce the concepts how cryptographic algorithms and protocols work and how to use them provides a broad view of security with practical applications of cryptography to data security

List of Programs

1. Write a program that contains a string (char pointer) with a value ‘Hello world’. The program shouldXOR each character in this string with 0 and displays the result.
2. Write a program that contains a string (char pointer) with a value ‘Hello world’. The program shouldAND or and XOR each character in this string with 127 and display the result
3. Perform encryption and decryption using the following algorithms:
   a. Ceaser cipher b. Substitution cipher c. Hill Cipher
4. Implement the DES algorithm logic

ACADEMIC COUNCIL

5. Implement the Blowfish algorithm logic
6. Encrypt the text “Hello world”using Blowfish
7. Implement RSA algorithm
8. Calculate the message digest of a text using the SHA-1 algorithm
9. Calculate the message digest of a text using the MD5 algorithm
10. Encrypt and Decrypt the password in Shell Script
11. Encrypt and Decrypt file using RIJNDAEL-128
12. Encrypt Password file and Decrypt in a shell Script
13. Shell Script to cipher a Text file (Caesar Method)

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes

After suceesful completion of this course, student will be able to

CO1: Apply encryption and decryption algorithms i.e., AES, MD5 and RSA algorithms
CO2: Analyze basic security attacks and services
CO3: Illustrate symmetric and asymmetric key algorithms for cryptography
CO4: Demonstrate authentication functions
CO5: Explain classical encryption techniques and block ciphers.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	3	9	1	3	9	3	9	**37**
CO2	9	9	3	3	3	9	1	**37**
CO3	9	9	9	3	9	3	3	**45**
CO4	9	1	3	9	3	9	1	**35**
CO5	3	9	3	9	9	3	3	**39**
Total	**33**	**37**	**19**	**27**	**33**	**27**	**17**	**193**

Low-1 Medium – 3 High – 9

Extra Credit I -Desktop Publishing Lab

(For Students Admitted from 2024-25)

Semester:II
Subject Code: IBCYX21P **Credit: 2**

Course Objectives:

1. To understand the basic concepts of FIGMA
2. To gain knowledge about various tools of FIGMA

FIGMA

1. Create an Animated Text.
2. Create an Animated Image.

XV ACADEMIC COUNCIL

3. Create a bouncing ball using interactive component.
4. Design ON/OFF toggle.
5. Create a responsive grid system for web.
6. Create a poster.
7. Create an animation notification.
8. Create an animated card grid.
9. Design a glass morphism.
10. Design an Appreciation certificate.
11. Design a Sign Up page.
12. Create a News page design.

Note: Questions for internal examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Describe the concepts of tools and techniques in Figma.

CO2: Apply the concept of creation and modification of objects.

CO3: Simplify the process of designing, editing and animating.

CO4: Create a website screen and any form of certificate.

CO5: Construct and design an application.

.Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	9	3	9	**45**
CO2	9	3	9	3	9	3	9	**45**
CO3	9	3	9	3	9	3	9	**45**
CO4	9	1	9	3	9	3	9	**43**
CO5	9	1	9	3	9	3	9	**43**
Total	**45**	**11**	**45**	**15**	**45**	**15**	**45**	**221**

Low-1 Medium-3 High-9

Extra Credit II - No SQL Lab

(For Students Admitted from 2024-25)

Semester: III

Subject Code: IBCYX31P **Credit:2**

Course Objectives:

1. The students get practical knowledge on developing No SQL database using MongoDB and ability to read or query the collection

XX ACADEMIC COUNCIL

2. To understand various advanced methods such as update one MongoDB document in the collection and update many MongoDB documents in the collection

No SQL PROGRAMS:

1. MongoDB installation and configuration in windows
2. Demonstrate how to create and drop a database in MongoDB
3. Developing the collection in MongoDB on the fly
4. Developing collection with options before inserting the documents and drop the collection created
5. MongoDB insert document
   a) Insert single document
   b) Insert multiple documents in collection
6. Querying all the documents in JSON format and Querying based on the criteria
7. MongoDB update document
   a) Using update ( ) method
   b) Using save ( ) method
8. MongoDB delete document from a collection
   a) Using remove ( ) method
   b) Remove only one document matching your criteria
   c) Remove all documents
9. Develop a MongoDB projection
10. Apply limit ( ), skip ( ), sort ( ) methods in MongoDB
11. MongoDB indexing
    a) Develop index in MongoDB
    b) Finding the indexes in collection
    c) Drop indexes in a collection
    d) Drop all the indexes
12. MongoDB with java and PHP
    a) Develop a simple application that uses MongoDB with JAVA
    b) Develop a simple application that uses MongoDB with PHP
13. Build a social media app using document API and a No SQL Database

Note: Questions for external examination will be based on concept learnt

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Installing and configuring mongoDB in windows
CO2: Perform all database operations using mongoDB
CO3: Implement and harness the power of indexes
CO4: Use MongoDB compass to analyze a database

VX ACADEMIC COUNCIL

CO5: Develop applications by integrating mongoDB with JAVA/PHP

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low-1 Medium-3 High-9

Extra Credit III - R Tool Lab

(For Students Admitted from 2024-25)

Semester: IV
Subject Code: IBCYX4P **Credit: 2**

Course Objectives:

1. To understand the concept of R Tool
2. To implement statistics analysis

List of Programs

1. To implement correlation analysis
2. To implement regression analysis
3. To implement t-test
4. To implement z-test
5. To implement f-test
6. To implement chi-square test
7. To implement kruskal-wallis test
8. To implement likert scaling techniques
9. To implement analysis of variance (ANOVA)

Note: Questions for external examination will be based on concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Demonstrate the basics in R programming in terms of constructs, control statements and functions
CO2: Apply data analytics software
CO3: Enhance problem solving, programming and debugging skills
CO4: Plan the R programming from a statistical perspective

ACADEMIC COUNCIL

CO5: Analyze and implement the various data structures of R

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	3	**43**
CO2	9	3	9	3	9	9	9	**51**
CO3	3	9	1	1	3	1	9	**27**
CO4	9	3	9	1	9	9	3	**43**
CO5	9	1	9	3	9	9	3	**43**
Total	**39**	**25**	**31**	**9**	**39**	**37**	**27**	**207**

Low-1 Medium-3 High-9

Extra Credit V-Data Mining Lab

(For Students Admitted from 2024-25)

Semester: VI
Subject Code: IBCYX6P **Credit: 2**

Course Objectives:

1. To understand the concept of data mining tool
2. To implement various data mining algorithm

List of Programs

1. Create data-set in .arff file format. Demonstration of preprocessing on WEKA data-set
2. Demonstration of Association rule process on data-set contact lenses.arff /supermarket using apriori algorithm
3. Demonstration of classification rule process on WEKA data-set using j48 algorithm
4. Demonstration of classification rule process on WEKA data-set using Naive Bayes algorithm
5. Demonstration of clustering rule process on data-set iris.arff using simple k-means

Note: Questions for external examination will be based on concepts learnt

Course Outcomes

After suceesful completion of this course, student will be able to
CO1: Describe Data mining concept
CO2: Apply the knowledge of data mining techniques
CO3: Adapt to new data mining tools.
CO4: Explore recent trends in data mining such as web mining, spatial-temporal mining
CO5: Build different types of algorithm

AC ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	1	1	**25**
CO2	9	3	3	1	9	1	3	**29**
CO3	9	3	3	3	9	3	3	**33**
CO4	9	3	3	3	9	3	3	**33**
CO5	3	3	9	3	9	3	9	**39**
Total	**39**	**15**	**19**	**11**	**45**	**11**	**19**	**159**

Low-1 Medium-3 High-9

Bachelor of Computer Applications (BCA)

(Three Year Regular Programme)

(For Students Admitted from 2024-25)

Programme Specific Outcomes:

On completion of this programme, student will be able to gain

PSO1: To impart knowledge about various sub domains related to the field of Accounting, Mathematics and Computer Applications

PSO2: The graduate will equip themselves to pursue higher studies, entrepreneurship, and apply new ideas and technologies in the evolving field

PSO3: To produce students who can analyze a problem and apply the innovation ideas

PSO4: The graduates will become a successful employer as an outcome of Industry-Academia collaboration

PSO5: To produce professionals who show their readiness to work in a team and find solutions to the needs of the society with the help of upcoming technologies

PSO6: An ability to apply mathematical methodologies to solve computation task, model real world problem using appropriate data structure and suitable algorithm

PSO7: Familiarity with a programming language and open-source platforms

PREAMBLE

The Board of Studies of Computer Science revamped the curriculum with the following changes

Core Papers

- Syllabus of Programming in C & Digital Electronics course has been reduced
- Data Structures Lab course has been introduced
- Software Engineering, Internet of Things course has been swapped

Discipline Specific Elective

KA ACADEMIC COUNCIL

- Operating system has been shifted from Core to Discipline Specific Elective
- Software Testing elective course has been removed
- Theory of Computation elective course has been removed and Big Data Analytics course has been introduced
- Compiler Design elective course has been removed and Digital Marketing course has been introduced

Skill Enhancement Course

- Multimedia Lab II (Flash) course has been removed and the syllabus of .NET programming lab course has been introduced
- Python Lab course has been shifted from semester IV to VI

Extra Credit Course

- Coral Draw Lab has been removed and Desktop Publishing Lab has been introduced
- Programming in Visual Basic Lab has been removed and NoSQL Lab has been introduced

PROGRAMME STRUCTURE - PROGRAM CODE: UCP

Sem	Subject Code	Course	Subject Title	Hours / week	Credit	CIA	ESE	Total Marks
I	IBLT112/ IBLA111/ IBLH111	Language I	Tamil I / Arabic I / Hindi I	5	3	25	75	100
	IBLEI12/ IBLEII12	Language II	English I a (or) b	5	3	25	75	100
	IBCPC111	Core I	o**Programming in C**	4	3	25	75	100
	IBCPC12P	Core II	Programming in C Lab	4	3	25	75	100
	IBCPC141	Core III	Fundamentals of Computers	4	3	25	75	100
	IBCPA131	AECC I	Numerical Methods	4	4	25	75	100
	IBCPS15P	SEC I	Office Automation Lab	2	2	-	50	50
			Library	1	-	-	-	-
			Remedial/Games	1	-	-	-	-
			Total	**30**	**21**	**150**	**500**	**650**

XX ACADEMIC COUNCIL

II	IBLT212/ IBLA211/ IBLH211	Language I	Tamil II / Arabic II / Hindi II	5	3	25	75	100
	IBLEI22/ IBLEII22	Language II	English II a or b	5	3	25	75	100
	IBCPC21	Core IV	o Object Oriented Programming in C++	5	5	25	75	100
	IBCPC22P	Core V	Object Oriented Programming in C++ Lab	4	4	25	75	100
	IBCPA231	AECC II	**Digital Electronics**	3	2	25	75	100
	IBCPA24P	AECC III	Digital Electronics Lab	2	2	25	75	100
	IBCPS251P	SEC II	Web Designing Lab (HTML and Java Scripting Language)	2	2	-	50	50
	IBES2	GIC I	Environmental Science	2	2	-	50	50
			Library	1	-	-	-	-
			Remedial/Games	1	-	-	-	-
	IBCPX21P/ IBCPX2O	Extra Credit I	**Desktop Publishing Lab** / * OnlineCourse	-	2	-	100	100
			Total	**30**	**23+2**	**150**	**550+ 100**	**700+100**
III	IBLT311/ IBLA31/ IBLH311	Language I	Tamil III / Arabic III / Hindi III	5	3	25	75	100
	IBLEIB32/ IBLEIIA32	Language II	English III a or b	5	3	25	75	100
	IBCPC311	Core VI	Data Base Management System	4	4	25	75	100
	IBCPC32P	Core VII	Data Base Management System Lab	4	4	25	75	100
	IBCPA33	AECC IV	Accounting Principles & Package	4	4	25	75	100
	IBCPS34P	SEC III	Linux and Shell Programming Lab	2	2	-	50	50
		OEC		2	2	-	50	50
	IBHR3	GIC II	Human Rights	2	2	-	50	50

XX ACADEMIC COUNCIL

	IBXTN3	Extension Activities	NSS/CSS	2	2	100	-	100
	IBCPX31P/ IBCPX3O	Extra Credit II	**NoSQL Lab** / * Online Course	-	2	-	100	100
			Total	**30**	**26+2**	**225**	**525+ 100**	**750+100**
IV	IBLT41/ IBLA41/ IBLH411	Language I	Tamil IV /Arabic IV /Hindi IV	5	3	25	75	100
	IBLEI42/ IBLEII42	Language II	English IV a or b	5	3	25	75	100
	IBCPC41	Core VIII	Data Structures and Algorithms	4	4	25	75	100
	IBCPC421P	Core IX	**Data Structures Lab**	5	4	25	75	100
	IBCPA43	AECCV	Computer Organization and Architecture	5	4	25	75	100
	IBCPS442P	SEC IV	**.NET Programming Lab**	2	2	-	50	50
		OEC		2	2	-	50	50
	IBLEV4	GIC III	Life Skills and Value Education	2	2	-	50	50
	IBCPX4P/ IBCPX4O	Extra Credit III	R Tool Lab/ # Internship	-	2	-	100	100
			Total	**30**	**24+2**	**125**	**525+ 100**	**650+100**
V	IBCPC51	Core X	Programming in Java	6	5	25	75	100
	IBCPC52P	Core XI	Programming in Java Lab	6	5	25	75	100
	IBCPC532	Core XII	**Software Engineering**	6	5	25	75	100
	IBCPE51A/ IBCPE5B	DSE I	**a.Operating System** b.Cloud and Distributed Computing	4	4	25	75	100
	IBCPE5C/ IBCPE52D	DSE II	a. Blockchain Technology b. **Big Data Analytics**	4	4	25	75	100
	IBCPS54P	SEC V	PHP Programming Lab	2	2	-	50	50
	IBWE5	GIC IV	Women Entrepreneurship	2	2	-	50	50
	IBCPX5/	Extra	Employability Skills	-	2	100	-	100

XV ACADEMIC COUNCIL

	IBCPX5O	Credit IV						
			Total	**30**	**27+2**	**125+100**	**475**	**600 +100**
VI	IBCPC612	Core XIII	**Internet of Things**	6	5	25	75	100
	IBCPC621	Core XIV	Computer Networks	6	4	25	75	100
	IBCPC631	Core XV	Computer Graphics	5	4	25	75	100
	IBCPC64PW	Core XVI	Project	6	5	25	75	100
	IBCPE6A/ IBCPE61B	DSE III	a. Mobile Application Development **b. Digital Marketing**	4	4	25	75	100
	IBCPS651P	SEC VI	**Python Lab**	2	2	-	50	50
			Library	1		-	-	-
	IBCPX6P/ IBCPX6O	Extra Credit V	Data Mining Lab / * Online Course	-	2	-	100	100
			Total	**30**	**24+2**	**125**	**425+100**	**550+100**
			Grand Total	**180**	**145+10**	**900+100**	**3000 +400**	**3900+500**

*For Online Course credit alone will be assigned on submission of certificate obtained by appearing for online examination from EdX, Spoken Tutorial, NPTEL or Coursera etc.
For internship course, refer www.internshala.com or any online internship course.
o For online course integration, syllabus will be taken from Spoken Tutorial, Swayam, Edx, Udemy, Coursera

AECC - Ability Enhancement Compulsory Course
SEC - Skill Enhancement Course
DSE - Discipline Specific Elective
OEC - Open Elective Course
GIC – General Interest Course

XL ACADEMIC COUNCIL

Core I - Programming in C
(For Students Admitted from 2024-25)

Semester: I **Hours/week: 4**
Subject Code: IBCPC111 **Credit: 3**

Course Objectives:

1. To improve the knowledge of complete understanding of programming language C
2. To understand the main features of operators, input/ output statements, control statements andprogram structure

Unit I **(12 hours)**

Introduction to C Programming: C Character Set – Writing first program of C – Identifiers and Keywords – Data types – Constants – Variables and Arrays – Declarations – Expressions – Statements – Symbolic constants. **Operators and Expressions**: Arithmetic Operators – Unary Operators – Relational and logical Operators – Assignment Operators – The Conditional Operators.

Unit II **(12 hours)**

Data Input and Output: The getchar function – The putchar function – The scanf function The printf function – gets and puts function. **Control Statements - Branching:** The If-else Statement - Looping – while statement – do- while statement – for statement – nested control structures – switch statement – break statement – continue statement – coma operator – goto statement.

Unit III **(12 hours)**

Program Structure: Storage classes – Automatic variables – External variables – Static variables – Multi File programs. **Arrays:** Defining an Array – Processing an Array – Passing arrays to Functions – Multidimensional arrays. **Strings - Functions:** Defining a function – Accessing a function - Function prototypes – Passing arguments to a function – Recursion.

Unit IV **(12 hours)**

Pointers: Fundamentals – Pointer Declarations – Passing pointers to a function – Pointers and one dimensional arrays – Dynamic memory allocation – Operations on pointers - Pointers and multidimensional arrays – Arrays of Pointers - Passing functions to other functions.

Unit V **(12 hours)**

Structures and Unions: Defining a Structure – Processing a Structure – User defined data types – Structures and pointers – Passing structures to functions – Self Referential structures – Unions. **File Handling:** Opening and closing a Data file – Reading and writing a data file – Processing a data file – Unformatted data files – Concept of binary files – Accessing the file randomly.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe the basic programming knowledge of C, operators and expressions

XX ACADEMIC COUNCIL

CO2: Demonstrate data input and output, control statements & functions
CO3: Analyse program structure and arrays
CO4: Evaluate pointers
CO5: Formulate structures, unions and file handling

Text Book:
1. Byron Gottfried, *Programming with C*, Tata McGraw Hill Education, Fourth Edition, 2018.

Reference Books:
1. Balagurusamy E, *Programming in ANSI C*, Tata McGraw-Hill Publishing Company, Sixth Edition, 2012
2. Venugopal K R , Sudeep R Prasad, *Programming with C*, Tata McGraw-Hill Publishing Company, 2008
3. Mullish, Henry Cooper, Herbert, *The Spirit of C - An introduction to modern programming*, JaicoPublishing House, Third Edition, 2006

E - Resources:
1. NPTEL: https://onlinecourses.nptel.ac.in/noc19_cs42/preview
2. NPTEL:https://nptel.ac.in/courses/106/105/106105171/
3. NPTEL:https://onlinecourses.nptel.ac.in/noc21_cs01/preview
4. SpokenTutorial**:**https://spokentutorial.org/tutorialsearch/?search_foss=C+and+Cpp&search_language=English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	9	3	9	**45**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	9	3	9	9	9	**57**
Total	**45**	**21**	**21**	**21**	**45**	**27**	**45**	**225**

Low-1 Medium-3 High-9

Core II - Programming in C Lab

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 4**
Subject Code: IBCPC12P **Credit: 3**

Course Objectives:
1. To introduce the field of programming using C language
2. To enhance the analyzing and problem solving skills and use the same for writing programs in C

KA ACADEMIC COUNCIL

List of Programs

Formula substitution

1. Write a C Program to check whether the given number is odd or even
2. Write a C Program to find sum of the digits and reverse the digits
3. Write a C Program to generate the Fibonacci series
4. Write a C Program to generate Prime number within range
5. Write a C Program to find whether a given number is Armstrong or not
6. Write a C Program to count the number of positive, negative and zero in the list
7. Write a C Program to solve the Quadratic Equation
8. Write a C Program to find the area of various shapes using switch case

Array

9. Write a C Program to Find Matrix Addition , Subtraction, Multiplication and Transpose of a matrix using switch case
10. Write a C Program to Check whether the element is present in the given list or not
11. Write a C Program to sort numbers in ascending and descending order
12. Write a C Program to sort names in Alphabetical order

Functions & Structures

13. Write a C Program to find the factorial of a given number using function declaration
14. Write a C Program to find the factorial of a given number using recursion function
15. Write a C Program to Prepare student mark list using structure
16. Write a C Program to Prepare electricity bill using structure

String Manipulation

17. Write a C Program to count the vowels in the given string
18. Write a C Program to convert the case of given string from upper case to lower case and vice versa

Pointers

19. Write a C Program to sort numbers in ascending order using pointers
20. Write a C Program to find average of two numbers usingpointers

Note:-Questions for Internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the control structures and loops
CO2: Apply the concepts of functions and pointers
CO3: Analyze the concepts of Structures and arrays
CO4: Evaluate string handling functions
CO5: Create programs with pointers, arrays, structures

E-Resource:

1. SpokenTuroial:https://spokentutorial.org/tutorialsearch/?search_foss=C+and+Cpp&search_language=English

KAC ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**15**	**5**	**45**	**45**	**45**	**215**

Low-1 Medium-3 High-9

Core III - Fundamentals of Computers

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 4**
Subject Code: IBCPC141 **Credit: 3**

Course Objectives:

1. To understand the basics of computers
2. To understand the working of input/output interfaces

Unit I **(12hours)**

Computer Basics: Algorithms – Simple Model of a Computer – Characteristics of Computers – Problem Solving Using Computers. **Data Representation:** Representation of Characters in Computers – Representation of Integers – Representation of Fractions – Hexadecimal Representation of Numbers – Decimal to Binary Conversion.

Unit II **(12 hours)**

Input/Output Units: Traditional Computer Input/output Units – Other Input Technologies – Computer Output Devices – Choosing a Printer. **Computer Memory:** Memory Cell – Memory Organization – Read Only Memory – Serial Access Memory – Physical Devices used to construct memories – Magnetic Hard Disk – Compact Disk Read Only memory

Unit III **(12 hours)**

Binary Arithmetic: Binary Addition – Binary Subtraction – Signed Numbers – Two's Complement Representation of Numbers – Addition/ Subtraction of Numbers in 2's Complement Notation – Binary Multiplication – Binary Division – Arithmetic Operations with Normalized Floating Point Numbers.

KK ACADEMIC COUNCIL

Unit IV **(12 hours)**

Programming Languages: Why Programming Language? – Assembly language – Higher Level Programming Languages – Compiling a High Level Language Program – Some High Level Languages. **Microcomputers:** Ideal Microcomputer – Actual Microcomputer - Memory Systems for Microcomputers – Reduced Instruction Set Computers. **Computer Generations and Classification:** First Generation of Computers – Second generation – Third Generation – Fourth Generation – Fifth Generation –Classification of Computers.

Unit V **(12 hours)**

Advanced Input/output Interfaces: Graphical User Interface – Vector Graphics – Raster Graphics – Accelerated Graphics with GPU – Stereo Display Units – Other Visual Displays – Input Devices for Interaction – **Multimedia Data Acquisition and Processing:** Image Acquisition and Storage – Storage formats for pictures – Image Acquisition with a Digital Camera – Capturing a movie image with a Video Camera

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Summarize the basics of computers and its generations
CO2: Illustrate number systems and its conversions
CO3: Analyze the uses of internal and external components of computers
CO4: Select appropriate input and output devices for digital literacy according to its intended use
CO5: Formulate the methods to handle Multimedia Applications

Text Book:

1. V Rajaraman, Neeharika Adabala, *Fundamentals of Computers,* PHI Learning Private Limited, Sixth Edition, 2018.

Reference Books:

1. James A. O'Brien, George M. Marakas, *Introduction to Information Systems,* McGraw Hill Company, Fifteenth Edition, 2010.
2. ITL Education Solutions Limited, *Introduction to Information Technology*, Pearson Education, Fourth Edition, 2007.
3. Alexis Leon, Mathews Leon, *Fundamentals of Information Technology*, L&L Consultancy Services Private Limited, Second Edition, 1999.

E-Resources:

1. NPTEL: https://nptel.ac.in/courses/106/105/106105163/
2. https://www.coursera.org/courses?query=computer%20fundamentals
3. https://cstutorialpoint.com/computer-fundamentals-notes/
4. https://ecomputernotes.com/fundamental
5. https://testbook.com/learn/computer-fundamentals/

EX ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	3	3	3	9	9	9	9	**45**
CO2	9	1	9	3	9	9	9	**49**
CO3	9	3	3	9	9	9	3	**45**
CO4	9	9	3	9	9	9	9	**57**
CO5	9	3	9	9	9	9	3	**51**
Total	**39**	**19**	**27**	**39**	**45**	**45**	**33**	**247**

Low-1 Medium-3 High-9

SEC I - Office Automation Lab

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 2**
Subject Code: IBCPS15P **Credit: 2**

Course Objectives:

1. To acquire knowledge about word processing, spread sheet, Data base creation and slide preparation
2. To improve creative thinking in presentations

List of Programs

Word Processing

1. Create a word processing document consists two pages in a Book named "XX" and then do the following:
   a. Formatting Text, Alignment and Font Style
   b. Perform Find and Replace
   c. Add Header and Footer option to specify name of the Book Chapter Heading and Page number of total pages.
2. Create a word processing document having details of our College courses usingbulleted and number lists. Type the title using Word Art
3. Design a Letter to felicitate Farewell Address to our seniors with Font Setting/PageBorders/Word Art/Clip Art/Symbols
4. Create a time table for your Internal Exam Schedule (using Table)
5. Type Business letter and send it to more using Mail Merge.
6. Create an spreadsheet consists of Student details and then do the following:
   a. Calculate student wise total and subject wise total.
   b. Find the Maximum and Minimum marks of the subject.

XXX ACADEMIC COUNCIL

c. Grade is calculated as
   i. if %>=90, then grade A
   ii. if %>=80 and <90, then grade B
   iii. if %>=70 and <80, then grade C
   iv. if %>=60 and <70, then grade D
   v. If %<60, then grade F

7. Create a spreadsheet having Employee details suitably and then do the following
   a. Use functions to calculate Net Pay and Gross Pay
   b. Perform conditional formatting and validation

Presentation

1. Create a presentation showing your various activities of the department a perform slide translation and Setting background designs
2. Create a presentation showing various aspect of your college and perform custom animationand import sound

Database

1. Crate a Student Database having Name, Regno, Tamil, English, Maths, Total, and Average. Perform to find total and average and check data entered
2. Create an Inventory database having Item Name, Item no. Quantity and Price. Perform query operation to retrieve data

Note:- Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Illustrate various options of Office Application
CO2: Demonstrate different types of formats, formulas and transition in office application
CO3: Develop reports to solve the problems of manual report handling
CO4: Compare the options of different Microsoft Office Applications to use appropriately
CO5: Build a Presentation, Advertisement, Reports etc for enterprises

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	9	3	3	9	3	9	45
CO2	9	9	3	9	9	9	9	57
CO3	9	9	3	9	9	9	9	57
CO4	9	3	3	3	9	3	9	39
CO5	9	9	3	3	9	3	9	45
Total	45	39	15	27	45	27	45	243

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core IV - Object Oriented Programming in C++

(For Students Admitted from 2024-25)

Semester: II **Hours/Week: 5**
Subject Code: IBCPC21 **Credit: 5**

Course Objectives:

1. To enhance the knowledge of complete understanding of Programming language C++
2. To understand the significance of functions, operator overloading and inheritance concepts

Unit I **(15 hours)**

Principles of Object-Oriented Programming Paradigm: Basic Concepts of Object Oriented Programming- Benefits of OOP - Object Oriented languages - Application of OOP

Beginning with C++: What is C++ - Applications of C++ - A Simple C++ program – More C++ statements -An example with Class – Structure of C++ program- Creating the source file – Compiling and Linking **Tokens, Expressions and Control Structure:** Introduction -Tokens- Keywords – Identifiers and Constants- Data types – Operators in C++ - Operator Overloading- Operator Precedence –Control structures.

Unit II **(15 hours)**

Functions in C++: Introduction- The main function- Function prototyping- Call by Reference- Return by Reference- Inline Functions- Default Arguments- Const Arguments- Function Overloading- Function and Virtual Functions- Math Library Functions.

Classes and Objects: Introduction , Specifying a Class, Defining Member Functions, A C++ Program with Class, Making an Outside Function Inline, Nesting of Member Functions, Private Member Functions, Array within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Array of Objects, Objects as Function Arguments, Friendly Functions, Returning Objects, Const Member Functions.

Unit III **(15 hours)**

Operator Overloading and Type Conversions: Introduction, Defining Operator Overloading – Overloading Unary, Binary Operators – Overloading Binary Operators using Friends – Manipulation of Strings using Operators - Rules for Overloading Operators.

Inheritance: Extending Classes: Introduction, Defining Derived Class, Single Inheritance, Making Private Member Inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Class, Abstract Classes, Constructors in Derived Classes, Member Classes: Nesting of Classes.

Unit IV **(15 hours)**

Pointers, Virtual Functions and Polymorphism: Introduction, Pointers, Pointers to Objects, this Pointer, Pointer to Derived Classes, Virtual Functions, pure Virtual functions

Managing Console I/O Operations: Introduction, C++ Streams, C++ Stream classes, Unformatted I/O Operations, Formatted Console I/O Operations, Managing Output with Manipulators.

ACADEMIC COUNCIL

Unit V **(15 hours)**

Working with files: Introduction – classes for file stream operations- opening and closing a file – Detecting End of file – more about open - File modes.**Templates**: introduction – class Templates – class templates – class templates with multipleparameters-function templates – function templates with multiple parameters.**Exception Handling:** Introduction- Basics of Exception Handling – Exception HandlingMechanism-throwing Mechanism-catching mechanism.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Outline principles of object oriented programming paradigm, tokens, expressions and control structure

CO2: Illustrate functions in C++, the concept of classes and objects

CO3: Analyse operator overloading, type conversions and inheritance extending classes

CO4: Relate pointers, virtual functions, polymorphism and managing console I/O Operations**CO5:** Formulate working with files, templates and exception handling

Text Book:

1. E. Balagurusamy, *Object - Oriented Programming with C++*, Tata McGraw- Hill Publishing Company Limited, Eighth Edition, 2020.

Reference Books:

1. Ivor Horton, *Beginning C++ The Complete Language*, Shroff Publishers and Distributors Private Limited,2007.
2. Venugopal K R, Rajkumar B, and RaviShankar T, *Mastering C++*, Tata McGraw Hill, Fifth Reprint, 2006.

E - Resources:

1. NPTEL: https://onlinecourses.nptel.ac.in/noc21_cs02/preview
2. NPTEL: https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-cs38/
3. NPTEL: https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs17/
4. NPTEL: https://nptel.ac.in/courses/106/101/106101208/
5. NPTEL: https://nptel.ac.in/noc/courses/noc22/SEM1/noc22-cs43/
6. SpokenTutroail:https://spokentutorial.org/tutorialsearch/?search_foss=C+and+Cpp&search_language= English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	9	3	9	**45**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	9	3	9	9	9	**57**
Total	**45**	**21**	**21**	**21**	**45**	**27**	**45**	**225**

Low-1 Medium-3 High-9

XXX ACADEMIC COUNCIL

Core V - Object Oriented Programming in C++ Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/Week: 4**
Subject Code: IBCPC22P **Credit: 4**

Course Objectives:

1. To familiarize the students with language environment and to develop the programs forsolving the problems using function overloading, constructors and object
2. To introduce the concepts that includes various steps involved in developing software including requirement elicitation, system design, object design and testing

List of Programs

Formula Substitution

1. To check a given number is odd or even
2. To check a given number is palindrome or not using class
3. To sort the list of numbers using class

Functions

4. To check a given number is positive or negative using function
5. To find sum of digit using nesting of member function
6. To demonstrate unary operator using friend function

Constructors

7. To find reverse of digit using constructor

Overloading

8. To find area of shapes using function overloading
9. To add two complex numbers using binary operator overloading

Inheritance

10. To perform student mark list using single inheritance
11. To prepare electricity bill using multilevel inheritance

Pointer

12. To searching an element in the list using pointer
13. To checking a given number is prime or not using pointer to object

File Handling

14. To create a new files to store content and display number of words in the files

Exception Handling

15. To demonstrate user defined exception

Note: Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the different programming paradigm such as procedure oriented and object oriented programming methodology and conceptualize elements of OO methodology

CO2: Apply the concepts of object oriented programming

KA ACADEMIC COUNCIL

CO3: Analyze the usage of pointers and exception handling
CO4: Evaluate the concepts of inheritance and overloading features.
CO5: Create programs with the usage of Files, templates and exception Handling

E-Resource:
1. https://spokentutorial.org/tutorialsearch/?search_foss=C+and+Cpp&search_language=English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**15**	**5**	**45**	**45**	**45**	**215**

Low-1 Medium-3 High-9

AECC II - Digital Electronics

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 3**
Subject Code: IBCPA231 **Credit: 2**

Course Objectives:
1. To know the fundamental concepts associated with the digital logic and circuit design
2. To understand the concepts of different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems.

Unit I **(9 hours)**

Number Systems and Codes: Introduction - binary, octal, decimal, and hexadecimal number system- decimal to binary, octal to binary, hexadecimal to binary – hexadecimal to octal conversions and vice versa - binary arithmetic - 1s and 2s complement representations - BCD addition and subtraction.

Unit II **(9 hours)**

Basic Boolean functions: Boolean theorems and laws - use of Boolean algebra for simplification of logical expressions - canonical sum of products and product of sum simplifications - minimization of logical expressions using K-map - logic gates - AND, OR, NOT, EX- OR, NAND, NOR gates.

KX ACADEMIC COUNCIL

Unit III **(9 hours)**

Introduction to combinational logic circuits: arithmetic circuits – half adder, full adder, half subtractor, full subtractor, parallel binary adder - subtractor, serial adder, multiplier and divider.

Unit IV **(9 hours)**

Introduction to sequential circuits: flipflops - SR, JK, D and T flipflops - master-slave flipflops - level and edge triggering - synchronous and asynchronous counters - shift registers - serial in serial out - serial in parallel out, parallel in serial out and parallel in parallel out shift counters.

Unit V **(9 hours)**

Read only memory- architecture of ROM, PROM, EPROM, EEPROM - RAM architecture - static and dynamic RAM.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Understand the basics of number systems, Boolean functions, logic and sequential circuits, and memory architecture

CO2: Implement number systems, boolean functions to simplify the logical expressions

CO3: Examine the operations of various number systems and boolean functions, and design guidelines of logic and sequential circuits

CO4: Evaluate the functions of the memory organization using number systems, boolean functions, and logic and sequential circuits

CO5: Design and implement real time digital systems

Text Book:

1. S. Salivahanan, S. Arivazhagan, *Digital Circuits And Design*, Oxford University Press, 2018.

Reference Books:

1. M. Morris Mano and Michael D. Ciletti, *Digital Design*, Pearson Education, Fifth Edition,2014.
2. A.Anand Kumar, Fundamentals *of Digital Circuits*, PHI Learning Private Limited, Fourth Edition, 2016.
3. Anil K.Maini ,*Digital Electronics*, Wiley Publications, 2014.
4. Charles H.Roth, *Fundamentals of Logic Design*, Thomson Learning, Sixth Edition, 2013.

E-Resources:

7. NPTEL: https://nptel.ac.in/courses/108/105/108105113/
8. Swayam: https://www.classcentral.com/course/swayam-digital-electronic-circuits-12953
9. Swayam: https://onlinecourses.swayam2.ac.in/cec21_cs16/preview
10. https://tutorialsinhand.com/tutorials/digital-electronics-tutorial/digital-electronics-basics/digital-electronics-introduction.aspx
11. https://www.udemy.com/course/introduction-to-digital-electronics/
12. https://www.udemy.com/course/basics-of-digital-electronics/

ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	3	9	**37**
CO3	9	3	3	1	9	3	9	**37**
CO4	9	3	3	1	9	3	9	**37**
CO5	9	3	3	1	9	3	9	**37**
Total	**45**	**15**	**15**	**5**	**45**	**21**	**45**	**191**

Low-1 Medium-3 High-9

AECC III – Digital Electronics Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/Week: 2**
Subject Code: IBCPA24P **Credit: 2**

Course Objectives:

1. To know the concepts of Combinational circuits.
2. To understand the concepts of flipflops, registers and counters

List of Programs

Logic Gates

1. Verification of AND Gate using ICs
2. Verification of OR Gate using ICs
3. Verification of NOT Gate using ICs
4. Verification of NAND Gate using ICs
5. Verification of NOR Gate using ICs
6. Verification of EX-OR Gate using ICs

Universal Gates

7. Universality of NAND gates using IC 7400
8. Universality of NOR gates using IC 7402

Boolean algebra and Theorem

9. Verification of Boolean Expression using ICs 10.Verification of Demorgan's theorems using ICs

Combinational Logic Circuits

11. Binary half and full adder using ICs
12. Binary half and full subtractor using ICs

Note: Questions for internal and external examination will be based on the conceptslearnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Recognize logic functions

CO2: Identify the steps for truth tables, and Boolean algebra expressions

ACADEMIC COUNCIL

CO3: Simplify the process of the laws of Boolean algebra to simplify circuits and Booleanalgebra expressions
CO4: Support combinational logic circuits
CO5: Build the Diodes Characteristics

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	3	9	**39**
CO2	9	3	3	9	1	1	9	**35**
CO3	3	3	3	9	1	1	9	**29**
CO4	9	1	3	9	1	1	9	**33**
CO5	9	3	1	9	1	3	9	**35**
Total	**39**	**13**	**13**	**45**	**7**	**9**	**45**	**171**

Low-1 Medium-3 High-9

SEC II - Web Designing Lab (HTML and Java Script Language)

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 2**
Subject Code: IBCPS251P **Credit: 2**

Course Objectives:
1. To analyze a web page and identify its elements and attributes
2. To build dynamic web pages by using Java script

List of Programs
1. Create a HTML page for displaying the personal information by using varioustags such as background color, heading tag, font tag
2. Create a HTML page, which includes images and audio for any application.
3. Create a HTML page for displaying the Tender notice which is given to you.
4. To create a Time Table of your class using HTML.
5. Create mark sheet preparation using table
6. Creation of Lists in HTML
7. Create web site for your company product advertisement in HTML
8. Create your own website for your personal information

Frames
9. To create a simple website for our college
10. To create a dictionary using frames. The words are displayed in one frame and when you clickthe word, the meaning will be displayed on the other frame.

Java Script:
11. Develop a JavaScript program to display the current day and time in the following format

ACADEMIC COUNCIL

Today is: Tuesday. Current time is: 10 AM: 30: 38

12. Develop a JavaScript program to check whether a string starts with 'Java'
13. Develop a JavaScript program to find the largest of three given integers
14. Develop a JavaScript program to reverse a given string
15. Develop a JavaScript program to create a simple Calculator
16. Develop a JavaScript Program to Count the Number of Vowels in a String

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Understand the basic tags in HTML and create the programs in that tags
CO2: Create a web page by applying frames and own personal web pages
CO3: Develop a web page for advertising purposes
CO4: Design web pages for own company and institution
CO5: Create interactive web page using Script

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	9	9	**45**
CO2	3	3	9	9	3	9	9	**45**
CO3	3	3	9	9	1	9	9	**43**
CO4	3	3	9	9	3	3	3	**33**
CO5	3	3	3	9	1	9	3	**31**
Total	**21**	**15**	**33**	**39**	**17**	**39**	**33**	**197**

Low-1 Medium-3 High-9

Core VI – Data Base Management System

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 4**
Subject Code: IBCPC311 **Credit: 4**

Course Objectives:

1. To understand the basic concepts, applications of database systems, relational database design principles and SQL queries
2. To understand the different issues involved in the design and implementation of a database system, security, integrity and concurrency

Unit I **(12 hours)**

Introduction: Database System Applications-Purpose of Database System-View of Data-Database Design- **Data Storage and Quering**-Transaction Management-Database Architecture.-

KU-ACADEMIC COUNCIL

Relational Databases : Introduction to the Relational Model-Introduction to SQL-Intermediate SQL:Join Expressions-Views- Transactions-Integrity constraints- Schemas-Authorization.

Unit II **(12 hours)**

Database Design: Database design and E-R Model: overview -ER-Model-Constraints- ER-Diagrams- Reduction to Relational Schemas – Design Issues-.Relational database model: Logical view of data- keys- integrity rules. **Relational Database design:** Features of good relational database design- Atomic domain andNormalization (1NF- 2NF- 3NF-BCNF).Database-Design Process.

Unit III **(12 hours)**

Data Storage and Querying: Storage and File Structure: Overview of Physical Storage- Magnetic Disk and Floppy Disk-RAID- Organization of Records in Files-**Indexing and Hashing:** Basic Concepts-Ordered Indices-Multiple Key Access-Static Hashing-Dynamic Hashing-Bit Map Indices. **Query Processing**: Overview-Selection Operation-Sorting- Join Operation.

Unit IV **(12 hours)**

Transaction Management: Transaction: Transaction Concept-Simple Transaction Model-Storage Structure- Transaction Atomicity and Durability-Transaction Isolation-Serializablity-**Concurrency Control:** Lock- Based Protocols-Deadlock Handling-Multiple Granularity-**Recovery System:** Failure Classification-Recovery and Atomicity-Recovery Algorithm-Failure Management.

Unit V **(12 hours)**

System Architecture Text: Database –System Architecture Centralised and Client-Server Architecture- Server System Architecture-Parallel System-Distributed System-Network Types-**ObjectBased Databases:** Complex Data Types –Table Inheritance-Implementing O-R Features.

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Explore about DBMS architecture, database designs, database modeling

CO2: Extend about ER-Diagram and UML, Relational Algebra and Relational Calculus

CO3: Distinguish the normalization theory

CO4: Apply Structured query language (SQL) and Constraints

CO5: Evaluate various transaction processing, concurrency control mechanisms and database protection mechanisms

Text Book:

1. A Silberschatz, H Korth, S Sudarshan, *Database System and Concepts*, McGraw-Hill, Sixth Edition, 2019.

Reference Books:

1. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems (3/e*),

AK ACADEMIC COUNCIL

McGrawHill, 2003.
2. Atul Kahate, *Introduction to Database Management Systems*, Pearson Education, Tenth impression, 2012.
3. C J Date , *An Introduction to Database System* , Addison- Wesley Publishing Company,Third Edition, 1998.

E-Resources:
1. https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
2. https://www.coursera.org/projects/introduction-to-relational-database-and-sql
3. NPTEL: https://onlinecourses.nptel.ac.in/noc21_cs04/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low-1 Medium-3 High-9

Core VII – Data Base Management System Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 4**
Subject Code: IBCPC32P **Credit: 4**

Course Objectives:
1. The Students get practical knowledge on designing and creating Relational Database Management
2. To understand various advanced queries such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL

SQL PROGRAMS
DDL
1. Create an address table with fields name , doorno , street & city
   - describe its structure
   - alter the table to include pincode
   - alter the table to modify street column
   - drop the table

XX ACADEMIC COUNCIL

DML

2. Create a student table with regno, name, age and dept.
    - insert records
    - delete the students with age above 20
    - truncate and drop the table

Functions

3. Create an employee table with fields eno , ename , sex ,age & years of experience
    - find out the no. of female employees
    - find out the employees with age ranging between 30 and 35
    - list out the employees who are working more than 5years
4. Create a library file with fields accno, title, author, cost & no of copies
    - Arrange the books according to accno
    - Find out the total no. of books available in the library
    - Find out the book of minimum cost
5. Create a player table with fields name, sports(cricket, hockey, etc.),age & country
    - find out the eldest and youngest player
    - group players according to sports
    - list out the Indian players
6. Write the SQL queries to illustrate all number functions
7. Write the SQL queries to illustrate date functions
8. Write the SQL queries to illustrate all string functions
9. Create an item table with field's itemno, itemname, quantity & price and insert records.
10. Illustrate the comparison operators (between, like, in & isnull)
11. Create a table with the fields clientno , clientname & phoneno Illustrate the set operatorsunion , unionall, minus & intersect
12. Create a student table with fields' regno, name, English, Tamil, Maths and total & insert records
    - Arrange all records according to total
    - Find the student who got first mark in Maths
    - List out the students whose name starts with 'S'
13. Create an inventory table with fields' itemno, itemname, qnty, price and reorderlevelinsert records
    - update the qnty when it goes less than reorderlevel
    - list the items with price less than 100
14. Create an employee table with fields ecode, ename, age & salary and createa department tablewith fields ecode, designation, deptcode & dept. Illustrate joins and sub queries using the above tables.

Constraints

15. Create a vendormaster table with fields vencode, venname, place and phoneno. Create an **ordermaster table** with fields item no, itemcode, vencode, qnty and orderdate. Illustrate the following constraints using the above tables
    - vencode as primary key in vendormaster
    - vencode as foreign key in ordermaster

KV ACADEMIC COUNCIL

- phoneno as unique
- place as notnull &
- qnty > 100

TCL

16. SQL queries to illustrate TCL commands (savepoint, rollback and commit)

Triggers

17. Creating and executing triggers

Note: Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Build DDL, DML and TCL Commands

CO2: Make use of implementing constraints in tables

CO3: Apply to create block structure programming language

CO4: Create the concepts of functions.

CO5: Develop the procedures, exceptions, triggers in PL/SQL block

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low-1 Medium-3 High-9

SEC III – Linux and Shell Programming Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 2**

Subject Code: IBCPS34P **Credit: 2**

Course Objectives:

1. To understand and make effective use of Linux utilities and shell scripting language to solve problems
2. To develop the skills the necessary for systems programming including file system programming, processand signal management and interprocess communication

List of Programs

Built-in Commands

ACADEMIC COUNCIL

1. Write a shell program to use who commands
2. Write a shell program to use list commands
3. Write a shell program to use sort commands
4. Write a shell program to use wc commands
5. Write a shell program to use cat commands

Formula Substitution

6. Write a shell program to find odd or even number
7. Write a shell program to find smallest among three numbers
8. Write a shell program to find the factorial value
9. Write a shell program to display multiplication table

Switch case

10. Write a shell program to use case statement

Functions

15. To display username, pwd using function
16. Find age of a person using set date

Checking

17. To check the given file is a directory or not

String Manipulation

18. Convert lowercase to uppercase using tr statement

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Summarize shell commands, scripts, managing files, pipes and redirections

CO2: Apply appropriate Linux commands to make effective use of the environment to solve problems

CO3: Illustrate shell scripts to perform repetitive tasks using while and for loops

CO4: Evaluate shell functions

CO5: Derive command-line arguments

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	9	**49**
CO2	9	9	3	1	9	9	9	**49**
CO3	9	9	3	1	9	9	9	**49**
CO4	9	9	3	1	9	9	9	**49**
CO5	9	9	3	1	9	9	9	**49**
Total	**45**	**45**	**15**	**5**	**45**	**45**	**45**	**245**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core VIII -Data Structures and Algorithms

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 4**
Subject Code: IBCPC41 **Credit: 4**

Course Objectives:

1. To understand the fundamental design, analysis, implementation of basic data structures, specification and analysis of programs
2. To understand about Significance of algorithms in the computer field and various aspectsof Algorithm Development

Unit I **(12 hours)**

Introduction: History of Algorithms - Data structures and Algorithms - Data structure - Definition and Classification. **Stacks:** Introduction - stack Operation - Application. **Queues:** Introduction - Operation – circular Queues - Other Types of Queues - Application.

Unit II **(12 hours)**

Linked Lists: Introduction - Singly Linked Lists - Circularly Linked List - Doubly Linked List – Multiply Linked List- Application. **Trees and Binary Trees:** Introduction -Trees: Definition and Basic Terminologies - Representation of Trees -Binary Tree Traversals - Threaded Binary Trees- Applications.

Unit III **(12 hours)**

Graphs: Introduction-Definitions and Basic Terminologies - Representations of Graphs - Graph Traversals - Single- source & All pairs shortest paths problem - Minimum cost spanning trees. Bi**nary Search Trees and AVL Trees**: Introduction - Binary Search Trees: Definition and Operations - AVL Trees: Definition and Operations - Applications.

Unit IV **(12 hours)**

Red-Black Trees and Splay Trees: Red-Black Trees - Applications. **Hash Tables:** Introduction- Hash Table Structure- Hash Functions - Linear Open Addressing - Chaining - Applications. **Searching:** Introduction - Linear Search - Transpose Sequential Search - Interpolation Search - Binary Search- Fibonacci Search - Other Search Techniques.

Unit V **(12 hours)**

Internal Sorting: Introduction - Bubble Sort - Insertion Sort - Selection Sort - Merge Sort - Shell Sort - Quick Sort - Heap Sort - Radix Sort. **Algorithms:** Algorithm Specification - Performance analysis - Asymptotic notation.

Course Outcomes:

After successful completion of the course, the students will be able to

AK ACADEMIC COUNCIL

CO1: Explain the basics concept of data structures and Algorithm stacks, queues and lists
CO2: Distinguish about knowledge of tree and graphs concepts
CO3: Analyze the concepts about searching and sorting techniques
CO4: Demonstrate the types of Trees
CO5: Evaluate about Algorithm and step by step approach in solving problems with the help of fundamental data structure

Text Books:
1. Vijayalakshmi Pai G A, *Data structures and Algorithms, Concepts, Techniques and Application***,** Tata McGraw-Hill Education, 2008.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, *Fundamentals of ComputerAlgorithms*, Universities Press, Second Edition, 2008.

Reference Books:
1. Alfred V Aho,John E Hopcroft,Jeffrey D Ullman, data Structures and Algorithms,Dorling Kindersley,2013.
2. Patel R B, *Expert Data Structures with C*, Khanna Book Publishing, Third Edition, 2000.

E-Resources:
1. http://www.dave-reed.com/csc427.F04/
2. http://www.math.tau.ac.il/~matias/ds03.html
3. NPTEL: https://onlinecourses.nptel.ac.in/noc22_cs26/preview
4. NPTEL: https://nptel.ac.in/courses/106/106/106106127/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	1	1	**19**
CO2	9	3	9	1	9	1	3	**35**
CO3	9	1	9	9	1	1	3	**33**
CO4	9	3	3	3	3	3	3	**27**
CO5	9	1	1	9	9	9	3	**41**
Total	**45**	**11**	**23**	**23**	**25**	**15**	**13**	**155**

Low-1 Medium-3 High-9

Core IX – Data Structures Lab

(For Students Admitted from 2024-25)

Semester: IV **Hours/Week: 5**
Subject Code: IBCPC421P **Credit: 4**

Course Objectives:
1. To introduce the concepts of data structure and its operation
2. To implement data structures for problem solving in C/ C++

XX ACADEMIC COUNCIL

List of programs

1. Implementation of Stacks Using Arrays
2. Implementation of Stacks Using Linked Lists
3. Implementation of Queue Using Arrays
4. Implementation of Queue Using Linked Lists
5. Search a key element in a list of elements using linear search
6. Search a key element in a list of elements using binary search
7. Implement Insertion sort algorithm
8. Implement Selection sort algorithm
9. Implement Merge sort algorithm
10. Implementation of Binary Search Tree
11. Create a singly linked list and perform the following operations:
    a. Delete an element from linked list
    b. Display the contents of the above list after deletion
12. Create a doubly linked list and perform the following operations:
    a. Delete an element from doubly linked list
    b. Display the contents of the above list after deletion

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of the course, the students will be able to

CO 1: Understand the basics of data structures and its systematic approaches
CO 2: Implement the data structure and its operations in C or C++
CO 3: Compare the difference between various searching & sorting techniques
CO 4: Demonstrate Tree and linked list algorithm
CO 5: Develop simple applications using data structures

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	9	3	9	49
CO2	9	3	9	1	9	3	9	43
CO3	9	1	9	1	9	1	9	39
CO4	9	1	9	1	9	1	9	39
CO5	9	1	9	1	9	1	9	39
Total	**45**	**15**	**45**	**5**	**45**	**9**	**45**	**209**

Low-1 Medium-3 High-9

XAVIER ACADEMIC COUNCIL

AECC V – Computer Organization and Architecture

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 5**
Subject Code: IBCPA43 **Credit: 4**

Course Objectives:

1. To understand the structure, function and characteristics of computer systems andunderstand the design of the various functional units and components of computers
2. To identify the elements of modern instructions sets and their impact on processor design, explain the function of each element of a memory hierarchy

Unit I **(15 hours)**

Basic Computer Organization and Design: Instruction Codes- Computer Registers- Computer Instructions-Timing and Control-Instruction Cycle-Memory Reference Instructions- Input- Output and Interrupts.

Unit II **(15 hours)**

Micro programmed Control: Control Memory- Address Sequencing-Micro program Examples – Design of Control Unit.

Unit III **(15 hours)**

Central Processing Unit: Introduction- General Register Organization- Instruction formats – Addressing Modes - Data Transfer and Manipulation - Program Control - RISC **Pipeline and Vector Processing:** Parallel Processing - Pipeline - Arithmetic Pipeline -Instruction Pipeline - Vector Processing.

Unit IV **(15 hours)**

Input-Output Organization: Peripheral Devices-I/O interface- Asynchronous Data Transfer – Modes of Transfer - Direct Memory Access - Input Output Processor (Excluding IBM and Intel IOPs).

Unit V **(15 hours)**

Memory Organization: Memory-Main Memory – Auxiliary Memory - Associative Memory - Cache Memory-Virtual Memory-Memory Management Hardware.

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Define the fundamental organization of a computer system
CO2: Explain the concept of sequencing, designing, pipeline and vector processing methods
CO3: Examine the function of input-output organization
CO4: Compare various pipeline concepts
CO5: Distinguish the organization of various parts of a system memory hierarchy

AC ACADEMIC COUNCIL

Text Book:
1. Morris Mano M, *Computer System Architecture*, Prentice Hall of India Private Limited, 2011

Reference Books:
1. William Stallings. *Computer Organization and Architecture*. Pearson publication, EighthEdition, 2010
2. Morris Mano. *Digital Login and Computer Design*, Prentice Hall of India Private Limited, 2001

E-Resources:
1. NPTEL: https://nptel.ac.in/courses/106/105/106105163/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	3	3	3	**31**
CO2	9	3	3	3	9	9	3	**39**
CO3	3	9	3	3	3	3	3	**27**
CO4	9	3	9	3	3	3	3	**33**
CO5	3	9	3	3	9	3	3	**33**
Total	**33**	**33**	**21**	**13**	**27**	**21**	**15**	**163**

Low-1 Medium-3 High-9

SEC IV – .NET Programming Lab

(For Students Admitted from 2024-25)

Semester: IV **Hours/Week: 2**
Subject Code: IBCPS442P **Credit: 2**

Course Objectives:
1. To understand .Net IDE Framework
2. To create website using ASP.Net Controls

List of Programs
Console Application
1. Calculate the factorial of a number N, assuming the number is more than zero
2. Check a given numbers (prime, perfect, palindrome etc.)
3. Calculate age for a person using properties
4. Sort a given list of numbers and find out the average of a list of numbers.
5. Display how many days are in a given month (check for leap years also)

VV ACADEMIC COUNCIL

Windows Application

6. Build a simple calculator
7. Calculate the arithmetic operations using functions
8. Do String manipulation
9. Create notepad

Web Application

10. Create a login webpage using database connectivity. Enter the username and password in the login page. If the username and password are correct, the personal web page should be loaded otherwise the error page should be loaded
11. Create a student details form and validate the details using validation controls
12. Display employee details using data grid control

Note: Questions for the external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO 1: Understand the basic concepts of ASP. Net framework
CO 2: Implement console, windows and web applications using ASP.Net controls
CO 3: Demonstrate database connectivity with applications
CO 4: Create console, windows and web applications
CO 5: Design dynamic webpages

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	9	9	9	**51**
CO2	9	3	9	3	9	9	9	**51**
CO3	9	3	9	3	9	9	9	**51**
CO4	9	3	9	3	9	9	9	**51**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**15**	**45**	**15**	**45**	**45**	**45**	**255**

Low-1 Medium-3 High-9

Core X - Programming in Java

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 6**
Subject Code: IBCPC51 **Credit: 5**

Course Objectives:

1. To gain knowledge about basic Java language syntax and semantics to develop Javaprograms and use concepts such as variables, conditional and iterative execution methods
2. To understand the fundamentals of object-oriented programming in Java, includingdefining classes, objects, invoking methods etc and exception handling mechanisms

KA ACADEMIC COUNCIL

Unit I **(18 hours)**

Fundamentals of Object Oriented Programming: Introduction, object oriented paradigm – basic concepts of oops – benefits of oops – applications of OOPs**. Java Evolution:** java features –java Versus C and C++ -java and internet – java and WWW – web browsers **Overview of Java Language**: simple java program - more of java – application with two classes –java program structure – java tokens – java statements-implementing a java program - java virtual machine - command line arguments.

Unit II **(18 hours)**

Constants, Variables, data types: Declaration of variables- giving values to variables – scope of variables – symbolic constants – type casting – getting values of variables – standard default values – **Operators and Expressions**: Arithmetic operators –Relational operators- logical operators – assignment operators – increment and decrement operators – conditional operator – bitwise operator – special operators –arithmetic expressions – evaluation of expressions– precedence of arithmetic operators-type conversion in expression –operator precedence and associativity – mathematical functions.- **Decision making and Branching:** if statement – switch - ? : operator –**Decision Making and Looping:** while statement – do statement – for statement – jumps in loops - labeled loops.

Unit III **(18 hours)**

Classes, Objects and Methods: Introduction – defining a class, field declaration – methods declaration – creating objects– accessing class members – constructors – methods overloading – static members – nesting of methods – inheritance – overriding methods – final variables and methods – final classes–finalizer methods – abstract methods and classes – visibility control - **Arrays Strings and Vectors** :one dimensional array – creating an array –two dimensional arrays – strings –vectors –wrapper classes. **Interfaces, Multiple Inheritance**: defining interfaces – extending interfaces – implementing interfaces accessing interface variables.

Unit IV **(18 hours)**

Packages, Putting classes together : Introduction - java API packages : using system packages– naming conventions–creating packages –accessing a package –using a package – adding a class to a package–hiding classes – **Multi-threaded Programming** : creating threads – extending the thread class – stopping and blocking a thread - life cycle of a thread – using thread methods – thread exceptions –thread priority–synchronization –implementing the runnable interface.

Unit V **(18 hours)**

Managing Errors and Exception: Introduction – types of errors –exceptions -syntax of exception handling code – multiple catch statements –using finally statement –throwing our own exceptions – using exceptions for debugging- **Applet Programming:** introduction –how applets differ from applications –building applet code–applet life cycle – creating an executable applet – designing a web page - applet tag – adding applet to html file –running the applet – more about applet tags – passing parameters to Applets –aligning the display.

KKACADEMIC.COM

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Remember the importance of java with its data types, control statements and class fundamentals
CO2: Apply the concepts of inheritance, method overriding and implement packages and interfaces
CO3: Analyze the concept of exception handling and multithreading
CO4: Evaluate string buffer handling functions
CO5: Create applet programming through awt controls, layout managers and menus

Text Book:
1. E. Balaguruswamy, *Programming with JAVA - A Primer*, McGraw Hill, 2015.

Reference Books:
1. Herbert Schildt, *Java: The Complete Reference*, McGraw Hill, 2017.
2. Robert Sedgewick, Kevin Wayne, *Introduction to Programming in Java,* Addison Wesley, 2017.
3. Y. Daniel Liang, *Introduction to Java Programming*, Brief Version Pearson Education, 2017.

E-Resources:
1. https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_ language=English
2. https://onlinecourses.swayam2.ac.in/aic20_sp13/preview
3. https://spoken-tutorial.org/watch/Java/First+Java+Program/English/
4. https://onlinecourses.nptel.ac.in/noc19_cs84/preview

Course Outcomes	**Programme Outcomes**							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	9	**49**
CO2	9	9	3	1	9	9	9	**49**
CO3	9	9	3	1	9	9	9	**49**
CO4	9	9	3	1	9	9	9	**49**
CO5	9	9	3	1	9	9	9	**49**
Total	**45**	**45**	**15**	**5**	**45**	**45**	**45**	**245**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core XI - Programming in Java Lab

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 6**
Subject Code: IBCPC52P **Credit: 5**

Course Objectives:

1. To make the students to understand Programming language Java
2. To implement sorting and searching programs

List of Programs

Formula Substitution

1. Find the factorial and binomial coefficient
2. Calculate mean, variance and standard deviation
3. Develop the programs for Number conversions

Checking

4. Develop the programs for Number checking (prime, perfect, etc.)

Generation

5. Develop the programs for Number generation (prime, perfect, etc.)

Array

6. Arrange numbers and names in order
7. Develop the program for performing matrix addition, subtraction, multiplication & transpose

Searching

8. Develop the programs for implementing linear search and binary search

String

9. Develop the programs for doing String manipulation (case conversion, reversing, etc.)

OOP Concepts

10. Develop the programs for implementing inheritance concepts
11. Develop the programs for implementing exception handling
12. Develop the programs for implementing multithreading

Applet

13. Develop the programs to handle Keyboard events
14. Simulate a calculator (arithmetic operations) using GUI components

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Outline Java programs that solve simple Mathematical problems, number checking and number generation

CO2: Demonstrate the concepts of String Manipulation, Linear Search and Binary Search

CO3: Illustrate OOP in Java programming like inheritance

CO4: Evaluate the multi-threaded programs

CO5: Develop Exception handling and GUI components

ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	3	9	**39**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	9	9	9	9	9	9	**63**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**33**	**27**	**33**	**45**	**33**	**45**	**261**

Low-1 Medium-3 High-9

Core XII - Software Engineering

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 6**
Subject Code: IBCPC532 **Credit: 5**
Course Objectives:

1. To provide the idea of decomposing the given problem into analysis, design, implementation, testing and maintenance phases and provide an idea of using various process models in the software industry according to given circumstances
2. To gain knowledge of how analysis, design, implementation, testing and maintenance processes are conducted in a software project

Unit I **(18 hours)**

Introduction: Software engineering: A layered technology – A process framework – Process models –The waterfall model – Incremental process models – Evolutionary process models.
Software Engineering Practice: Communication practices – Planning practices – Modeling practices –Construction practice.

Unit II **(18 hours)**

Requirements Engineering: Requirements engineering tasks – Initiating the requirements engineering process – Eliciting requirements – Developing use-cases – Negotiating requirements – Validating requirements **Design Engineering:** Design process and design quality – Design concepts – The design model.

Unit III **(18 hours)**

Testing Strategies: A strategic approach to software testing – Test strategies for conventional software –Validation testing – System testing – The art of debugging. **Testing Tactics:** Software testing fundamentals – White-box testing – Basis path testing – Control structure testing – Black-box testing.

SX ACADEMIC COUNCIL

Unit IV **(18 hours)**

Project Management: The management spectrum – The people – The product – The process – Theproject. **Risk Management:** Reactive vs proactive risk strategies – Software risks – Risk identification – Riskprojection – Risk refinement.

Unit V **(18 hours)**

Quality Management: Quality concepts – Software quality assurance – Software reviews – Formal technical reviews – The ISO 9000 quality standards – The SQA plan. **Change Management:** Software configuration management – The SCM process.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain a process model for a software project Development

CO2: Apply Project Management and Requirement analysis, Principles to software project development

CO3: Analyze the cost estimate and problem complexity using various estimation techniques

CO4: Compare the SRS, Design document, Project plan of given software system.

CO5: Generate test cases using the techniques involved in selecting: (a) White Box testing (b) Block Box testing

Text Book

1. Roger S. Pressman, **Software Engineering A Practitioner's Approach**, Tata McGraw Hill International edition, New Delhi, Sixth Edition 2005.

Reference Books:

1. Ian Sommerville, **Software Engineering**, Pearson Education, New Delhi,7th edition, 2004
2. Samarjeet kaur, Sandhir Sharma & P.P Singh, **Software Engineering – Complete Course Book**,Deep & Deep Publications Pvt. Ltd., New Delhi , 2006
3. Waman S Jawadekar, **Software Engineering – Principles and Practice**, Tata McGraw Hill Education Private Limited, New Delhi, 2004

E-Resources:

1. https://nptel.ac.in/courses/106/105/106105218/
2. https://onlinecourses.nptel.ac.in/noc19_cs70/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	9	3	**45**
CO2	9	9	9	3	9	9	9	**57**
CO3	9	9	9	3	9	9	9	**57**
CO4	9	9	3	3	9	9	9	**51**
CO5	9	9	9	3	9	9	9	**57**
Total	**45**	**45**	**33**	**15**	**45**	**45**	**39**	**267**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

DSE I - a) Operating Systems
(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBCPE51A **Credit: 4**

Course Objectives:

1. To understand the services provided by and the design of an operating system
2. To understand what a process is and how processes are synchronized and scheduled

Unit I **(12 hours)**

Introduction: What is an Operating System -Mainframe systems- desktop systems- Multiprocessor Systems - Distributed systems - Clustered Systems - Real time systems - Hand held systems **Operating System Structure:** System components - Operating System services - System calls- System structure

Unit II **(12 hours)**

Processes: Process concept- process scheduling- operations on processes- Inter process Communication **CPU Scheduling**: Basic Concepts- Scheduling Criteria- Scheduling algorithms **Process Synchronization**: Background- The critical section problem- Mutex Locks-semaphores- Monitors.

Unit III **(12 hours)**

Deadlock: System Model-Deadlock Characterization- Methods of Handling Deadlock-Deadlock Prevention-Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock. **Memory management**: Background- Contiguous memory allocation- Swapping.

Unit IV **(12 hours)**

Virtual memory: Background- Demand paging- Copy-on-Develop -Page replacement- Thrashing. **File system interface**: File concepts- access methods- Directory structure. **Mass storage structure**: Overview of mass storage structure-HDD Scheduling-NVM Scheduling.

Unit V **(12 hours)**

Protection: Goals of protection- domain of protection- Access matrix- Implementation of Access matrix-revocation of access rights. **Security:** The security problem- User authentication- Program threats- System threats- securing systems and facilities- Intrusion detection- Cryptography.

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Remember the structure of operating system and scheduling algorithms
CO2: Apply the concept of process scheduling, deadlocks and its recovery
CO3: Analyze the background of memory with segmentation and paging
CO4: Evaluate file management with file organization, and disk scheduling
CO5: Create Securing systems and facilities

ACADEMIC COUNCIL

Text Book:

1. Abraham G Silberschatz, *Operating System*, Wiley Publisher, Tenth Edition, 2017.

Reference Books:

1. Milan Milenkovic, *Operating System Concepts & Design***,** Tata McGraw Hill PublishingLimited, Second Edition, 1997.
2. Peter Baer Galvin, Robert Neilson Boyd, *Applied Operating System Concepts*, John Wiley & Sons Publisher, First Edition, 2000.
3. Dhananjay M. Dhamdhere, *Operating System A Concept-Based Approach*, Tata McGraw Hill Publishing Limited, Third Edition, 2012.
4. W. Stallings, *Operating Systems, Internals & Design Principles*, Prentice Hall of India, Fifth Edition, 2008.

E-Resources:

1. https://nptel.ac.in/courses/106/105/106105214/
2. https://nptel.ac.in/courses/106/106/106106144/
4. https://onlinecourses.nptel.ac.in/noc21_cs44/preview
5. https://www.udacity.com/course/introduction-to-operating-systems--ud923

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	9	9	**45**
CO2	9	3	3	3	9	9	9	**45**
CO3	9	3	9	9	3	9	9	**51**
CO4	9	3	9	3	9	9	9	**51**
CO5	9	3	9	9	9	9	9	**57**
Total	**45**	**15**	**33**	**33**	**33**	**45**	**45**	**249**

Low-1 Medium-3 High-9

DSE I - b) Cloud and Distributed Computing

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBCPE5B **Credit: 4**

Course Objectives:

1. To impart the complete understanding of cloud, virtualization and distributed clouds and able to understand the leader election in cloud and distributed systems
2. To enhance the students to understand the significance of classical distributed algorithms, give the clear idea about recovery in clouds and cloud storage and enable the students to understand cloud applications, cloud native computing

AX ACADEMIC COUNCIL

Unit I ` **(12 hours)**

Introduction to Cloud, Virtualization, and Virtual Machine: Introduction to CloudComputing - Features of Today's Cloud - Introduction to Virtualization - Mitigation Techniques for VM Migration Network Virtualization and Geo- Distributed Clouds: Introduction - Cloud Computing and Server Virtualization - Networking of Virtual Machines Inside the Hypervisor – Docker – Software - Defined Network

Unit II **(12 hours)**

Leader Election in Cloud, Distributed Systems, and Industry Systems: Introduction – Leader Election in Rings (Classical Distributed Algorithms) - Ring Leader Election and Bully Leader Election Algorithms - Classical Algorithm: Ring Election Algorithm - Classical Algorithm: Bully Election - Algorithms for Recording Global State and Snapshot - Mutual Exclusion Algorithms for Distributed Systems.

Unit III **(12 hours)**

Consensus, Paxos, and Recovery in Clouds: Introduction – Consensus – Byzantine Agreement – Failures and Recovery approaches in Distributed systems **Cloud Storage:** Key-Value Stores/NoSQL Stores and HBase: Design of Key-Value Stores - Design of HBase.

Unit IV **(12 hours)**

P2P Systems and Their applications in Industry systems: Introduction – Bitcoin crypto currency system –Blockchain technology and its applications beyond bitcoin solutions
Cloud Applications: MapReduce, Spark, and Apache Kafka – MapReduce – Spark – Kafka.

Unit V **(12 hours)**

Cloud-Native Computing: Introduction – Micro services – Docker – Kubernetes-Introduction to Edge Computing - Classification of Edge Computing - **Software-Defined Networking and Network Function Virtualization:** Introduction - Software-Defined Networking -Applications and Use Cases-Software - Defined NFV – Network Slicing - Ongoing Research Opportunities.

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Identify the features of cloud computing and virtualization
CO2: Demonstrate the leader election and classical distributed algorithms
CO3: Classify types of consensus, paxos, recovery in clouds and cloud storage
CO4: Justify P2P systems and cloud applications
CO5: Formulate the cloud native computing, software-defined networking and network function virtualization

Text Book:

1. Rajiv Misra, Yashwant Singh Patel, *Cloud and Distributed Computing: Algorithm andSystems*, Wiley Emerging Technology Series, 2020.

XAMCADEMIC COUNCIL

Reference Books:

1. Chris Dotson, *Practical Cloud Security: A Guide for Secure Design and Deployment*,OReilly Media, First Edition, 2019.
2. Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi, *Mastering Cloud Computing*, Tata McGraw Hill, 2017.
3. Rajkumar Buyya, James Broberg, Andrzej Goscinski, *Cloud Computing Principles and Paradigms*,John Wiley & Sons Publishing, 2011.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, *Cloud Computing-A Practical Approach*, Tata McGraw Hill Publishing, 2010.

E- References:

1. https://nptel.ac.in/courses/106/104/106104182/
2. www.amazon.in/Cloud-Distributed-Computing-Algorithms-Systems/dp/8126520272?asin=B086V7Q2KW&revisionId=&format=4&depth=1

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	9	3	1	9	**35**
CO2	9	1	9	9	3	1	3	**35**
CO3	9	3	3	9	3	1	9	**37**
CO4	3	9	9	9	9	3	9	**51**
CO5	3	9	9	9	9	3	9	**51**
Total	**33**	**23**	**33**	**45**	**27**	**9**	**39**	**209**

Low-1 Medium-3 High-9

DSE II - a) Blockchain Technology

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBCPE5C **Credit: 4**

Course Objectives:

1. To understand how block chain system (Bitcoin and Ethereum) work
2. To integrate Ideas from block chain technology into their own projects

Unit I **(12 hours)**

Introduction of Block chain: Block 101-Distributed Systems-Consensus-The history of block chain- Introduction of block chain-Features of block chain-Applications of block chain technology-Tiers of Block chain technology-Consensus in block chain-CAP theorem and block chain-Benefits and limitations of Block chain.

SX ACADEMIC COUNCIL

Unit II **(12 hours)**

Cryptography and technical Foundations: Introduction-Mathematics-Cryptography-Confidentiality- Integrity- Authentication-Non repudiation-Accountability-Block Ciphers-DES-AES-Public and Private keys- RSA-hash Functions-Secure hash algorithms-Merkle trees-Patricia trees-DHT-ECDSA-Financial markets and trading-Trading- Exchanging.

Unit III **(12 hours)**

Bitcoin: Bitcoin definitions-transactions-types of transactions-What is UTXO-Block chain-The genesis of Block-The bitcoin network-wallets-**Alternative coins**: Theoretical Foundations-Alternatives of Proof of Work-Proof of stake-Name coin-Litecoin.

Unit IV **(12 hours)**

Ethereum101: Introduction-Ethereum block chain-The consensus mechanism-The world state- the account state- Transactions-Contract creation transaction-Message call transaction-Elements of ethereum block chain- EVM-Execution Environment-Opcodes and their meaning-Accounts- Block-Block header.

Unit V **(12 hours)**

BlockChain–Outside of Currencies: Internet of things- IoT Block chain experiment-Government-Health-Finance- **Emerging Trends**: ABC's-Enterprise-grade block chains-Private Blockchains-startups- standardization-Enhancements- Real world Implementations- Consortia-Education in block chain technologies-Employment-Crypto Economics.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the fundamental concept of block chain and consensus algorithm
CO2: Apply cryptography algorithms in protecting the block chain
CO3: How transactions held in bitcoins
CO4: Develop an application in ethereum framework
CO5: Design block chain technology in popular fields

Text Book:

1. Imran Bashir, *Mastering Block chain: Deeper insights into decentralization, Cryptography, Bitcoin and Popular block chain frameworks***,** Packt Publishing, 2017.

Reference Books:

1. Andreas Antonopoulos, Satoshi Nakamoto, *Mastering Bitcoin***,** O'Reilly, 2014.
2. Roger Wattenhofer**,** *The Science of the Block chain*, Create Space Independent Publishing, 2016.
3. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, *Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction***,** Princeton University Press, 2016.

E-Resources:

1. https://nptel.ac.in/courses/106/104/106104220/#
2. https://www.udemy.com/course/build-your-blockchain-az/

AX ACADEMIC COUNCIL

3. https://www.mygreatlearning.com/academy/learn-for-free/courses/blockchain-basics

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	9	9	3	3	9	9	51
CO2	9	3	9	9	9	9	9	57
CO3	9	3	9	3	9	9	9	51
CO4	9	3	9	3	9	9	9	51
CO5	9	3	9	3	9	3	9	45
Total	45	21	45	21	39	39	45	255

Low-1 Medium-3 High-9

DSE II – b) Big Data Analytics

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBCPE52D **Credit: 4**

Course Objectives:

1. To understand about Big Data Technology, Hadoop Ecosystem and various tools related to it.
2. To learn about the HDFS File System, Map Reduce Framework, analyzing data using Hbase and Hive along with the Integration of R with Hadoop.

Unit I **(12 hours)**

Introduction to Big Data

What Is Big Data? - History of Data Management- Evolution of Big Data- Structuring of Big Data- Elements of Big Data- Application of Big Data in the Business Context- Careers in Big Data. Business Applications of Big Data: The Significance of Social Network Data- Financial Fraud and Big Data- Fraud Detection in Insurance- Use of Big Data in the Retail Industry.

Unit II **(12 hours)**

Technologies for Handling Big Data

Distributed and Parallel Computing for Big Data- Understanding Hadoop- Cloud Computing- Grid Computing- and In-Memory Technology for Big Data. VMWare Installation of Hadoop- Linux and its Shell Commands- Different Hadoop Distributions and their advantages- Horton works- Cloudera- MapR.

Unit III **(12 hours)**

Understanding the Hadoop Ecosystem

The Hadoop Ecosystem- Storing Data with HDFS- Design of HDFS- HDFS Concepts- Command Line Interface to HDFS- Hadoop File Systems- Java Interface to Hadoop- Anatomy of a file read-

KAC ACADEMIC COUNCIL

Anatomy of a file write- Replica placement and Coherency Model- Parallel Copying with distcp- keeping an HDFS Cluster Balanced.

Unit IV **(12 hours)**

Map Reduce Fundamentals

Origins of Map Reduce- How Map Reduce Works- Optimization Techniques for Map Reduce Jobs- Applications of Map Reduce- Java Map Reduce classes (new API)- Data flow- combiner functions- running a distributed Map Reduce Job. Configuration API- setting up the development environment- Managing Configuration.

Unit V **(12 hours)**

Integrating R with Hadoop, Understanding Hive & Hbase

Understanding R-Hadoop- Integration Procedure- Packages needed for R under Hadoop Ecosystem- Text Mining for Deriving Useful Information using R within Hadoop- Introduction to Hive & Hbase- Hive and Hbase Architecture- Understanding Queries- Mining Big Data with Hive & Hbase.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the fundamentals of Big Data and its Applications in various Domains
CO2: Apply HDFS File Structure, Map Reduce Framework to solve complex problems
CO3: Analyze the technologies behind Big Data
CO4: Implement Hive/ Hbase shell pertaining to relational data handling under Hadoop.
CO5: Build applications integrating R with Hadoop

Text Book:

1. Arshdeep Bahga, *Big Data Science & Analytics: A Hands-On Approach*, VPT,2016

Reference Books:

1. Tom White, *Hadoop: The Definitive Guide*, O'Reilly, 2012
2. Adam Shook and Donald Miner, *Map Reduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems*, O'Reilly,2012.
3. Dean Wampler, Edward Capriolo & Jason Rutherglen, *Programming Hive*, O'Reilly, 2012
4. Lars George, *HBase - The Definitive Guide: Random Access to Your Planet-Size Data*,O'Reilly, 2011

E-Resources:

1. https://nptel.ac.in/courses/106104189
2. https://www.naukri.com/learning/big-data-computing-by-nptel-course-nptel33?enModal=Y&logFlow=N

AC ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	3	3	**31**
CO2	9	3	9	1	9	9	3	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	9	1	9	9	9	**49**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**27**	**5**	**45**	**39**	**33**	**209**

Low-1 Medium-3 High-9

SEC V - PHP Programming Lab

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 2**
Subject Code: IBCPS54P **Credit: 2**

Course Objectives:

1. To understand the concepts of regular expressions including modifiers, operators and meta characters
2. To develop PHP programs that use various PHP library functions and thatmanipulate files and directories

List of Programs

1. Develop a PHP program to print Sum of digits
2. Develop a PHP program to print factorial of a number
3. Develop a PHP program to display count, from 10 to 20 using loop
4. Develop a PHP program to print prime number
5. Develop a PHP program to check Armstrong number
6. Develop a PHP program to check Palindrome number
7. Develop a PHP program to swap two numbers with and without using third variable
8. Develop a PHP program to find if the given year is leap year or not
9. Develop a PHP program to reverse the number with strrev ()
10. Develop a PHP program to show day of the week (for eg: Monday) based on numbers using Switch/case statements
11. Develop a PHP program to print number triangle
12. Develop a PHP program to print alphabet triangle
13. Develop a PHP program to check student grade based on the marks using if-else statement
14. Develop a PHP program Using nested for loop that creates a chessboard

Note: Questions for the internal and external examination will be based on the concepts learnt

ACADEMIC COUNCIL

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Describe the fundamentals of PHP Language in trivial problem solving.
CO2: Determine solution to a problem and apply control structures.
CO3: Simplify the use of Strings and string handling functions.
CO4: Justify real time applications using PHP language features.
CO5: Build skill on problem solving by constructing algorithms

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	1	1	**25**
CO2	9	3	3	3	9	3	3	**33**
CO3	9	3	1	3	9	9	3	**37**
CO4	9	3	3	3	9	9	3	**39**
CO5	9	3	3	3	9	9	3	**39**
Total	**45**	**15**	**11**	**13**	**45**	**31**	**13**	**173**

Low-1 Medium-3 High-9

Core XIII - Internet of Things

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 6**
Subject Code: IBCPC612 **Credit: 5**

Course Objectives:
1. To understand the fundamentals of Internet of Things and its building blocks
2. To understand the recent application domains of IoT in everyday life and the protocols with standards designed for IoT and the current research on it

Unit I **(18 hours)**

Introduction to IoT: Introduction to IoT- Enabling technologies of IoT - AI and Machine Learning - Physical and logical design of IoT - IoT levels and deployment templates– **Application domains of IoT:** Home automation – Cities – Environment – Agriculture – Transportation - Health care & Lifestyle.

Unit II **(18 hours)**

IoT and M2M: Introduction to M2M – Difference between IoT and M2M- SDN and NFV for IoT- SNMP- NETCONF- YANG- IoT Systems Management with NETCONF- YANG.

ACADEMIC COUNCIL

Unit III **(18 hours)**

IoT Platforms Design Methodology: Step 1 to Step 10-Case Study on IoT System for Weather Monitoring- IoT Systems Logical Design using Python- Python Data Types and Data Structures-Control Flow-Functions-Modules- Packages-File Handling-Date/Time-Operations-Classes.

Unit IV **(18 hours)**

IoT Physical Devices and Endpoints: What is an IoT Device- Exemplary Device: Raspberry Pi-Linux and Raspberry Pi- Raspberry Pi Interfaces- Programming Raspberry Pi with Python – Other IoT Devices.

Unit V **(18 hours)**

IOT Physical Servers and Cloud Offerings: Introduction to Cloud Storage Models and Communication API-WAMP- Python Web Application Framework-Django - Amazon Web Services for IoT-Case Studies Illustrating IoT Design- Home Automation- Cities-Environment-Agriculture-Productivity Applications.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Recall the importance of smart objects and smart environment

CO2: Define IoT and M2M

CO3: Create IoT platforms using design methodology

CO4: Perform WiFi data communications, remote data storage in cloud, and handle the data using web applications

CO5: Develop potential problems and solutions using IoT

Text Book:

1. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach*, Universities Press, 2015

Reference Books:

1. Charles Platt, *Make Electronics – Learning by discovery*, O'Reilly Media, 2015
2. Michael Miller, *The Internet of Things*, Pearson Education, 2015

E-Resources:

1. NPTEL:https://nptel.ac.in/courses/106/105/106105166/
2. Classcentral:https://www.classcentral.com/course/swayam-introduction-to-internet-of- things-10093

EX ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	3	3	3	9	3	1	3	**25**
CO2	1	3	9	9	3	1	9	**35**
CO3	3	3	3	1	1	9	9	**29**
CO4	1	3	9	1	3	3	9	**29**
CO5	3	3	3	3	1	3	9	**25**
Total	**11**	**15**	**27**	**23**	**11**	**17**	**39**	**143**

Low-1 Medium-3 High-9

Core XIV - Computer Networks

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 6**
Subject Code: IBCPC621 **Credit: 4**

Course Objectives:

1. To build an understanding of the fundamental concepts of computer networking
2. To identify the different types of network topologies and protocols and enumerate the layers of the OSI and TCP/IP Model, Explain the function of each layers

Unit I **(18 hours)**

Introduction: Uses of Computer Networks-Network Hardware-Network Software- Reference Models-Network Standardization **Physical Layer:** Guided Transmission Media-Wireless transmission.

Unit II **(18 hours)**

Data Link Layer: Data Link Layer Design Issues-Error Detection and Correction-
Medium Access Control Sub layer: Channel Allocation Problem-Multiple Access Protocols-Ethernet-Wireless LANs- Data Link Layer Switching.

Unit III **(18 hours)**

Network Layer: Network layer Design Issues-Routing Algorithms-Congestion Control Algorithms-Quality of Service- Internetworking-Network Layer in the Internet.

Unit IV **(18 hours)**

Transport Layer: Transport Service-Elements of Transport Protocols-Congestion Control-Internet Transport Protocols: UDP –TCP.

Unit V **(18 hours)**

Application Layer: Domain Name System-Electronic Mail-World Wide Web: HTTP - Streaming Audio and Video.

XX ACADEMIC COUNCIL

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Explain the concepts of computer networks
CO2: Apply the protocols of computer networks in network design and implementation
CO3: Analyse functions of each layer in the OSI and TCP/IP reference model
CO4: Compare the working principle of various layer protocols
CO5: Design networks by using protocols of computer networks

Text Book:
1. Andrew S Tanenbaum, David. J. Wetherall, *Computer Networks***,** Pearson Education, Fifth Edition, 2021.

Reference Books:
1. Behrouz A Forouzan, *Data Communications & Networking*, Tata McGraw Hill, FourthEdition, 2003.
2. Douglas E Comer, *Computer Networks and Internets*, Pearson Education, Fourth Edition, 2004.

E-Resources:
1. https://onlinecourses.swayam2.ac.in/ugc19_cs10/preview
2. https://onlinecourses.swayam2.ac.in/cec19_cs07/preview
3. https://nptel.ac.in/courses/106/105/106105081/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	1	3	9	**31**
CO2	9	1	3	3	1	3	9	**29**
CO3	9	1	3	3	1	9	9	**35**
CO4	9	1	3	3	1	9	9	**35**
CO5	9	3	3	3	1	9	9	**37**
Total	**45**	**9**	**15**	**15**	**5**	**33**	**45**	**167**

Low-1 Medium-3 High-9

Core XV - Computer Graphics

(For Students Admitted from 2024-25)

Semester: VI **Hours/Week: 5**
Subject Code: IBCPC631 **Credit: 4**

Course Objectives:
1. To acquire the fundamental concept and theory of computer graphics
2. To learn the important concept of drawing algorithm, clipping ,Color illumination , 2D &3D transformation

XL ACADEMIC COUNCIL

Unit I **(15 hours)**

Introduction to Computer Graphics: Introduction-Non Interactive/Interactive Computer Graphics-Uses of Computer Graphics-Classification of Applications-Programming Language, Graphics and Operating Software.

Unit II **(15 hours)**

Output Primitives: Representing Image-Straight Line-Line Drawing Algorithms-DDA Algorithm-Breshenhams Line Algorithm-Circle Generating Algorithm-Midpoint Circle Algorithm-Ellipse Generating Algorithm-Midpoint Ellipse Generating Algorithm-Polygon Filling Algorithms.

Unit III **(15 hours)**

Windowing and Clipping: Viewing Transformation-Window to Viewport-Clipping-point Clipping-Line Clipping- Cohen Sutherland Line Clipping Algorithm -Liang Barsky Line Clipping Algorithm-Polygon Clipping-Sutherland Hodgeman Clipping Algorithm-Curve Clipping-Text Clipping.

Unit IV **(15 hours)**

3D Concepts and Techniques: Introduction-3D Transformation-3D Modeling Schemes-Projection- Ortho Graphic Projection-Isometric Projection-Oblique Projection-Perspective Projection-One Two Three point Perspective-Viewing Parameter-Object-3D Clipping.

Unit V **(15 hours)**

Surface Generation: Introduction-Quadric surface-Bezier Surface - B-Spline Surface. **Color and Illumination Model:** Introduction-Colors-Illumination Model and Light Sources-Specular Reflection-Intensity Attenuation-Shadow- Reflectivity and Refractivity-Radiosity Model..

Course Outcomes:

After successful completion of this course, student will be able to

CO1: List out the computer graphics devices

CO2: Demonstrate different graphical objects like rescale, transmit, skew and rotate

CO3: Apply various transformations to 2D and 3D graphics objects

CO4: Analyze algorithms for clipping

CO5: Elaborate various projections of 3D objects, know the method of color illumination and animation in graphics model

Text Book:

1. Amarendra N Sinha Arun D Udai, *Computer Graphics*, Tata Mc Graw Hill Publishing, 2008

Reference Books:

1. Donald Hearn, M.Pauline Bsker, *Computer Graphics*, Prentice Hall of India, Second Edition, 2001
2. William M.Newman, Robert F.Sproull, *Principles of Interactive Computer graphics*, Tata

XX ACADEMIC COUNCIL

McGraw Hill, 1997
3. Foley, Van Dam, Feiner, Hughen, *Computer graphics Principles and Practice*, Addision-Wesley Publishing Company, Second Edition,1990

E- Resource:
1. https://www.geeksforgeeks.org/computer-graphics-2/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	**45**
CO2	9	3	3	3	3	3	3	**27**
CO3	9	9	3	9	3	1	9	**43**
CO4	9	3	3	3	3	3	3	**27**
CO5	9	3	3	3	3	3	9	**33**
Total	**45**	**27**	**15**	**21**	**21**	**13**	**33**	**175**

Low-1 Medium-3 High-9

Core XVI - Project

(For Students Admitted from 2024-25)

Semester: VI **Hours/Week: 6**
Subject Code: IBCPC64PW **Credit: 5**

Course Objectives:
1. To impart the students to implement project by data collection and selecting the softwaretool
2. To enhance the students to select the programming language for implementing the project

Students have to undergo an individual project work on campus and appear for the viva voce examination with the software developed and document prepared by her

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Identify goals, constraints, deliverables, performance criteria and resource requirements in consultation with stakeholders
CO2: Apply the plan by executing the code
CO3: Illustrate the various aspects of software development for the total project
CO4: Evaluate the entire software project according to the specific problem
CO5: Develop the software project by executing with the various data.

ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	9	9	9	9	3	9	57
CO2	9	3	9	3	9	9	9	51
CO3	9	3	9	9	9	9	9	57
CO4	9	3	9	9	9	9	9	57
CO5	9	9	9	9	9	9	9	63
Total	45	27	45	39	45	39	45	285

Low-1 Medium-3 High-9

DSE III - a) Mobile Application Development

(For Students Admitted from 2024-25)

Semester: VI **Hours/Week: 4**
Subject Code: IBCPE6A **Credit: 4**

Course Objectives:

1. To facilitate students to understand android SDK and to help students to gain a basic understanding of Android application development
2. To inculcate working knowledge of Android Studio development tool

Unit I **(12 hours)**

Introduction-Important of Mobile strategies, Mobile development today, Mobile myths, Mobile web vs Mobile App, benefits of mobile app, creating consumable web services for mobile devices-What is a web service, Web services languages. **Mobile user interface design**- understanding mobile platforms, using the toolsof mobile interface design.

Unit II **(12 hours)**

Introduction to Android-Android Features-Android Operating system-Downloading apps from Google play-Packages- Android Software Development Kit-Test Driving the Tip Calculator App in an Android Virtual Device-Building Great Android Apps-Android Development Resources.

Unit III **(12 hours)**

Android Studio – Introduction - Technologies overview - Creating an App - Android Studio window - Building the Apps GUI with the Layout Editor-Adding an Image to the project, adding an app icon, changing Relative Layout to a Linear Layout, orientation, Configuring the Textview's id, textsize property, Setting textcolor, gravity, weight property, Adding an Image view to display the image, Previewing the Design.

Unit IV **(12 hours)**

Tip Calculator App-Introduction, Test-driving the Tip Calculator App-Technologies overview-Class activity, Activity lifecycle methods, arranging views with a GridLayout, Creating and

ACADEMIC COUNCIL

Customizing the GUIwith the Layout editor, Implementing interface TextWatcher for Handling EditText text changes, Building the GUI, Default Theme and customizing theme colors.

Unit V **(12 hours)**

Overview of Kotlin-Installation of Android Studio-Getting started with Hello World app- Creating a Registration form-Adding Radio Buttons-Adding spinner and Image-Creating a search App-URL Request- Display Search Result-Playing video using YouTube API.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the principles of Mobile strategies
CO2: Demonstrate the Android installing and configuring support tools
CO3: Build and publishing Android app
CO4: Apply the knowledge of Android user interface
CO5: Develop Mobile application using Android and IOS

Text Book:

1. Paul Deitel, Harvey Deitel, Alexander Wald, *Android 6 for Programmers – An App driven Approach*, Pearson Education, Third Edition, 2016.

Reference Books:

1. Jeff McWherter, Scott GoWell, *Professional Mobile Application Development*, John Wiley & Sons Publication, 2012.
2. DonnFelker with Joshua Dobbs, *Android Application Development for Dummies*, John Wiley& Sons Publication, 2011.
3. Jerome (J. F) DiMarzio, *Android – A Prograammer's Guide*, Tata McGraw Hill, Eigth reprint, 2015.

E-Resources:

1. https://developer.android.com/
2. https://www.openxcell.com/mobile-app-development/
3. https://www.zoho.com/creator/application-development/mobile.html
4. https://spoken-tutorial.org/tutorial-search/?search_foss=Android+app+using+Kotlin&search language=English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	**45**
CO2	9	9	3	9	9	9	9	**57**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	3	3	9	3	9	**45**
Total	**45**	**39**	**15**	**27**	**45**	**27**	**45**	**243**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

DSE III – b) Digital Marketing

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 4**
Subject Code: IBCPE61B **Credit: 4**

Course Objectives:

1. To know the fundamental concepts associated with the digital marketing.
2. To understand the concepts of different strategies, search engine, and social media channels utilized in the different marketing systems.

Unit I **(12 hours)**

Introduction to Digital Marketing: Introduction - Evolution of Digital Marketing from traditional to modern era- Role of Internet; Current trends - Drivers of the new marketing environment - Digital marketing strategy; P.O.E.M. framework - Digital marketing plan- Digital marketing models.

Unit II **(12 hours)**

Internet Marketing and Digital Marketing Mix: Internet Marketing - opportunities and challenges - Digital marketing framework - Impact of digital channels on IMC. **Search Engine Advertising:** Pay for Search Advertisements - Ad Placement - Display marketing: Types of Display Ads - Programmable Digital Marketing - YouTube marketing.

Unit III **(12 hours)**

Social Media Marketing: Understanding Social Media Marketing – Social Networking- Role of Influencer Marketing-Modes of Social Media Marketing- Tools & Plan - Facebook Marketing: - Business through Facebook Marketing, Facebook Marketing Tools - LinkedIn Marketing: - Introduction and Importance of LinkedIn Marketing, -Twitter Marketing: Introduction to Twitter Marketing, Mobile Advertising

Unit IV **(12 hours)**

Introduction to SEO: SEM - Web Analytics - Mobile Marketing - Trends in Digital Advertising - Introduction and need for SEO- How to use internet & search engines; search engine and its working pattern: SEO Tactics - Introduction to SEM Web Analytics: Google Analytics & Google AdWords

Unit V **(12 hours)**

Social Media Channels: Introduction - Key terms and concepts - Traditional media vs Social media - Social networking - Content creation - Tracking social media campaigns **Social Media Strategy:** Introduction - Key terms and concepts - Using social media to solve business challenges - Dealing with opportunities and threats

Course Outcomes:

After successful completion of this course, student will be able to

XX ACADEMIC COUNCIL

CO1: Understand the practical factor to improve results in digital marketing.
CO2: Implement a structured digital marketing plan and budget.
CO3: Examine the operations of digital marketing, and track the progress of digital marketing.
CO4: Evaluate the functions of social media marketing, Internet marketing, and social media channels.
CO5: Design and Initialize implement process to conduct digital marketing campaigns.

Text Book:
1. Seema Gupta, *Digital Marketing*, Mc-Graw Hill 1st Edition – 2017

Reference Books:
1. Damian Ryan, Calvin Jones, *Understanding Digital Marketing-Marketing Strategies For Engaging the Digital Generation*, Kogan Page - Fourth Edition
2. Teresa Pineiro-Otero and Xabier Martinez-Rolan *Understanding Digital Marketing- Basics and Actions* Springer International Publishing – 2009

E-Resources:
1. https://www.simplilearn.com/tutorials/digital-marketing-tutorial

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	1	3	3	9	**43**
CO2	9	9	3	3	9	9	9	**51**
CO3	9	3	9	1	9	9	9	**49**
CO4	9	9	3	3	9	1	9	**43**
CO5	9	3	3	1	9	3	9	**37**
Total	**45**	**33**	**27**	**9**	**39**	**25**	**45**	**223**

Low-1 Medium-3 High-9

SEC VI - Python Lab

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 2**
Subject Code: IBCPS651P **Credit: 2**

Course Objectives:
1. To acquire programming skills in Core Python
2. To develop the web designing in Python

List of Programs
Display Text
1. Write a python program to display any given text message

UG ACADEMIC COUNCIL

Formula Substitution

2. Write a python program to display Fibonacci series

Array

3. Write a python program to count the number of vowel in the string

Function

4. Write a python program to convert a date read from the user, given in DD/MM/YYYY format into written format.
5. Write a python program to print the contents of a file in uppercase using function
6. Write a python program to sort the contents of a file using function Operator Overloading
7. Write a python program to implement Operator Overloading Script
8. Write a python script that implements the Arithmetic Quiz
9. Write a python script to create a button with the text, "HelloWorld"
10. Write a python script that creates a combo box with three elements. When the selection is changed the selected item is to be printed
11. Write a python script that creates a simple application window with menus and submenus
12. Write a python script that creates a simple application window with displaying lines
13. Writea python program to create your own web site for displaying message
14. Write a python program to create a simple blog using models

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO 1: Acquiring the basic knowledge of functions
CO 2: Examine test and debug simple Python programs
CO 3: Implement Python programs with conditionals and loops
CO 4: Develop Python programs step-wise by defining functions
CO5: Develop the webpage

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	3	3	9	**39**
CO2	9	9	9	9	3	9	9	**57**
CO3	9	9	9	3	3	9	9	**51**
CO4	9	3	9	3	3	3	9	**39**
CO5	3	9	3	3	3	3	9	**33**
Total	**39**	**39**	**33**	**21**	**15**	**27**	**45**	**219**

Low-1 Medium-3 High-9

XXACADEMIC COUNCIL

Extra Credit I - Desktop Publishing Lab
(For Students Admitted from 2024-25)

Semester: II
Subject Code: IBCPX21P **Credit: 2**

Course Objectives:
1. To understand the basic concepts of FIGMA
2. To gain knowledge about various tools of FIGMA

FIGMA
1. Create an Animated Text.
2. Create an Animated Image.
3. Create a bouncing ball using interactive component.
4. Design ON/OFF toggle.
5. Create a responsive grid system for web.
6. Create a poster.
7. Create an animation notification.
8. Create an animated card grid.
9. Design a glass morphism.
10. Design an Appreciation certificate.
11. Design a Sign Up page.
12. Create a News page design.

Note: Questions for the external examination will be based on concept learnt

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Describe the concepts of tools and techniques in Figma.
CO2: Apply the concept of creation and modification of objects.
CO3: Simplify the process of designing, editing and animating.
CO4: Create a website screen and any form of certificate.
CO5: Construct and design an application.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	9	3	9	**45**
CO2	9	3	9	3	9	3	9	**45**
CO3	9	3	9	3	9	3	9	**45**
CO4	9	1	9	3	9	3	9	**43**
CO5	9	1	9	3	9	3	9	**43**
Total	**45**	**11**	**45**	**15**	**45**	**15**	**45**	**221**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Extra Credit II - No SQL Lab
(For Students Admitted from 2024-25)

Semester: III
Subject Code: IBCPX31P **Credit: 2**

Course Objectives:
1. The students get practical knowledge on developing No SQL database using MongoDB and ability to read or query the collection
2. To understand various advanced methods such as update one MongoDB document in the collection and update many MongoDB documents in the collection

No SQL PROGRAMS
1. MongoDB installation and configuration in windows
2. Demonstrate how to create and drop a database in MongoDB
3. Developing the collection in MongoDB on the fly
4. Developing collection with options before inserting the documents and drop the collection created
5. MongoDB insert document
    a. Insert single document
    b. Insert multiple documents in collection
6. Querying all the documents in JSON format and Querying based on the criteria
7. MongoDB update document
    a. Using update ( ) method
    b. Using save ( ) method
8. MongoDB delete document from a collection
    a. Using remove ( ) method
    b. Remove only one document matching your criteria
    c. Remove all documents
9. Develop a MongoDB projection
10. Apply limit ( ), skip ( ), sort ( ) methods in MongoDB
11. MongoDB indexing
    a. Develop index in MongoDB
    b. Finding the indexes in collection
    c. Drop indexes in a collection
    d. Drop all the indexes
12. MongoDB with java and PHP
    a. Develop a simple application that uses MongoDB with JAVA
    b. Develop a simple application that uses MongoDB with PHP
13. Build a social media app using document API and a No SQL Database

Note: - Questions for the internal and external examination will be based on concept learnt

Course Outcomes:
After successful completion of the course, the students will be able to
CO1: Installing and configuring MongoDB in windows
CO2: Perform all database operations using MongoDB

ACADEMIC COUNCIL

CO3: Implement and harness the power of indexes
CO4: Use MongoDB compass to analyze a database
CO5: Develop applications by integrating MongoDB with JAVA/PHP

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low-1 Medium-3 High-9

Extra Credit III - R Tool Lab

(For Students Admitted from 2024-25)

Semester: IV
Subject Code: IBCPX4P **Credits: 2**
Course Objectives:
1. To understand the concept of R Tool
2. To implement statistics analysis

List of Programs
1. Write a Program to implementing correlation analysis
2. Write a Program to implementing regression analysis
3. Write a Program to implementing t-test
4. Write a Program to implementing z-test
5. Write a Program to implementing f-test
6. Write a Program to implementing chi-square test
7. Write a Program to implementing kruskal-wallis test
8. Write a Program to implementing likert scaling techniques
9. Write a Program to implementing analysis of variance (ANOVA)

Note: Questions for the external examination will be based on concepts learnt

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Demonstrate the basics in R programming in terms of constructs, control statements and functions
CO2: Apply data analytics software

XX ACADEMIC COUNCIL

CO3: Enhance problem solving, programming and debugging skills
CO4: Plan the R programming from a statistical perspective
CO5: Analyze and implement the various data structures of R

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	3	**43**
CO2	9	3	9	3	9	9	9	**51**
CO3	3	9	1	1	3	1	9	**27**
CO4	9	3	9	1	9	9	3	**43**
CO5	9	1	9	3	9	9	3	**43**
Total	**39**	**25**	**31**	**9**	**39**	**37**	**27**	**207**

Low-1 Medium-3 High-9

Extra Credit V - Data Mining Lab

(For Students Admitted from 2024-25)

Semester: VI
Subject Code: IBCPX6P **Credit: 2**
Course Objectives:
1. To understand the concept of data mining tool
2. To implement various data mining algorithm

List of Programs
1. Create data-set in .arff file format. Demonstration of preprocessing on WEKA data-set.
2. Demonstration of Association rule process on data-set contact lenses.arff /supermarket using apriori algorithm
3. Demonstration of classification rule process on WEKA data-set using j48 algorithm
4. Demonstration of classification rule process on WEKA data-set using Naive Bayes algorithm
5. Demonstration of clustering rule process on data-set iris.arff using simple k-means

Note: Questions for the external examination will be based on concepts learnt

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Describe Data mining concept.
CO2: Apply the knowledge of data mining techniques
CO3: Adapt to new data mining tools.
CO4: Explore recent trends in data mining such as web mining, spatial-temporal mining
CO5: Build different types of algorithm

ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	1	1	**25**
CO2	9	3	3	1	9	1	3	**29**
CO3	9	3	3	3	9	3	3	**33**
CO4	9	3	3	3	9	3	3	**33**
CO5	3	3	9	3	9	3	9	**39**
Total	**39**	**15**	**19**	**11**	**45**	**11**	**19**	**159**

Low-1 Medium-3 High-9

B Com with Computer Applications

Three Years Regular Programme

(For Students Admitted From 2024 – 2025)

Program Specific Outcomes: (PSOs)

On completion of this programme, student will be able to gain

PSO1: Disciplinary Knowledge in the concepts of commerce and its application.

PSO2: Effective Communication skills to lead the group and organization in the attainment of overall objective

PSO3: Research Skills and Critical Thinking to identify, understand, analyse and assess the business problems and to suggest solutions

PSO4: Moral, Ethical Awareness/ Reasoning to run the business with Corporate Social Responsibility

PSO5: Professional skills to be placed in ever changing challenging situations.

PSO6: Entrepreneurial Skills to explore, innovate, plan, execute, start and run business as job providers

PSO7: Life long Learning Skills to be self-directed for independent thinking and action to tackle day today problems.

PREAMBLE

The Board of Studies of Computer Science revamped the curriculum with the following changes

Core Papers

- The topic UNIX with Linux in Unit III in Principles of Information technology has been replaced
- The topics ‘Array’ with ‘Functions’ in Programming in C has been exchanged

XV ACADEMIC COUNCIL

PROGRAMME STRUCTURE - PROGRAMME CODE: UCC

Sem	Subject code	Part	Course	Subject Title	Hours/ Week	Credits	CIA	ESE	TOTAL
I		I	Language I	Tamil I / Arabic I / Hindi I	5	3	25	75	100
		II	Language II	English I a (or) b	5	3	25	75	100
		III	Core I	○ Financial Accounting- I	6	5	25	75	100
	IBCCC122	III	Core II	**Principles of Information Technology**	5	4	25	75	100
	IBCCA131	III	AECC I	**Programming in C**	3	2	25	75	100
	IBCCA14P	III	AECC II	**Programming in C Lab**	2	2	25	75	100
	IBCCS15P	IV	SEC I	**PC Package Lab**	2	2	-	50	50
				Library / Browsing	1	-	-	-	-
				Remedial/ Games	1	-	-	-	-
				TOTAL	**30**	**21**	**240**	**410**	**650**
II		I	Language I	Tamil II / Arabic II / Hindi II	5	3	25	75	100
		II	Language II	English II a (or) b	5	3	25	75	100
		III	Core III	Financial Accounting-II	5	5	25	75	100
		III	Core IV	Business Statistics	4	4	25	75	100
	IBCCA231	III	AECC III	**Data Base Management System**	3	2	25	75	100
	IBCCA241P	III	AECC IV	**DBMS Lab**	2	2	25	75	100
	IBCCS25P	IV	SEC II	**Designing Lab I**	2	2	-	50	50
		IV	GIC I	Environmental Science	2	2	-	50	50
				Library / Browsing / Lectures	1	-	-	-	-
				Remedial	1	-	-	-	-
			Extra Credit	Business Communication / * Online Course	-	2	-	100	100
				TOTAL	**30**	**23+2**	**240**	**460+ 100**	**700+ 100**
		I	Language I	Tamil III / Arabic / Hindi III	5	3	25	75	100

XX ACADEMIC COUNCIL

III		II	Language II	English III a (or) b	5	3	25	75	100
		III	Core V	E-Commerce	4	4	25	75	100
		III	Core VI	Partnership Accounting	4	4	25	75	100
	IBCCA331P	III	AECC V	**Web Designing Lab**	4	4	25	75	100
		IV	SEC III	Digital Marketing	2	2	-	50	50
		IV	OEC		2	2	-	50	50
		IV	GIC II	Human Rights	2	2	-	50	50
		V	Extension	NSS/CSS	2	2	100	-	100
			Extra Credit	Marketing/ *Online Course	-	2	-	100	100
				TOTAL	**30**	**26+2**	**300**	**450+ 100**	**750+ 100**
IV		I	Language I	Tamil IV / Arabic IV / Hindi	5	3	25	75	100
		II	Language II	English IV a (or) b	5	3	25	75	100
		III	Core VII	Banking Law and Practice	5	4	25	75	100
		III	Core VIII	Financial Markets & Services	4	4	25	75	100
	IBCCA43	**III**	**AECC VI**	**Programming in Java**	3	2	25	75	100
	IBCCA44P	**III**	**AECC VII**	**# Programming in Java Lab**	2	2	25	75	100
		IV	SEC IV	Business Research Methods	2	2	-	50	50
		IV	GIC III	Life Skills and Value Education	2	2	-	50	50
		IV	OEC		2	2	-	50	50
			Extra Credit	Business Environment/ *Online Course	-	2	-	100	100
				TOTAL	**30**	**24+2**	**240**	**510+ 100**	**750+ 100**
V		III	Core IX	○ Income Tax Law & Practices –I	6	6	25	75	100
		III	Core X	Accounting Package Lab(Tally)	5	3	25	75	100
	IBCCC531	III	Core XI	**PHP**	4	3	25	75	100
	IBCCC541P	III	Core XII	**PHP Lab**	3	3	25	75	100
		III	DSE I	Corporate Accounting	4	4	25	75	100

XX ACADEMIC COUNCIL

				/Corporate Law					
		III	DSE II	Management Accounting / Corporate Finance	4	4	25	75	100
	IBCCS55P	IV	SEC V	**Graphics and Animation Lab**	2	2	-	50	50
		IV	GIC IV	Women Entrepreneurship	2	2	-	50	50
			Extra Credit	Employability Skills/ *Online Course	-	2	100	-	100
				TOTAL	**30**	**27+2**	**240+ 100**	**460**	**700+ 100**
VI		III	Core XIII	Accounting for Public Utility	6	5	25	75	100
		III	Core XIV	Income Tax Theory Law and Practice -II	6 (T-4 P-2)	5	25 (T-15 P-10)	75	100
		III	Core XV	Project	6	4	25	75	100
		III	Core XVI	Practical Auditing	5	4	25	75	100
		III	DSE III	Human Resource Management / Services Marketing	4	4	25	75	100
	IBCCS65P	IV	SEC VI	**Designing Lab II**	2	2	-	50	50
				Library/Browsing	1	-			
			Extra Credit	Total Quality Management / *Online Course	-	2	-	100	100
				TOTAL	**30**	**24+2**	**200**	**350 +100**	**550+ 100**
				GRAND TOTAL	**180**	**145+10**	**1460+ 100**	**2640 +400**	**4100+ 500**

*****For Online Course credit alone will be assigned on submission of certificate obtained by appearing for online examination from EdX, Spoken Tutorial, NPTEL or Coursera etc.

#For internship course, refer www.internshala.com or any online internship course

- For online course integration, syllabus will be taken from spoken tutorial

AECC-Ability Enhancement Compulsory Course
SEC-Skill Enhancement Course
DSE-Discipline Specific Elective
OEC-Open Elective Course

EXACADEMIC COUNCIL

Core II – Principles of Information Technology

(For Students Admitted From 2024 – 25)

Semester: I **Hours/Week: 5**
Subject Code: IBCCC122 **Credit: 4**

Course Objectives:

1. To know the generation of computers and various I/O devices
2. To understand about new developments in the digital communication and Networks

Unit I **(15 hours)**

Computer System: Algorithms-Simple model of Computer - Characteristics of a Computer - Problem solving of a computer. **Input/output Units:** Traditional Computer Input/output units-other Input Technologies-Computer Output Devices.

Unit II **(15 hours)**

Computer Memory: Memory Cell-Memory Organization-ROM-Serial Access Memory-Physical Devices Used to Construct Memories-Magnetic Hard Disk-CDROM-Magnetic Tape Drive-Memory Hierarchy. **Computer Generation:** First Generation-second Generation-Third Generation-Fourth Generation-Fifth Generation-Moore Law-Classification of Computers.

Unit III **(15 hours)**

Computer Architecture: Interconnection of Units-Processor to Memory Communication-I/O Devices to processor Communication-Interrupt Structures-Multiprogramming. **Operating systems:** Batch Operating System-Multiprogramming Operating system-Time sharing Operating System-On-Line and Real Time systems- LINUX Operating Systems.

Unit IV **(15 hours)**

Computer Network: Communication Protocols-LAN-Using Public switched Telephone Network to Connect Computers-Interconnecting Networks-Internet and WWW-Internet Security. **Voice and Data Communications:** Communication Channels-Allocation of Communication Channel-Physical Communication Media-Public Switched Telephone Networks-Cable Modems-Cellular Communication Systems

Unit V **(15 hours)**

Multimedia Data Acquisition: Image Acquisition-Storage formats for pictures-Compression of Video Data- MPEG Compression Standard-Acquiring and Storing Audio Signals-Compression of Audio Signals-Audio Signal Processing. **Emerging Computing Environments:** Current Computing Scenario-Peer to peer computing-Grid computing-Cloud Computing.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Summarize the concept of Computer System, Architecture, Network and Memory
CO2: Explain how computers are networked and how an operating system interacts with hardware
CO3: Illustrate the working of Voice and Data Communication Systems and Networks

KAACADEMIC COUNCIL

CO4: Evaluate and Measure the performance of Computer security and Virus
CO5: Develop the applications in Multimedia and Cloud Computing

Text Book:

1. V Raja Raman, Neeharika Adabala, *Fundamentals of Computers***,** PHI Learning Private Limited,2018.

Reference Books:

1. Alex Leon, Mathews Leon, *Fundamentals of Information Technology***,** Tata McGraw Hill Education, Fourth Edition, 2007.
2. Bethesda MD, *Planning for Integrated Academic Information Management Systems,* Proceedings of a symposium sponsored by the National Library of Medicine, 1984.

E-Resources:

1. https://www.coursera.org/courses?query=computer%20fundamentals
2. https://www.classcentral.com/course/swayam-computer-fundamentals-13950

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	3	9	3	9	**37**
CO2	9	3	3	3	3	9	9	**39**
CO3	9	1	9	9	3	3	9	**43**
CO4	3	1	3	9	9	3	3	**31**
CO5	9	1	9	3	3	9	9	**43**
Total	**39**	**9**	**25**	**27**	**27**	**27**	**39**	**193**

Low-1 Medium-3 High-9

AECC I - Programming in C

(For Students Admitted From 2024-25)

Semester: I **Hours/week: 3**
Subject Code:IBCCA131 **Credit: 2**

Course Objectives:

1. To improve the knowledge of complete understanding of Programming language C
2. To Enhance the students to understand the significance of functions, arrays, strings, pointers and structures

Unit I **(9 hours)**

Introduction to C Programming: C Character Set–Writing first program of C-Identifiers and Keywords- A more useful C Program- Entering the program into the computer - Data types-Constants-Variables **Operators and Expressions:** Arithmetic Operators – Unary Operators-

KTU ACADEMIC COUNCIL

Relational and logical - Assignment Operators- The conditional Operators. Expressions-Types of Expressions.

Unit II **(9 hours)**

Data Input and Output: Preliminaries – The getchar function – The putchar function – The scanf function – The printf function – gets and puts function **Control Statements:** Preliminaries – **Branching:** The If-else Statement - Looping – while statement –do-while statement –for statement – nested control structures – switch statement.

Unit III **(9 hours)**

Arrays: Defining an Array –Processing an Array –Passing arrays to Functions–Multidimensional arrays. **Strings:** Defining a String – NULL Character – Initialization of Strings – Reading and writing a string – Processing strings – Character arithmetic – Searching and sorting of strings.

Unit IV **(9 hours)**

Functions: A brief overview-Defining function-Accessing a function - Function prototypes-Passing argument to a function -Recursion. **Program Structure:** Storage classes- Automatic variables -External variables -Static variables -Multi File programs.

Unit V **(9 hours)**

Pointers: Fundamentals – Pointer Declarations – Passing pointers to a function – Pointers and one dimensional arrays – Dynamic memory allocation – Operations on pointers – Arrays of Pointers. **Structures and Unions:** Defining a Structure –Processing a Structure – User defined data types – Structures and pointers – Unions.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe the basic programming knowledge of C, operators and expressions
CO2: Demonstrate data input, output, control statements & functions
CO3: Analyze program structure and arrays
CO4: Evaluate strings and pointers
CO5: Formulate structures, unions and file handling

Text Book:

1. Byron Gottfried, *Programming with C*, Tata McGraw Hill, Fourth Edition, 2018.

Reference Books:

1 . Balagurusamy E, *Programming in ANSI C*, Tata McGraw-Hill Publishing Company, Sixth Edition, 2012.
2. Venugopal K R, Sudeep R Prasad, *Programming with C***,** Tata McGraw-Hill, 2008.
3. Mullish, Hentry Cooper, Herbert, *The Spirit of C - An Introduction to Modern Programming***,** Jaico Publishing House, Third Edition, 2006.

E - Resources:

1. https://onlinecourses.nptel.ac.in/noc19_cs42/preview

KU ACADEMIC COUNCIL

2. https://nptel.ac.in/courses/106/105/106105171/
3. https://onlinecourses.nptel.ac.in/noc21_cs01/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	9	3	9	**45**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	9	3	9	9	9	**57**
Total	**45**	**21**	**21**	**21**	**45**	**27**	**45**	**225**

Low-1 Medium-3 High-9

AECC II – Programming in C Lab
(For Students Admitted From 2024-25)

Semester: I **Hours/week: 2**
Subject Code: IBCCA14P **Credit: 2**

Course Objectives:

1. To introduce the field of programming using C language
2. To enhance the analyzing and problem solving skills and use the same for writing programs in C

List of Programs

Formula Substitution

1. Develop a C program to find largest number among three numbers
2. Develop a C program to find the sum of the digits of a given Integer.
3. Develop a C program to generate the Fibonacci series
4. Develop a C Program to find the area of shapes using switch case
5. Develop a C program to check whether the given number is palindrome or not

Arrays

6. Develop a C program to check whether the element is present in the given list or not
7. Develop a C program to sort the numbers in ascending order

Conversion

8. Develop a C program to convert the case of given string from upper case to lower case

Function

9. Develop a C program to find the factorial of a given number using recursive and non- recursive function

XX. ACADEMIC COUNCIL

Structure

10. Develop a C program to prepare student mark list using structure

Note: Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the control structures and loops
CO2: Apply the concepts of functions
CO3: Analyze the concepts of Structures and arrays
CO4: Evaluate string handling functions
CO5: Create programs with arrays, structures

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**37**
CO2	9	3	3	1	9	9	9	**46**
CO3	9	3	3	1	9	9	9	**37**
CO4	9	3	3	1	9	9	9	**37**
CO5	9	3	3	1	9	9	9	**37**
Total	**45**	**15**	**15**	**5**	**45**	**45**	**45**	**185**

Low-**1** Medium-3 High-9

SEC I – PC Package Lab

(For Students Admitted From 2024 – 25)

Semester: I **Hours/ week: 2**
Subject Code: IBCCS15P **Credit: 2**

Course Objectives:

1. To acquire knowledge about word processing, spread sheet, Data base creation and slide preparation
2. To improve creative thinking in presentations

List of Programs

Word Processing

1. Create a word processing document consists of two pages in a Book named "XX" andthen do the following:
   a) Formatting Text, Alignment and Font Style
   b) Perform Find and Replace
   c) Add Header and Footer option to specify name of the Book Chapter Heading and page number in all pages

XXI ACADEMIC COUNCIL

2. Create a word processing document having details of our college courses using bulleted and numbered lists. Type the title using Word
3. Design an invitation to invite seniors for a farewell party and use Font Setting/Page Borders/Word Art/Clip Art/Symbols in it
4. Create a Newsletter Article (using Columns, Drop cap)
5. Create your class time table (using Table)
6. Use Mail Merge to create many letters to send it to more recipients
7. Create your resume in a word document

Spread Sheet

1. Create a Spreadsheet consists of Student details and then do the following:
    a. Calculate student wise total and subject wise total.
    b. Find maximum and minimum marks of the subject.
    c. Grade is calculated as
        i. If % of marks >=90, then grade A
        ii. If % >=80 and <90, then grade B
        iii. If % >=70 and <80, then grade C
        iv. If % >=60 and <70, then grade D
        v. If % < 60, then grade F
2. Create a Spreadsheet having employee details suitably and then do following.
    a. Use functions to calculate Net Pay and Gross Pay.
    b. Perform conditional formatting and validation.
    c. Create a chart for these details

Presentation

1. Create a presentation showing various activities of your department and applySlide transition and background designs

2. Create a presentation showing various activities of your college. Apply animations and insert Audio in this presentation

Database

1. Create a Student Database having Name, Reg no, Tamil, English, Maths, Total, and Average. Calculate Total and Average and apply validation.
2. Create an Inventory database having Item Name, Item no, Quantity and Price.Perform query operation to retrieve data.

Note: Questions for internal and external examination will be based on concepts learnt.

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Recall various options of Office Applications
CO2: Identify the icons to work with document, presentation, spreadsheet and database
CO3: Simplify the process of creating reports to solve the problems of manual report handling
CO4: Compare the options of different Office Applications to use appropriately
CO5: Create Presentations, Advertisements, Reports etc for enterprises

KEA ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	**45**
CO2	9	9	3	9	9	9	9	**57**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	3	3	9	3	9	**45**
Total	**45**	**39**	**15**	**27**	**45**	**27**	**45**	**243**

Low-1 Medium-3 High-9

AECC III – Database Management System

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 3**
Subject Code: IBCCA231 **Credit: 2**
Course Objectives:

1. To understand the basic concepts of database systems, relational model, database design principles and SQL queries
2. To understand the design and implementation of a database security, Transaction concepts and advanced topics in DBMS

Unit I **(9 hours)**

Introduction to Database Systems: Introduction - Database Management Systems (DBMS) - An Overview of Database Management - Brief introduction to SQL - Embedded SQL - Dynamic SQL. **The Relational Model:** Relational Databases Primer - Relational Database Characteristics - Relational Algebra.

Unit II **(9 hours)**

Database Design: Design Considerations - Functional Dependency - Normalization and Normal Forms Entity/Relationship (E/R) Modeling - **Transaction Processing and Management:** Transaction –Recovery - Transaction Models - Two-Phase Commit - Locking Deadlocks.

Unit III **(9 hours)**

Database Security: Threats and Risks -Cryptography - Digital Signature - Database Control - Usersand Database Privileges - Types of Privileges - **Distributed Databases:** Distributed Database Concepts-Distributed Database Architectures - Advantages of Distributed Databases.

Unit IV **(9 hours)**

Indexing and hashing: Hash organization - Bit mapped Indexing- Static Hashing -Dynamic Hashing - Comparison of ordered indexing & Hashing - **Transactions:** Transaction concept - Transaction state - Implementation of Atomicity and Durability – Recoverability.

Unit V **(9 hours)**

Object Technology and DBMS: An Introduction to Object Technology - Abstraction -

AX ACADEMIC COUNCIL

Encapsulation - Inheritance - Object Technology and RDBMS.

Course Outcomes:

After successful completion of this course, students will be able to:

CO1: Explore about DBMS concepts such as database designs, database modeling, security indexing and Hashing and Advanced DBMS

CO2: Extend about database design and security

CO3: Distinguish the Relational model, Indexing and Hashing

CO4: Apply Structured query language (SQL), Transactions and Constraints

CO5: Evaluate the functions of ODBMS and Advanced DBMS

Text Book:

1. Atul Kahate, *Introduction to Database Management Systems*, Pearson Education, Tenth Impression, 2012.

Reference Books:

1. Abraham Silberschatz, Henry Forth, S.Sudarshan, *Database System Concepts*, Tata McGraw Hill, Fifth Edition, 2006.
2. C J Date, *An Introduction to Database System***,** Addison- Wesley Publishing Company, Third Edition, 1998.

E-Resources:

1. https://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
2. https://www.coursera.org/projects/introduction-to-relational-database-and-sql
3. https://onlinecourses.nptel.ac.in/noc21_cs04/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	3	3	**25**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	3	9	3	9	9	9	**51**
Total	**45**	**9**	**25**	**15**	**33**	**33**	**33**	**193**

Low-1 Medium-3 High-9

AECC IV – DBMS Lab

(For Students Admitted From 2024 –25)

Semester: II **Hours/week: 2**

Subject Code: IBCCA241P **Credit: 2**

Course Objectives:

1. To get practical knowledge on designing and creating Tables
2. To understand various queries such as relational constraints, joins, set operations, aggregate functions and views

XI ACADEMIC COUNCIL

SQL Programs

DDL

1. Create an address table with fields name , doorno , street & city
   - Describe its structure
   - Alter the table to include pincode
   - Alter the table to modify street column
   - Drop the table

DML

2. Create a student table with regno, name, age and dept.
   - Insert records
   - Delete the students with age above 20
   - Truncate and drop the table

Functions

3. Create an employee table with fields eno , ename , sex ,age & years of experience
   - Find out the no. of female employees
   - Find out the employees with age ranging between 30 and 35
   - List out the employees who are working more than 5 years
4. Create a library file with fields accno, title, author, cost & no of copies
   - Arrange the books according to accno
   - Find out the total no. of books available in the library
   - Find out the book of minimum cost
5. Create a player table with fields name, sports(cricket,hockey,etc.),age & country
   - Find out the eldest and youngest player
   - Group players according to sports
   - List out the Indian players
6. Write the SQL queries to illustrate all number functions
7. Write the SQL queries to illustrate date functions
8. Write the SQL queries to illustrate all string functions
9. Create an item table with field's item no, item name, quantity & price and insert records. Illustrate the comparison operators (between, like, in & isnull)
10. Create a table with the fields client no , client name & phone no Illustrate the set operators Union, union all, minus & intersect
11. Create a student table with fields' regno, name, English, Tamil, Maths and Total & insert records without total values.
    - Update Total in the table
    - Find the student who got first mark in Maths
    - List out the students whose name starts with "S"
12. Create an employee table with fields ecode, ename, age & salary and create a department table withfields ecode, designation, deptcode & dept. Illustrate joins and sub queries using the above tables.

Note: Questions for the internal and external examination will be based on concept learnt

XI ACADEMIC COUNCIL

Course Outcomes:
After successful completion of this course, students will be able to
CO1: Build DDL, DML Commands
CO2: Make use of implementing constraints in tables
CO3: Apply to create block structure programming language
CO4: Create the concepts of functions
CO5: Develop the Real Time database

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	3	3	3	**27**
CO2	9	1	1	3	3	3	3	**23**
CO3	9	1	3	3	3	9	3	**31**
CO4	9	1	3	3	9	3	9	**37**
CO5	9	3	9	3	3	9	9	**45**
Total	**45**	**9**	**19**	**15**	**21**	**27**	**27**	**163**

Low-1 Medium-3 High-9

SEC II –Designing Lab I

(For students admitted from 2024-25)

Semester: II **Hours/week: 2**
Subject Code: IBCCS25P **Credit: 2**

Course Objectives:

1. To understand the basic concepts of GIMP
2. To gain knowledge about various tools of GIMP

GIMP

1. Design a Business card
2. Create a logo
3. Convert an image into pencil drawing
4. Design a scenery using various brushes
5. Design a greeting card
6. Create clipping mask- place an image inside text
7. Create passport size photo
8. Animate a still photo
9. Create ashadow effect for an objkect
10. Create a mirror effect for an image
11. Apply the following tools in an image
    a.smudge b.Blur Sharpen c.Dodge Burn

XVI ACADEMIC COUNCIL

12. Create a mosaic photo collage

Note: Questions for the internal and external Examinations shall be based on the concepts learnt

Course Outcomes:

After completion of this course, student will be able to

CO1: Recognize the uses of various tools and effects in GIMP
CO2: Identify the steps to start designing with images
CO3: Simplify the process of desingning, editing, masking to solve the difficulties of designs
CO4: Support studios to create passport size photo
CO5: Design Visiting card, ID card, Birthday card, logo etc.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	9	9	1	**43**
CO2	9	1	9	9	3	9	3	**43**
CO3	9	3	9	9	3	9	9	**51**
CO4	9	1	3	9	3	9	3	**37**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**17**	**39**	**39**	**27**	**45**	**25**	**237**

Low-1 Medium-3 High-9

AECC V – Web Designing Lab

(For students admitted from 2024-25)

Semester: III **Hours/week: 4**
Subject Code: IBCCA331P **Credit: 4**

Course Objectives:

1. To design web pages using HTML Elements
2. To make use of frames in web designing

List of Programs

1. Create a HTML page for displaying the personal information by using various tags such as background color, heading tag, font tag
2. Create a HTML page for displaying the Tender notice which is given to you
3. Create a Time Table of your class using HTML
4. Create a HTML page to advertise the opportunities for the job in a Company
5. Create a web page depicting the application form of our College
6. Create a HTML page for displaying your Curriculum vitae

KK ACADEMIC COUNCIL

7. Create a simple web page for a company which includes the following details: History,LOGO, Departments, and Sales reports of the company
8. Design a web page by using images,lists and links

Frames

9. To create a simple web site for our college which includes the following details: History ofthe college and courses offered for both UG and PG, Individual department Details, Fee particulars for the courses using frames
10. To create dictionary using frames. The words are displayed in one frame and when you click the word, the meaning will be displayed on the other frame

Note: Questions for the External examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Illustrate the uses of various formatting tags
CO2: Identify the tags for creating forms
CO3: Simplify the process of designing a web page by including frames
CO4: Support web developers by designing effective web pages
CO5: Develop web pages for enterprises

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	9	9	**45**
CO2	3	3	9	9	3	9	9	**45**
CO3	3	3	9	9	1	9	9	**43**
CO4	3	3	9	9	3	3	3	**33**
CO5	3	3	3	9	1	9	3	**31**
Total	**21**	**15**	**33**	**39**	**17**	**39**	**33**	**197**

Low-1 Medium -3 High-9

AECC VI – Programming in Java

(For students admitted from 2024-25)

Semester: IV **Hours/week: 3**
Subject Code: IBCCA43 **Credit: 2**

Course Objectives:

1. To Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc
2. To Understand the fundamentals of object-oriented programming in Java, including definingClasses, objects, invoking methods etc. and exception handling mechanisms

UG ACADEMIC COUNCIL

Unit I **(9 hours)**

Fundamentals of Object Oriented Programming: Introduction, object oriented paradigm –Basic concepts of oops – benefits of oops – applications of OOPs. Java Evolution: java features – java Versus C and C++ - java and internet – java and WWW – web browsers **Overview of Java Language:** simple java program - more of java – application with two classes –java program structure – java tokens – java statements-implementing a java program.

Unit II **(9 hours)**

Constants, Variables, data types: Declaration of variables- giving values to variables- Scope of variables-symbolic constants- type casting- getting values of variables -standard default values- **Operators and Expressions**: Arithmetic operators-Relational operators- logical operators-assignment operators-increment and decrement operators-conditional operator-bitwise operator-special operators-arithmetic expressions-evaluation of expressions - precedence of arithmetic operators.

Unit III **(9 hours)**

Decision-making and Branching: if statement –switch - ? : Operator –Decision Making and Looping: while statement – do statement – for statement – jumps in loops - labelled loops. **Classes, Objects and Methods**: Introduction – defining a class, field declaration–methods declaration–creating objects – accessing class members – constructors – methods overloading – static members – nesting of methods – inheritance – overriding methods – final variables and methods – final classes – finalizer methods.

Unit IV **(9 hours)**

Arrays Strings and Vectors: one-dimensional array- creating an array –two dimensional arrays. **Multithreaded Programming**: creating threads- extending the thread class-stopping and blocking a thread - life cycle of a thread – using thread methods - thread exceptions-thread priority – synchronization – implementing the runnable interface.

Unit V **(9 hours)**

Applet Programming: Introduction –how applets differ from applications –building applet code – applet life cycle – creating an executable applet –designing a web page - applet tag – adding applet to html file –running the applet – more about applet tags –passing parameters to Applets– aligning the display.

Course Outcomes:

After successful completion of this course, student will be able to:

CO1: Remember the importance of java with its data types, control statements and class fundamentals

CO2: Apply the concepts of inheritance, method overriding and implement packages and interfaces

CO3: Analyze the concept of exception handling and multi-threading

CO4: Evaluate string buffer handling functions

X ACADEMIC COUNCIL

CO5: Create applet programming through awt controls, layout managers and menus

Text Book:

1. E. Balaguruswamy, *Programming with JAVA - A Primer*, McGraw Hill Professional, 2015.

Reference Books:

1. Herbert Schildt, *Java: The Complete Reference***,** McGraw Hill Professional, 2017.
2. Robert Sedgewick & Kevin Wayne, *Introduction to Programming in Java,* Addison Wesley**,** 2017.
3. Y. Daniel Liang, *Introduction to Java Programming*, Brief Version Pearson Education 2017.

E-Resources:

1. https://spokentutorial.org/tutorialsearch/?search_foss=Java&search_language=English
2. https://onlinecourses.swayam2.ac.in/aic20_sp13/preview
3. https://spoken-tutorial.org/watch/Java/First+Java+Program/English/
4. https://onlinecourses.nptel.ac.in/noc19_cs84/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**37**
CO2	9	3	3	1	9	9	9	**46**
CO3	9	3	3	1	9	9	9	**37**
CO4	9	3	3	1	9	9	9	**37**
CO5	9	3	3	1	9	9	9	**37**
Total	**45**	**15**	**15**	**5**	**45**	**45**	**45**	**185**

Low-1 Medium-3 High-9

AECC VII – Programming in Java Lab

(For students admitted from 2024-25)

Semester: IV **Hours/week: 2**
Subject Code: IBCCA44P **Credit: 2**

Course Objectives:

1. To make the students to understand Programming language 'Java'
2. To enhance the students to develop inheritance and exception handling programs

List of Programs

Formula Substitution

1. Develop a java program to find the factorial and binomial coefficient
2. Develop a java program to calculate mean, variance and standard deviation

XXI ACADEMIC COUNCIL

3. Develop a java programs for Number conversions (Decimal to Binary, etc.)

Checking

4. Develop a java program for perfect number checking

Generation

5. Develop java programs for Number generation (prime, Fibonacci)

Array

6. Develop a java program to arrange numbers in order
7. Develop a java program to perform matrix addition and subtraction

String

8. Develop a java program for String manipulations (case conversion, reversing, etc.)

OOP Concepts

9. Develop a java program for implementing inheritance
10. Develop a java program for implementing exception handling
11. Develop a java program for implementing multithreading

Note: - Questions for the external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Outline Java programs that solve simple mathematical problems, number checking and generation

CO2: Demonstrate the concepts of String Manipulation

CO3: Illustrate OOP in Java programming like inheritance

CO4: Evaluate the multi-threaded programs

CO5: Develop Exception handling programs

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	3	9	**39**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	9	9	9	9	9	9	**63**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**33**	**27**	**33**	**45**	**33**	**45**	**261**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core XI– PHP

(For students admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBCCC531 **Credit: 3**

Course Objectives:

1. To understand the uses of various PHP statements
2. To gain knowledge about arrays and user defined functions

UNIT I **(12 hours)**

Introducing PHP-History- Unique features-Basic development concepts-creating your first PHP Script-writing and running the script-understanding the script-handling script errors

UNIT II **(12 hours)**

Storing data in variables-assigning values of variables-destroying variables-inspecting variable contents-**understanding PHP's data types**-setting and checking variables data types-using constants –manipulating variables with operators.

UNIT III **(12 Hours)**

Controlling program flow-writing simple conditional statements-the if statement-the if-else statement-writing more complex conditional statements-the if - elseif statement-the switch-case statement-combining conditional statements-repeating actions with loops-working with string and numeric functions.

UNIT IV **(12 hours)**

Working with arrays-storing data in arrays-processing arrays with loops and iterators-using arrays with forms-working with array functions-working with date and times-creating User-defined functions-creating classes-using advanced OOP concepts.

UNIT V **(12 hours)**

Working with files and directories-reading files-writing files-processing directories-performing other file and directory operations-working with databases and SQL-**introducing databases and SQL**-using PHP's MySQLi extension-adding or modifying data-handling errors

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Explain the uses of various PHP statements
CO2: Solve the problems of website users by using PHP
CO3: Associate web developers to generate dynamic content
CO4: Apply data base connectivity in developing web applications
CO5: Create websites for enterprises, educational institutions etc.

KAU ACADEMIC COUNCIL

Text Book:

1. Vikram Vaswani, **PHP: A Beginner's Guide**, Tata McGraw-Hill, New Delhi, Second Edition, 2009

Reference Books:

1. Steven Holzner, **PHP: The Complete Reference**, Tata McGraw-Hill, New Delhi, Second Edition, 2007
2. Larry Ullman, **PHP Advanced and Object-Oriented Programming: Visual QuickPro Guide**, *Pearson Education, New Delhi, Third Edition, 2013*

E - Resources:

1.https://onlinecourses.swayam2.ac.in/aic20_sp32/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	9	9	**45**
CO2	9	9	9	3	9	9	3	**51**
CO3	9	1	9	9	9	9	9	**55**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	1	9	9	9	9	9	**55**
Total	**45**	**15**	**39**	**27**	**45**	**45**	**39**	**255**

Low-1 Medium-3 High-9

CORE XII – PHP Lab

(For students admitted from 2024-25)

Semester: V **Hours/week: 3**

Subject Code: IBCCC541P **Credit: 4**

Course Objectives:

1. To understand the concepts of regular expressions including modifiers, operators and meta characters
2. To develop PHP programs that use various PHP library functions and that manipulate files and directories

List of Programs

1. Develop a PHP program to print Sum of digits.
2. Develop a PHP program to print factorial of a number.
3. Develop a PHP program to display count, from 10 to 20 using loop.
4. Develop a PHP program to print prime number.
5. Develop a PHP program to check Armstrong number.
6. Develop a PHP program to check Palindrome number.

KK ACADEMIC COUNCIL

7. Develop a PHP program to swap two numbers with and without using third variable.
8. Develop a PHP program to reverse the number with strrev ().
9. Develop a PHP program to show day of the week (for eg: Monday) based on numbers using Switch/casestatements
10. Develop a PHP program to print alphabet triangle
11. Develop a PHP program to check student grade based on the marks using if-else statement
12. Develop a PHP program Using nested for loop that creates a chess board

Note: Questions for the internal and external examinations will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe the fundamentals of PHP Language in trivial problem solving
CO2: Determine solution to a problem and apply control structures
CO3: Simplify the use of Strings and String Handling functions
CO4: Justify real time applications using PHP language feat
CO5: Build skill on problem solving by constructing algorithms

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	1	1	**25**
CO2	9	3	3	3	9	3	3	**33**
CO3	9	3	1	3	9	9	3	**37**
CO4	9	3	3	3	9	9	3	**39**
CO5	9	3	3	3	9	9	3	**39**
Total	**45**	**15**	**11**	**13**	**45**	**31**	**13**	**173**

Low-1 Medium-3 High-9

SEC V– Graphics and Animation Lab

(For students admitted from 2024-25)

Semester: V **Hours/week: 2**
Subject Code: IBCCS55P **Credit: 2**

Course Objectives:

1. To understand the basic concepts of animation
2. To gain knowledge about creating animated pictures using Blender

Blender

1. Create a coffee cup
2. Create a dinner table fork
3. Create a cup with wooden texture

KU ACADEMIC COUNCIL

4. Create a wooden table
5. Model a leather couch
6. Create a teddy bear
7. Create a photo realistic ring
8. Create a simple character
9. Create a stylized number animation
10. Animate a bouncing ball
11. Animate a shape of an object into another shape

Note: Questions for the internal and external examinations will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Recognize the uses of various tools in macromedia flash
CO2: Predict the steps that are needed to create animation
CO3: Critically analyze the required options to create animation with respect to its nature
CO4: Evaluate the use of 'Motion tween' in the given concept
CO5: Create animated scenes, animated logos, animated cartoon characters etc.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	3	3	9	3	**31**
CO2	9	1	9	3	3	9	3	**37**
CO3	9	1	9	3	9	9	9	**49**
CO4	9	1	3	3	9	9	9	**43**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**13**	**33**	**21**	**33**	**45**	**33**	**223**

Low-1 Medium-3 High-9

SEC VI – Designing Lab II

(For students admitted from 2024-25)

Semester: VI **Hours/week: 2**
Subject Code: IBCCS65P **Credit: 2**

Course Objectives:

1. To understand various menu bars and graphic tools of Corel Draw
2. To make designs with very great accuracy

EXAMINATION COUNCIL

Corel Draw

1. Create a newspaper advertisement using CorelDraw's text formatting tools
2. Create a Bitmap Image and apply the auto tracing technique to that image
3. Create an object and apply transformation technique
4. Create a Parachute using the given special fills methods such as
    a) Filling object using foundation fills
    b) Pattern Fill
    c) Interactive Fill Tool
5. Create any kind of invitation
6. Create a Mirror object using Mirror command
7. Create any kind of LOGO using Fit Text to Path technique
8. Create a Flyer design
9. Design a College Identity Card
10. Design a participation certificate for workshop

Note: Questions for the internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe the concepts of tools and techniques in CorelDraw

CO2: Apply the concept of Creation and modification of objects for graphic design purposes

CO3: Analyze various tools to design Flyers

CO4: Develop any kind of LOGO using techniques in CorelDraw

CO5: Build participation certificate and presentations

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	1	1	**25**
CO2	9	3	3	1	9	3	3	**31**
CO3	9	3	3	3	9	3	3	**33**
CO4	9	3	3	3	9	3	3	**33**
CO5	9	3	9	3	9	3	9	**45**
Total	**45**	**15**	**19**	**11**	**45**	**13**	**19**	**167**

Low-1 Medium-3 High-9

XXI ACADEMIC COUNCIL

B Sc Data Science
(Three Year Regular Programme)
(For Students Admitted from 2024-25)

Programme Specific Outcomes:
On completion of this programme, student will be able to

PSO 1: Disciplinary Knowledge: Apply computing theory, languages and algorithms, as well as mathematical and statistical models and the principles of optimization to appropriates, formula and use data analyze. Formulate and use appropriate models of data analysis to solve hidden solution to business related challenges

PSO 2: Effective Communication: Organize, visualize and analyze large, complex datasets using descriptive statistics and graphs to make decisions
PSO 3: Research Skill and Critical Thinking: Apply the theories and methodologies of data science to new research in their primary area of study.
PSO 4: Ethical Awareness: Develop and implement data analysis Strategies base on theoretical principles, ethical considerations and detailed knowledge of the underlying data
PSO 5: Digital Literacy: Demonstrate an ability to articulate, assess and apply appropriate theories and principles of information management. Student can construct complex statistical models, assess the fit of such models to the data and apply the models in real-world contexts
PSO 6: Problem Solving Skill: Identify, assess and select appropriate among data analytics methods and models for solving a particular real-world problem, weighing their advantages and disadvantages.
PSO 7: Self-Learning: Recognize the need for lifelong learning and have the ability to engage independent learning keeping in mind the rapid technological changes

PREAMBLE

The Board of Studies of Computer Science revamped the curriculum with the following changes
Core I

- Syllabus has been modified for Programming in C.

PROGRAMME STRUCTURE - PROGRAMME CODE: UDS

Sem	Part	Subject code	Course	Subject Title	Hours/ Week	Credit	Marks		
							CIA	ESE	Total
I	I	IBLT112/ IBLA111/ IBLH111	Language I	Tamil I / Arabic I / Hindi I	5	3	25	75	100
	II	IBLEI12 IBLEII12	Language II	English I a or b	5	3	25	75	100
	III	**IBDSC111**	**Core I**	○ **Programming in C**	5	4	25	75	100

XX ACADEMIC COUNCIL

		IBDSC12	**Core II**	**R Programming**	6	5	25	75	100
		IBDSA132	AECC I	Fundamental of Mathematics	5	4	25	75	100
	IV	**IBDSS14P**	**SEC I**	**Programming in C Lab**	2	2		50	50
			Library / Browsing		1				
			Remedial / Games		1				
				Total	**30**	**21**	**125**	**425**	**550**
II	I	IBLT212/ IBLA211/ IBLH211	Language I	Tamil II / Arabic II / Hindi II	5	3	25	75	100
	II	IBLEI22 IBLEII22	Language II	English II a or b	5	3	25	75	100
	III	IBDSC211	Core III	Calculus & DE	5	5	25	75	100
		IBDSC22	**Core IV**	**Python Programming**	4	4	25	75	100
		IBDSA232	AECC II	Mathematical Statistics - I	5	4	25	75	100
	IV	**IBDSS24P**	**SEC II**	**Data Analytics Lab - I**	2	2		50	50
		IBES2	GIC I	Environmental studies	2	2		50	50
		IBDSX2/ IBDSX20	Extra Credit	Arithmetic for Competitive Examinations/ * Online Course		2		100	100
			Library/ Browsing		1				
			Remedial / Games		1				
				Total	**30**	**23+2**	**125**	**475 +100**	**600+ 100**
III	I	IBLT311/ IBLA31/ IBLH311	Language I	Tamil III / Arabic III / Hindi III	5	3	25	75	100
	II	IBLEI32 IBLEII32	Language II	English III a or b	5	3	25	75	100
	III	IBDSC311	Core V	Mathematical Statistics II	4	4	25	75	100

XX ACADEMIC COUNCIL

		IBDSC32	**Core VI**	**Structured Query Language**	4	4	25	75	100
		IBDSA33	**AECC I**	**Natural Language Processing**	4	4	25	75	100
	IV	IBOE3DS	OEC I		2	2		50	50
		IBDSS34P	**SEC III**	**PHP Lab**	2	2		50	50
		IBHR3	GIC II	Human Rights	2	2		50	50
	V	IBXTN3	Extension Activities	NSS/CSS	2	2	100		100
		IBDSX3/ IBDSX3O	Extra Credit	Logical Reasoning/*Online course		2		100	100
				Total	**30**	**26+2**	**225**	**525+ 100**	**750+ 100**
IV	I	IBLT41/ IBLA41/ IBLH411	Language I	Tamil IV / Arabic IV / Hindi IV	5	3	25	75	100
	II	IBLEI42 IBLEII42	Language II	English IV a or b	5	3	25	75	100
	III	IBDSC41	Core VII	Matrix Theory & Linear Algebra	4	4	25	75	100
		IBDSC421	**Core VIII**	**# Machine Learning & Artificial Intelligence**	5	4	25 T-15 P-10	75	100
		IBDSA43	**AECC II**	**Big Data Analytics**	5	4	25	75	100
	IV	IBLVE4	GIC III	Life Skills and Value Education	2	2		50	50
		IBOE4DS	OEC II		2	2		50	50
		IBDSS44P	**SEC IV**	**Data Analytics Lab - II**	2	2		50	50
		IBDSX4/ IBDSX4O	Extra Credit	Applications of Group Theory /*Online Course		2		100	100
				Total	**30**	**24+2**	**125**	**525+ 100**	**650+ 100**
V	III	IBDSC51	Core IX	Discrete Mathematics	6	5	25	75	100
		IBDSC521	**Core X**	○ **Deep Learning**	6	5	25	75	100
		IBDSC53	Core XI	Graph Theory	6	5	25	75	100
		IBDSE5A IBDSE51B	**DSE I**	**a.Time series analysis and Forecasting b.Predictive Analysis**	4	4	25	75	100

XX ACADEMIC COUNCIL

		IBDSE5C **IBDSE51D**	DSE II	a.Operations Research b. **Data Mining**	4	4	25	75	100
	IV	**IBDSS54P**	**SEC V**	**Programming in Java Lab**	2	2		50	50
		IBWE5/	GIC IV	Women Entrepreneurship	2	2		50	50
		IBDSX5O	Extra Credit	Employability Skills/ *Online Course		2	100		100
				Total	**30**	**27+2**	**125+ 100**	**475**	**600+ 100**
VI	III	IBDSC611	Core XII	Numerical Methods	6	5	25	75	100
		IBDSC62PW	Core XIII	Project	6	5	25	75	100
		IBDSC63	**Core XIV**	**Computer Vision**	5	4	25	75	100
		IBDSC64	Core XV	Regression Analysis	6	4	25	75	100
		IBDSE6A/ IBDSE6B	**DSD III**	**a.Data Structures and Algorithms b.Data base Security**	4	4	25	75	100
	IV	**IBDSS65P**	**SEC VI**	**Data Mining Lab**	2	2		50	50
			Library/ Browsing		1				
		IBDSX6/ IBDSX6O	Extra Credit	Quantitative Techniques/* Online Course		2		100	100
				Total	**30**	**24+2**	**125**	**425+ 100**	**550+ 100**
				Grand Total	**180**	**145 + 10**	**850 +100**	**2850 +400**	**3700 +500**

*****For Online Course credit alone will be assigned on submission of certificate obtained by appearing for online examination from EdX, Spoken Tutorial, NPTEL or Coursera etc.

#For internship course, refer www.internshala.com or any online internship course.

- For online course integration, syllabus will be taken from spoken tutorial , swayam, edx, Udemy, coursera

AECC - Ability Enhancement Compulsory Course
SEC – Skill Enhancement Course
DSE - Discipline Specific Elective
OEC – Open Elective Course

EX ACADEMIC COUNCIL

Core I - Programming in C

(For Students Admitted from 2024-25**)**

Semester: I **Hours/week: 5**
Subject Code: IBDSC111 **Credit: 4**

Course Objectives:

1. To improve the knowledge of complete understanding of Programming language C
2. To understand the main features of operators, input/ output statements, control statements and program structure

Unit I **(15 hours)**

Introduction to C Programming: C Character Set-Writing first program of C- Identifiers and Keywords - Data types- Constants -Variables - Declarations - Expressions- Statements- Symbolic constants. **Operators and Expressions:** Arithmetic Operators-Unary Operators - Relational and logical Operators-Assignment Operators-The conditional Operators.

Unit II **(15 hours)**

Data Input and Output: Preliminaries – The getchar function- The putchar function - The scanf function-The printf function- gets and puts function-Interactive programming. **Control Statements:** Preliminaries -**Branching:** The If-else Statement-Looping- while statement- do-while statement- for statement -nested control structures- switch statement - break statement- continue statement- coma operator -goto statement.

Unit III **(15 hours)**

Arrays: Defining an Array – Processing an Array – Passing arrays to Functions – Multidimensional arrays- Strings Handling Functions.**Functions:** Defining a function - Accessing a function -Function prototypes- Passing arguments to a function- Recursion. **Program Structure:** Storage classes – Automatic variables – External variables – Static variables – Multi File programs.

Unit IV **(15 hours)**

Pointers: Fundamentals – Pointer Declarations – Passing pointers to a function – Pointers and one dimensional arrays – Dynamic memory allocation – Operations on pointers - Pointers and multidimensional arrays – Arrays of Pointers - Passing functions to other functions – More about pointer declarations.

Unit V **(15 hours)**

Structures and Unions: Defining a Structure – Processing a Structure – User defined data types – Structures and pointers – Passing structures to functions – Self Referential structures – Unions. **File**

XX ACADEMIC COUNCIL

Handling: Opening and closing a Data file – Reading and writing a data file – Processing a data file – Unformatted data files – Concept of binary files – Accessing the file randomly

Course Outcomes:
After successful completion of this course, the student will be able to
CO1: Describe the basic programming knowledge of C, operators and expressions
CO2: Demonstrate data input and output, control statements & functions
CO3: Analyse program structure and arrays
CO4: Evaluate strings and pointers
CO5: Formulate structures, unions and file handling

Text Book:
1. Byron Gottfried, *Programming with C*, Tata McGraw Hill, Fourth Edition, 2018.

Reference Books:
1. Balagurusamy E**,** *Programming in ANSI C*, Tata McGraw Hill, Sixth Edition, 2012.
2. Venugopal K R , Sudeep R Prasad, *Programming with C*, Tata McGraw Hill ,2008.
3. Mullish, Henry Cooper, Herbert, *The Spirit of C - An Introduction to Modern Programming*, Jaico Publishing House, Third Edition, 2006.

E - Resources:
1. https://onlinecourses.nptel.ac.in/noc19_cs42/preview
2. https://nptel.ac.in/courses/106/105/106105171/
3. https://onlinecourses.nptel.ac.in/noc21_cs01/preview
4. https://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	9	3	9	**45**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	9	3	9	9	9	**57**
Total	**45**	**21**	**21**	**21**	**45**	**27**	**45**	**225**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core II - R Programming

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 6**
Subject Code: IBDSC12 **Credit: 5**

Course Objectives:

1. To know the fundamentals of statistical analysis in R environment
2. To understand probability and sampling distributions

Unit I **(18 hours)**

Introduction to R Programming:R and R Studio, Logical Arguments, Missing Values- Characters- Factors and Numeric- Help in R- Vector to Matrix- Matrix Access- Data Frames- Data Frame Access- Basic Data Manipulation Techniques- Usage of various apply functions – apply- lapply- sapply and tapply- Outlier's treatment.

Unit II **(18 hours)**

Descriptive Statistics: Types of Data- Nominal, Ordinal, Scale and Ratio- Measures of Central Tendency- Mean, Mode and Median- Bar Chart- Pie Chart and Box Plot- Measures of Variability- Range- Inter-Quartile- Range- Standard Deviation- Skewness and Kurtosis- Histogram- Stem and Leaf Diagram- Standard Error of Mean and Confidence Intervals.

Unit III **(18 hours)**

Probability- Probability& Sampling Distribution: Experiment- Sample Space and Events- Classical Probability- General Rules of Addition- Conditional Probability- General Rules For Multiplication- Independent Events- Bayes' Theorem- Discrete Probability Distributions: Binomial- Poisson- Continuous Probability Distribution- Normal Distribution & t-distribution- Sampling Distribution and Central Limit Theorem.

Unit IV **(18 hours)**

Statistical Inference and Hypothesis Testing: Population and Sample- Null and Alternate Hypothesis- Level of Significance- Type I and Type II Errors- One Sample t Test- Confidence Intervals- One Sample Proportion Test- Paired Sample t Test- Independent Samples t Test- Two Sample Proportion Tests- One Way Analysis of Variance and Chi Square Test.

Unit V **(18 hours)**

Correlation and Regression: Analysis of Relationship- Positive and Negative Correlation- Perfect Correlation- Correlation Matrix- Scatter Plots- Simple Linear Regression- R Square, Adjusted R Square- Testing of Slope- Standard Error of Estimate- Overall Model Fitness- Assumptions of Linear Regression- Multiple Regression- Coefficients of Partial Determination- Durbin Watson Statistics- Variance Inflation Factor.

Course Outcomes:

After successful completion of this course, student will be able to

CO 1: Describe key terminologies, concepts and techniques employed in Statistical Analysis

ACADEMIC COUNCIL

CO 2: Demonstrate fundamentals of statistical analysis in R environment
CO 3: Analyse the purpose of exploration using Descriptive and Inferential Statistics
CO 4: Evaluate the variety of Hypothesis Tests to aid Decision Making
CO 5: Create application of Linear Regression in multivariate context for predictive purpose

Text Book:

1. Ken Black, 2013, *Business Statistics*, New Delhi, Wiley.

Reference Books:

1. Lee, Cheng. et al., 2013, *Statistics for Business and Financial Economics*, New York: Heidelberg Dordrecht.
2. Anderson, David R., Thomas A. Williams and Dennis J. Sweeney, 2012, *Statistics for Business and Economics*, New Delhi: Southwestern.
3. Waller, Derek, 2008, *Statistics for Business*, London: BH Publications.
4. Levin, Richard I. and David S. Rubin, 1994, *Statistics for Management*, New Delhi: Prentice Hall.

E Resources:

1.https://onlinecourses.nptel.ac.in/noc19_ma33/preview
2.https://onlinecourses.nptel.ac.in/noc22_ma69/preview
3.https://onlinecourses.nptel.ac.in/noc22_ma34/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	3	3	1	9	9	9	**43**
Total	45	15	15	5	45	45	45	**215**

Low-1 Medium-3 High-9

SEC I- Programming in C Lab

(For Students Admitted from 2024-25)

Semester : I **Hours/week: 2**
Subject Code: IBDSS14P **Credit: 2**

Course Objectives:

1. To introduce the programming skills using C language
2. To enhance the analyzing and problem solving skills and use the same for writing Programs in C

XX ACADEMIC COUNCIL

List of Programs

Formula Substitution

1. Check whether the given number is odd or even
2. Find sum of the digits and reverse the digits
3. Generate the Fibonacci series
4. Generate Prime number within range
5. Find whether a given number is Armstrong or not
6. Count the number of positive, negative and zero in the list
7. C Program to solve the Quadratic Equation
8. C Program to find the area of various shapes using switch case

Array

9. Create a C Program to Find Matrix Addition , Subtraction, Multiplication and Transpose of a matrix using switch case
10. Create a C Program to Check whether the element is present in the given list or not
11. Create a C Program to sort numbers in ascending and descending order
12. Create a C Program to sort names in Alphabetical order

Functions & Structures

13. Create a C Program to find the factorial of a given number using function declaration
14. Create a C Program to find the factorial of a given number using recursion function
15. Create a C Program to Prepare student mark list using structure
16. Create a C Program to Prepare electricity bill using structure

String Manipulation

17. Create a C Program to count the vowels in the given string
18. Create a C Program to convert the case of given string from upper case to lower case and vice versa

Pointers

19. Create a C Program to sort numbers in ascending order using pointers
20. Create a C Program to find average of two numbers using pointers

Note:-Questions for Internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Remember the control structures and loops
CO2: Apply the concepts of functions and pointers
CO3: Analyze the concepts of structures by creating student mark list and electricity bill
CO4: Evaluate string handling functions
CO5: Create programs with pointers, arrays and structures

SVKM'S ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	3	1	9	9	9	**43**
CO5	9	3	3	1	9	9	9	**43**
Total	45	15	15	5	45	45	45	**215**

Low-1 Medium-3 High-9

Core IV - Python Programming

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 4**
Subject Code: IBDSC22 **Credit: 4**

Course Objectives:

1.To know lists, tuples and dictionaries in Python programs.
2.To understand exception handling in Python applications for error handling.

Unit I **(12 hours)**

Introduction: History of Python- Need of Python Programming- Applications Basics of Python Programming Using the REPL(Shell)- Running Python Scripts- Variables- Assignment- Keywords- Input- Output- Indentation.

Unit II **(12 hours)**

Types, Operators and Expressions: Types - Integers- Strings- Booleans; Operators- Arithmetic Operators- Comparison (Relational) Operators- Assignment Operators- Logical Operators- Bitwise Operators- Membership Operators- Identity Operators- Expressions.

Unit III **(12 hours)**

Data Structures and Control Flow: Lists- Operations- Slicing- Methods- Tuples- Sets- Dictionaries- Sequences- Comprehensions- Conditional blocks using If- Else and El-if- For Loop- For loop using Ranges- String- list and Dictionaries- While Loop- Loop Manipulation using Pass- Continue- Break and Else- Conditional and Loops Block.

Unit IV **(12 hours)**

Functions, Modules and Packages: Defining Functions- Calling Functions- Passing Arguments- Keyword Arguments- Default Arguments- Variable-length arguments- Anonymous Functions- Function Returning Values- Scope of the Variables in a Function - Global and Local

ACADEMIC COUNCIL

Variables. Creating modules- Name Spacing- Introduction to PIP- Installing Packages via PIP- Using Python Packages.

Unit V **(12 hours)**

Object Oriented Programming & Exception Handling: Classes- Self-Variable- Methods- Constructor Method- Inheritance- Overriding Methods- Data Hiding- Difference between an Error and Exception- Handling Exception- Try Except Block- Raising Exceptions- and User Defined Exceptions.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Outline lists, tuples, and dictionaries in Python programs

CO2: Demonstrate the concepts of loops and decision statements in Python

CO3: Illustrate functions and pass arguments in Python

CO4: Design object-oriented programs with Python classes

CO5: Develop Python applications.

Text Book:

1. R. Nageswara Rao, *Core Python Programming*, Dreamtech, 2018

Reference Books:

1. John Hearty, *Advanced Machine Learning with Python*, Packt, 2016
2. Jake VanderPlas, *Python Data Science Handbook: Essential Tools for Working with Data*, O'Reilly, 2016
3. Mark Lutz, *Programming Python*, O'Reilly,2010
4. Tim Hall and J-P Stacey, *Python 3 for Absolute Beginners*, Apress,2009

E-Resources:

3. https://onlinecourses.nptel.ac.in/noc22_cs32/preview
4. https://onlinecourses.nptel.ac.in/noc22_cs31/preview

Course Outcome	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	1	9	9	9	**49**
CO2	9	3	9	1	9	9	9	**49**
CO3	9	3	9	1	9	9	9	**49**
CO4	9	3	9	1	9	9	9	**49**
CO5	9	3	9	1	9	9	9	**49**
Total	**45**	**15**	**45**	**5**	**45**	**45**	**45**	**245**

Low-1 Medium-3 High-9

XVI ACADEMIC COUNCIL

SEC II - Data Analytics Lab- I

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 2**
Subject Code: IBDSS24P **Credit: 2**

Course Objectives:

1. To know the modern quantitative tools to data analysis in a business context
2. To apply the tools to transform the data into useful information

List of Programs
Using Spread Sheet

1. To perform Basic Functions in Spread sheets
2. To perform Formatting and Proofing
3. To perform Mathematical & Text Functions
4. To Implement Date and Time Functions
5. To Implement Sorting
6. To Implement Filtering Techniques
7. To perform Logical Functions
8. To perform Data Validation
9. To display Pivot Tables
10. To display Charts and Slicers
11. To perform Lookup Functions

Note:-Questions for internal and external examination will be based on concept learnt

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Outline Excel functions to solve mathematical, text, date and time operations
CO2: Demonstrate the concepts of sorting, filtering using Excel
CO3: Illustrate Data validation feature of spread sheet
CO4: Evaluate Statistical operations using Pivot Table tool
CO5: Develop spread sheet with visualization using charts

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	1	9	9	**43**
CO2	9	1	9	3	1	9	9	**41**
CO3	9	1	9	3	1	9	9	**41**
CO4	9	1	9	3	1	9	9	**41**
CO5	9	3	9	3	1	9	9	**43**
Total	**45**	**9**	**45**	**15**	**5**	**45**	**45**	**209**

Low-1 Medium-3 High-9

XXI ACADEMIC COUNCIL

Core VI - Structured Query Language

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 4**
Subject Code: IBDSC32 **Credit: 4**

Course Objectives:

1. To know the basic concepts and the applications of Database Systems
2. To understand the basics of SQL and queries using SQL

Unit I **(12 hours)**

Introduction to Database Management Systems: Introduction-Database System Applications- Purpose of Database Systems- Views of Data- Data Abstraction- Instances and Schemas- Data Models- Database Languages- DDL- DML- Database Architecture- Database Users and Administrators- Database Design- ER Diagrams- Entities- Attributes and Entity Sets- Relationships and Relationship sets- Integrity Constraints- Views.

Unit II **(12 hours)**

SQL Operators and Relational Theorems: Relational Algebra and Calculus- Selection and Projection- Set Operations- Renaming- Joins- Division- Relational calculus- Tuple Relational Calculus- Domain Relational Calculus- Forms of Basic SQL Query- Nested Queries- Comparison Operators- Aggregate Operators- NULL values- Logical connectives- AND, OR and NOT- Outer Joins- Triggers.

Unit III **(12 hours)**

Normalization: Problems Caused by Redundancy- Decompositions- Functional Dependencies- Normal Forms- First, Second, Third Normal forms- BCNF- Properties of Decompositions- Loss less Join Decomposition- Dependency Preserving Decomposition- Multi Valued Dependencies- Fourth Normal Form- Join Dependencies- Fifth Normal Form.

Unit IV **(12 hours)**

Transactions: Transaction Management- Transaction Concept- Transaction State- Implementation of Atomicity and Durability- Concurrent Executions- Serializability- Recoverability- Implementation of Isolation- testing for serializability- Concurrency Control- Lock- Timestamp Based Protocols- Validation Based Protocols- Recovery- Failure Classification- Storage Structure- Atomicity- Log Based Recovery- Remote Backup Systems.

Unit V **(12 hours)**

No SQL: Overview of No SQL- Types of No SQL Databases- No SQL Storage Architecture- CRUD Operations in MongoDB- Querying- Modifying and Managing No SQL Databases- Indexing and Ordering- Migrating from RDBMS to No SQL- No SQL in Cloud- Database Administration.

EX ACADEMIC COUNCIL

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Describe the basic concepts and the applications of Database Systems
CO2: Demonstrate basics of SQL and queries using SQL
CO3: Illustrate Normalization
CO4: Evaluate indexing and ordering in No SQL
CO5: Create No SQL data bases

Text Book:
1.Guy Harrison, 2015, *Next Generation Databases: No SQL and Big Data*, Apress.

Reference Books:
1.Ramez Elmasri, ShamkatB.Navathe, 2013, *Database Systems*, Pearson.
2.Pramod J. Sadalage, Martin Fowler, 2012, *No SQL Distilled*, Addison Wesley.
3.A.Silberschatz, H.F. Korth, S.Sudarshan, 2006, *Database System Concepts*, McGraw Hill.
4.Raghurama Krishnan, Johannes Gehrke, 2003, *Database Management Systems*, McGraw Hill

E-Resources:
1.https://archive.nptel.ac.in/courses/106/105/106105175/
2.https://onlinecourses.nptel.ac.in/noc21_cs04/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	3	3	**31**
CO2	9	3	9	1	9	9	3	**43**
CO3	9	3	9	1	9	9	3	**43**
CO4	9	3	3	1	9	3	3	**31**
CO5	9	3	3	1	9	3	3	**31**
Total	**45**	**15**	**27**	**5**	**45**	**27**	**15**	**179**

Low-1 Medium-3 High-9

AECC I -Natural Language Processing

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 4**
Subject Code: IBDSA33 **Credit: 4**

Course Objectives:
1. To know the concepts of Text Analytics, Unstructured Information Analysis for better decision making
2. To understand the roots behind Text Mining which evolved from Machine Learning, Natural Language Processing and Statistics

XX ACADEMIC COUNCIL

Unit I **(12 hours)**

Introduction to Text Mining: Basics of Text Mining- Natural Language Content Analysis- Core Text Mining Operations- Associations- Using Background Knowledge for Text Mining- Domain Ontologies- Domain Lexicons. Text Mining Pre-processing Techniques- Task Oriented Approaches- NLP Tasks- Tokenization- Part-of-Speech Tagging- Syntactical Parsing and Shallow Parsing.

Unit II **(12 hours)**

Extracting Features, Relations from Text: Finding Implicit Features- Finding Opinion Phrases and their Polarity- Context-Specific Word Semantic Orientation- Analysis of Word- and Document Frequency- tf-idf - Zipf's Law- bind tf-idf Function- Subsequence Kernels for Relation Extraction- Capturing Relation Patterns with a String Kernel.

Unit III **(12 hours)**

Text Categorization and Clustering: Applications of Text Categorization- Document Representation- Knowledge Engineering Approach to Text Categorization- Machine Learning Approach to Text Categorization- Evaluation of Text Classifiers. Clustering Tasks in Text Analysis- Clustering Algorithms and Clustering of Textual Data.

Unit IV **(12 hours)**

Relationships between Words: Tokenizing by N-gram- Counting and Filtering N-gram- Analyzing Bigrams to provide Context in Sentiment Analysis- visualizing a Network of Bigrams using ggraph- Counting and Correlating Pairs of Words with the widyr Package- Counting and Correlating among Sections- Examining Pairwise Correlation.

Unit V **(12 hours)**

Topic Modelling and Probabilistic Models for Information Extraction: Latent Dirichlet Allocation- Word Topic Probabilities- Per-Document Classification- By-words Assignments- Alternative LDA Implementations. Hidden Markov models- Stochastic Context Free Grammar- Conditional Random fields- Parallel Learning Algorithms.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe the approaches to Syntax and Semantics in NLP

CO2: Demonstrate various methods for Statistical approaches to Machine Translation

CO3: Illustrate Topic Modelling and Probabilistic Models for Information Extraction.

CO4: Implement and deploy programs based on Relationship Extraction, POS Tagging and clustering Algorithms based on NLP.

CO5: Build Models which extract information from Textual Unstructured Data

Text Book:

1. Julia Silge, David Robinson, 2018, *Text Mining with R-A Tidy Approach*, O'Reilly

Reference Books:

1. Matthew L. Jockers, 2014, *Text Analysis with R for Students of Literature*, Springer.

ACADEMIC COUNCIL

2. James Pustejovsky, Amber Stubbs, 2012, *Natural Language Annotation for Machine Learning*, O'Reilly.
3. Steve R. Poteet, 2007, *Natural Language Processing with Text Mining*, Springer.
4. James Sanger, Ronen Feldman, 2002, *The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data*, Cambridge.

E-Resources:

1. https://nptel.ac.in/courses/106105158
2. https://nptel.ac.in/courses/106101007

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	3	3	**31**
CO2	9	3	3	1	9	3	3	**31**
CO3	9	3	3	1	9	3	9	**37**
CO4	9	3	3	1	9	3	3	**31**
CO5	9	3	3	1	9	3	9	**37**
Total	**45**	**15**	**15**	**5**	**45**	**15**	**27**	**167**

Low-1 Medium-3 High-9

SEC III – PHP Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 2**
Subject Code: IBDSS34P **Credit: 2**

Course Objectives:

1. To understand the concepts of regular expressions including modifiers, operators and met characters
2. To develop PHP programs that use various PHP library functions and that manipulate files and directories

List of Programs

1. Develop a PHP program to print Sum of digits
2. Develop a PHP program to print factorial of a number
3. Develop a PHP program to display count, from 10 to 20 using loop
4. Develop a PHP program to print prime number
5. Develop a PHP program to check Armstrong number
6. Develop a PHP program to check Palindrome number
7. Develop a PHP program to swap two numbers with and without using third variable.

XXX ACADEMIC COUNCIL

8. Develop a PHP program to reverse the number with strrev ().
9. Develop a PHP program to show day of the week (for eg: Monday) based on numbers using Switch/case statements
10. Develop a PHP program to print alphabet triangle
11. Develop a PHP program to check student grade based on the marks using if- else statement
12. Develop a PHP program Using nested for loop that creates a chess board

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe the fundamentals of PHP Language in trivial problem solving
CO2: Determine solution to a problem and apply control structures
CO3: Simplify the use of Strings and String Handling functions
CO4: Justify real time applications using PHP language features.
CO5: Build skill on problem solving by constructing algorithms

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	9	1	1	**25**
CO2	9	3	3	3	9	3	3	**33**
CO3	9	3	1	3	9	9	3	**37**
CO4	9	3	3	3	9	9	3	**39**
CO5	9	3	3	3	9	9	3	**39**
Total	**45**	**15**	**11**	**13**	**45**	**31**	**13**	**173**

Low-1 Medium-3 High-9

Core VIII - Machine Learning & Artificial Intelligence

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 5**
Subject Code: IBDSC42 **Credit: 4**

Course Objectives:

1. To gain critical knowledge and understanding about major Data Mining procedures like Decision Tree, Cluster Analysis
2. To apply and practice this gained knowledge in variety of Business Scenario

Unit I **(15 hours)**

Classification and Regression Tree: Classification & Regression- working of a Decision Tree- Attribute Selection Measures- Information Gain- Gain Ratio- Gini Index- Building Decision

XXI ACADEMIC COUNCIL

Trees- CART- C5.0 and CHAID Trees- Prediction by Decision Tree- Advantages and Disadvantages of Decision Trees- Model Overfitting- Building Decision Trees in R.

Unit II **(15 hours)**

Clustering: Cluster Analysis versus Factor Analysis- Overview of Basic Clustering Methods- Agglomerative Hierarchical Clustering- Within-Group Linkage- Nearest Neighbor or Single Linkage- Furthest Neighbor or Complete Linkage- Centroid Clustering- Ward's Method- K-Means Algorithm- Dendrogram- Profiling of Cluster- Cluster Evaluation.

Unit III **(15 hours)**

Support Vector Machine: Decision Boundaries for Support Vector Machine- Maximum Margin Hyperplanes- Structural Risk Minimization- Linear SVM-Separable Case- Linear SVM-Non-Separable Case- Kernel Function- Kernel Trick- Kernel Hilbert Space- Model Evaluation.

Unit IV **(15 hours)**

Marret Basket Analysis: Market Basket Analysis and Association Analysis- Market Basket Data- Stores- Customers- Orders- Items- Order Characteristics- Product Popularity- Tracking Marketing Interventions- Association Rules- Support- Confidence- Lift- Chi-Square Value- Sequential Pattern Analysis.

Unit V **(15 hours)**

Introduction to Artificial Intelligence: Current Trends in AI- Intelligent Agents- Environments- Problem Solving Agents- Searching Techniques- Knowledge and Reasoning in AI- Forms of Learning- Structure of a Neural Network- Analogy with Biological Neural Network- Activation Functions- Gradient Descent- Model Accuracy.

Course Outcomes:

After successful completion of this course, student will be able to

CO 1: Describe the wide variety of Statistical and Machine Learning Algorithms

CO 2: Demonstrate Machine Learning techniques

CO 3: Analyze the performance of machine learning algorithms

CO 4: Evaluate performance of machine learning algorithms and select the best one based on the solution.

CO 5: Create Programming Framework to obtain acceptable decisions for the Real-World problems.

Text Book:

1.Kevin Knight, Elaine Rich, B.Nair, 2017, *Artificial Intelligence*, McGraw Hill

Reference Books:

1. Han, Jiawei and Kamber, Micheline, 2012, *Data Mining: Concepts and Techniques*, Morgan Kaufman Publishers.
2. AnandRajaraman, 2011, *Mining of Massive Datasets*, Cambridge University Press.

XX ACADEMIC COUNCIL

3. Mitchell, 2013, *Machine Learning*, McGraw Hill.
4. Stuart Russell, Peter Norvig, 2004, *Artificial Intelligence – A Modern Approach*, Pearson.

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc21_cs42/preview
2. https://onlinecourses.nptel.ac.in/noc22_cs24/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	1	9	9	9	**49**
CO2	9	3	9	1	9	9	9	**49**
CO3	9	3	9	1	9	9	9	**49**
CO4	9	3	9	1	9	9	9	**49**
CO5	9	3	9	1	9	9	9	**49**
Total	**45**	**15**	**45**	**5**	**45**	**45**	**45**	**245**

Low-1 Medium-3 High-9

AECC II - Big Data Analytics

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 5**
Subject Code: IBDSA43 **Credit: 4**

Course Objectives:

1. To understand about Big Data Technology, Hadoop Ecosystem and various tools related to it.
2. To learn about the HDFS File System, Map Reduce Framework, analyzing data using Hbase and Hive along with the Integration of R with Hadoop.

Unit I **(15 hours)**

Introduction to Big Data: What Is Big Data? - History of Data Management- Evolution of Big Data- Structuring of Big Data- Elements of Big Data- Application of Big Data in the Business Context- Careers in Big Data. Business Applications of Big Data: The Significance of Social Network Data- Financial Fraud and Big Data- Fraud Detection in Insurance- Use of Big Data in the Retail Industry.

Unit II **(15 hours)**

Technologies for Handling Big Data: Distributed and Parallel Computing for Big Data- Understanding Hadoop- Cloud Computing- Grid Computing- and In-Memory Technology for Big Data. VMWare Installation of Hadoop- Linux and its Shell Commands- Different Hadoop Distributions and their advantages- Horton works- Cloudera- MapR.

ACADEMIC COUNCIL

Unit III **(15 hours)**

Understanding the Hadoop Ecosystem: The Hadoop Ecosystem- Storing Data with HDFS- Design of HDFS- HDFS Concepts- Command Line Interface to HDFS- Hadoop File Systems- Java Interface to Hadoop- Anatomy of a file read- Anatomy of a file write- Replica placement and Coherency Model- Parallel Copying with distcp- keeping an HDFS Cluster Balanced.

Unit IV **(15 hours)**

Map Reduce Fundamentals: Origins of Map Reduce- How Map Reduce Works- Optimization Techniques for Map Reduce Jobs- Applications of Map Reduce- Java Map Reduce classes (new API)- Data flow- combiner functions- running a distributed Map Reduce Job. Configuration API- setting up the development environment- Managing Configuration.

Unit V **(15 hours)**

Integrating R with Hadoop, Understanding Hive & Hbase: Understanding R-Hadoop- Integration Procedure- Packages needed for R under Hadoop Ecosystem- Text Mining for Deriving Useful Information using R within Hadoop- Introduction to Hive & Hbase- Hive and Hbase Architecture- Understanding Queries- Mining Big Data with Hive & Hbase.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the fundamentals of Big Data and its Applications in various Domains
CO2: Apply HDFS File Structure, Map Reduce Framework to solve complex problems
CO3: Analyze the technologies behind Big Data
CO4: Implement Hive/ Hbase shell pertaining to relational data handling under Hadoop.
CO5: Build applications integrating R with Hadoop

Text Book:

1. Arshdeep Bahga, 2016, *Big Data Science & Analytics: A Hands-On Approach,* VPT

Reference Books:

1. Tom White, 2012, *Hadoop: The Definitive Guide*, O'Reilly.
2. Adam Shook and Donald Miner, 2012, *Map Reduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems*, O'Reilly.
3. Dean Wampler, Edward Capriolo & Jason Rutherglen, 2012, *Programming Hive*, O'Reilly.
4. Lars George, 2011, *HBase - The Definitive Guide: Random Access to Your Planet-Size Data*,O'Reilly.

E-Resources:

3. https://nptel.ac.in/courses/106104189

XXACADEMIC COUNCIL

4. https://www.naukri.com/learning/big-data-computing-by-nptel-course-nptel33?enModal=Y&logFlow=N

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	3	3	**31**
CO2	9	3	9	1	9	9	3	**43**
CO3	9	3	3	1	9	9	9	**43**
CO4	9	3	9	1	9	9	9	**49**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**27**	**5**	**45**	**39**	**33**	**209**

Low-1 Medium-3 High-9

SEC IV - Data Analytics Lab II

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 2**
Subject Code: IBDSS44P **Credit: 2**

Course Objectives:

1. To identify datasets and explain how they are organized and manipulate data
2. To use functions for data visualization

List of Programs
Using R Tool:

1. To get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND)
2. To perform data import (.CSV, .XLS, .TXT) operations
3. To perform data export (.CSV, .XLS, .TXT) operations
4. To get the input matrix from user and perform Matrix addition, subtraction, multiplication, inverse transpose and division operations using vector concept
5. To create data frames and performs operations on it
6. To perform data pre-processing operations -Handling Missing data
7. To perform data pre-processing operations - Min-Max normalization
8. To perform statistical operations (Mean, Median, Mode and Standard deviation)
9. To perform Simple Linear Regression
10. To perform K-Means clustering operation and visualize for iris data set

XV ACADEMIC COUNCIL

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Outline R functions to perform numerical operations

CO2: Demonstrate the concepts of import/export operations

CO3: Illustrate data pre-processing operations

CO4: Evaluate Statistical operations

CO5: Develop an application using K-Means algorithm with visualization

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	1	9	9	**43**
CO2	9	1	9	3	1	9	9	**41**
CO3	9	1	9	3	1	9	9	**41**
CO4	9	1	9	3	1	9	9	**41**
CO5	9	3	9	3	1	9	9	**43**
Total	45	9	45	15	5	45	45	**209**

Low-1 Medium-3 High-9

Core X - Deep Learning

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 6**

Subject Code: IBDSC521 **Credit: 5**

Course Objectives:

1. To understand about the Deep learning, its principles and approaches
2. To learn about the Deep Learning algorithms and approaches.

Unit I **(18 hours)**

Fundamentals of Deep Networks: Defining Deep Learning- Common Architectural Principles of Deep Networks- Parameters- Layers- Activation Functions- Loss Functions- Optimization Algorithms- Hyper parameters and Frameworks to Deploy Deep learning Networks - Building Blocks of Deep Networks- Restricted Boltzmann Machines – Auto-encoders and Variational Auto-encoders.

Unit II **(18 hours)**

Regularization & Optimization for Training Deep Models: Parameter Norm Penalties- Norm Penalties as Constrained Optimization- Regularization and Under-Constrained Problems- Dataset Augmentation- Multitask Learning- Parameter Tying and Sharing- Sparse Representations- Ensemble Methods and Challenges in Neural Network Optimization- Basic

VAC ACADEMIC COUNCIL

Algorithms and Algorithms with Adaptive Learning Rates- Approximate Second Order- Optimization Strategies and Meta Algorithms.

Unit III **(18 hours)**

Convolutional Neural Networks: Convolution Operation- Pooling- Shortcomings of Feature Selection- Filters and Feature Maps- Convolutional layer- Architecture of CNN- Working with MNIST dataset- Image Pre- processing Pipelines- Accelerating Training with Batch Normalization- Building a CNN - The Neuro- Scientific Basis for CNN.

Unit IV **(18 hours)**

Sequence Analysis: Analyzing Variable-Length Inputs- tackling seq2seq with Neural N-Grams- Implementing Part-of- Speech Tagger- Unfolding Computation Graphs- Recurrent Neural Networks- Bidirectional-RNN- Recursive Neural Network- Echo-State Networks- Long Short-Term Memory- Tensor flow Primitives for RNN models- Implementing Sentiment Analysis Model.

Unit V **(18 hours)**

Applications of Deep Learning: Deep Reinforcement Learning- Markov Decision Processes- Versus Exploit- Policy versus Value learning- Open AI Gym- Q-Learning and Deep Q-Networks- Applications of Deep Learning in various disciplines such as Computer Vision- Speech Recognition- NLP and others.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe Deep Learning algorithms and approaches

CO2: Apply Deep Learning algorithms to solve problems which are almost impossible to handle via Traditional Approaches

CO3: Illustrate different types of Deep Neural Networks like CNN

CO4: Apply deep learning algorithms in real time problems

CO5: Develop applications such as NLP using Deep Learning Algorithms

Text Book:

1. Josh Patterson and Adam Gibson. (2018). *Deep Learning: A Practitioner's Approach*. O'Reilly.

Reference Books:

1. Francois Chollet. (2018). *Deep Learning with Python*. O'Reilly.
2. Sandro Skansi. (2018). *Introduction to Deep Learning: From Logical Calculus to Artificial Intelligence*. Springer.
3. Antonio Gulli and Sujit Pal. (2017). *Deep Learning with Keras*. Packt.
4. Nikhil Buduma. (2017). *Fundamentals of Deep Learning*. O'Reilly.
5. Ian GoodFellow, Yoshua Bengio and Aaron Courville. (2016). *Deep Learning*. MITPress.

XV ACADEMIC COUNCIL

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc20_cs62/preview
2. https://nptel.ac.in/courses/106106184

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	1	9	9	9	**49**
CO2	9	3	9	1	9	9	9	**49**
CO3	9	3	9	1	9	9	9	**49**
CO4	9	3	9	1	9	9	9	**49**
CO5	9	3	9	1	9	9	9	**49**
Total	**45**	**15**	**45**	**5**	**45**	**45**	**45**	**245**

Low-1 Medium-3 High-9

DSE I - a) Time Series Analysis and Forecasting

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBDSE5A **Credit: 4**

Course Objectives:

1. To equip students with various time series and forecasting methods and techniques to increase the knowledge on modern statistical methods for analyzing time series data
2. To understand the principles behind time series and forecasting techniques for analyzing various Stationary and Nonstationary time series model

Unit I **(12 hours)**

Introduction to Time Series: Examples of Time Series - Objectives of Time Series Analysis - Some Simple Time Series Models - **Introduction to Forecasting:** The Nature and Uses of Forecasts – Some Example of Time Series – The Forecasting Process – Data for Forecasting – Resources for Forecasting.

Unit II **(12 hours)**

Statistics Background for Forecasting: Introduction – Graphical Displays – Numerical Description of Time Series Data – Use of Data Transformations and Adjustments-General Approach to Time Series Modeling and Forecasting – Evaluating and Monitoring Forecasting Model Performance.

KK ACADEMIC COUNCIL

Unit III **(12 hours)**

Stationary Processes: Basic Properties - Linear Processes - Introduction to ARMA Processes - Properties of the Sample Mean and Autocorrelation Function – Forecasting Stationary Time Series - **ARMA Models**: ARMA(p, q) Processes - The ACF and PACF of an ARMA(p, q) Process - Forecasting ARMA Processes.

Unit IV **(12 hours)**

Nonstationary and Seasonal Time Series Models: ARIMA Models for Nonstationary Time Series - Identification Techniques - Forecasting ARIMA Models - Seasonal ARIMA Models - **Forecasting Techniques:** The ARAR Algorithm - The Holt–Winters Algorithm.

Unit V **(12 hours)**

Survey of other Forecasting Methods: Multivariate Time Series Models and Forecasting -State Space Model – Arch and Garch Model – Neural Networks and Forecasting – Spectral Analysis – Bayesian Methods in Forecasting.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Explain the concept of Time Series & Forecasting, Stationary, Nonstationary Process and Forecasting Methods

CO2: Apply the models of ARMA, ARIMA and various methods in forecasting process

CO3: Examine an example of time series models, general approach to time series modeling and forecasting and various methods in forecasting

CO4: Evaluate the performance of forecasting models, ARAR Algorithm and Holt - Winters Algorithm

CO5: Elaborate an objective of time series analysis, uses of forecasts, statistics background of forecasting and using various models in forecasting

Text Books:

1. Peter J. Brockwell, Richard A. Davis, *Introduction to Time Series and Forecasting*, Springer New York, Second Edition, 2002.
2. Douglas C. Montgomery, Cheryl L. Jennings, Murat Kulahci, *Introduction to Time Series Analysis and Forecasting*,John Wiley and Sons Publication, Second Edition, 2016.

Reference Books:

1. Bruce L. Bowerman, Richard O'Connell, Anne Koehler, *Forecasting, Time Series, and Regression***,** Cengage Unlimited Publishers, Fourth Edition, 2005.
2. George E. P. Box, Gwilym M. Jenkins, Gregory C. Reinsel, Greta M. Ljung, *Time Series Analysis Forecasting and Control*, John Wiley and Sons Publication, Fifth Edition, 2016.

E – Resources:

1. https://nptel.ac.in/courses/111/104/111104098/

XXACADEMIC COUNCIL

2. https://www.udacity.com/course/time-series-forecasting--ud980

Course Outcome	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	1	1	1	1	1	9	23
CO2	9	1	3	1	1	3	9	27
CO3	9	1	3	1	1	1	9	25
CO4	9	3	9	3	3	3	9	39
CO5	9	3	9	3	3	9	9	45
Total	45	9	25	9	9	17	45	159

Low-1 Medium-3 High-9

DSE I - b) Predictive Analysis

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBDSE51B **Credit: 4**

Course Objectives:

1. Develop skills to analyze complex data sets
2. Develop theoretical understanding of modeling techniques in data science

Unit I **(12 hours)**

Linear Methods for Regression and Classification: Overview of supervised learning, Linear regression models and least squares, Multiple regression, Multiple outputs, Subset selection , Ridge regression, Lasso regression , Linear Discriminant Analysis , Logistic regression , Perceptron learning algorithm.

Unit II **(12 hours)**

Model Assesment and Selection : Bias,Variance,and model complexity,Bias-variance trade off, Optimisim of the training error rate ,Esimate of In-sample prediction error,Effective number of parameters , Bayesian approach and BIC, Cross- validation ,Boot strap methods, conditional or expected test error.

Unit III **(12 hours)**

Additive Models,Trees,and Boosting: Generalized additive models, Regression and classification trees , Boosting methods-exponential loss and AdaBoost, Numerical Optimization via gradient boosting ,Examples (Spam data, California housing , NewZealand fish, Demographic data)

Unit IV **(12 hours)**

Neural Networks(NN) , Support Vector Machines(SVM),and K-nearest Neighbor: Fitting neural networks, Back propagation, Issues in training NN, SVM for classification, Reproducing Kernels, SVM for regression, K-nearest –Neighbour classifiers(Image Scene Classification)

ACADEMIC COUNCIL

Unit V **(12 hours)**

Unsupervised Learning and Random forests: Association rules, Cluster analysis, Principal Components,Random forests and analysis.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Formulate complex decision-making problems based on predictive analysis

CO2: Illustrate tfe formulation of complex decision-making problems

CO3: Analyze and evaluate predictive model outcomes for informing strategic decision-making processes

CO4: Evaluate the basic statistical and analytics tools for developing understanding of predictive methods and models

CO5: Build models using predictive analysis

Text Book:

1.Predictive Analytics for Dummies, Anasse Bari, Mohamed Chaouchi, Tommy Jung, Wiley Publication,2016

Reference Books:

1.C.M.Bishop –Pattern Recognition and Machine Learning,Springer,2006

2. Trevor Hastie, Robert Tibshirani, Jerome Friedman , The Elements of Statistical Learning-Data Mining, Inference, and Prediction ,Second Edition , Springer Verlag, 2009.

E – Resource:

1.https://onlinecourses.nptel.ac.in/noc23_ma46/preview

Course Outcome	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	1	1	1	1	9	**23**
CO2	9	1	3	1	1	3	9	**27**
CO3	9	1	3	1	1	1	9	**25**
CO4	9	3	9	3	3	3	9	**39**
CO5	9	3	9	3	3	9	9	**45**
Total	**45**	**9**	**28**	**9**	**9**	**17**	**45**	**159**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

DSE II - b) Data Mining

(For Students Admitted from 2024-25)

Semester: V **Hours/Week: 4**
Subject Code: IBDSE51D **Credit: 4**

Course Objectives:

1.It presents methods for mining frequent patterns, associations, and correlations
2.It describes methods for data classification and prediction, and data–clustering

Unit I **(12 hours)**

Data Mining: Data–Types of Data–, Data Mining Functionalities– Interestingness Patterns– Classification of Data Mining systems– Data mining Task primitives –Integration of Data mining system with a Data warehouse–Major issues in Data Mining–Data Preprocessing.

Unit II **(12 hours)**

Association Rule Mining: Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis– Constraint based Association mining. Graph Pattern Mining, SPM.

Unit III **(12 hours)**

Classification: Classification and Prediction **–** Basic concepts–Decision tree induction–Bayesian classification, Rule–based classification, Lazy learner.

Unit IV **(12 hours)**

Clustering and Applications: Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Grid–Based Methods, Outlier Analysis.

Unit V **(12 hours)**

Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data—Mining sequence patterns in Transactional databases– Mining Object– Spatial– Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining– Mining the World Wide Web.

Course Outcomes:

On the successful completion of the course, student will be able to
CO1: Ability to understand the types of the data to be mined and primitives to integrate a data mining system.
CO2: Apply preprocessing methods for any given raw data.
CO3: Extract interesting patterns from large amounts of data.
CO4: Discover the role played by data mining in various fields.
CO5: Choose and employ suitable data mining algorithms to build analytical applications

AA ACADEMIC COUNCIL

Text Book:

1.Data Mining – Concepts and Techniques – Jiawei Han & Micheline Kamber, 3rd Edition Elsevier, 2011

Reference Books:

1.Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.

2.Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA,2006.

E – Resource:

1.https://onlinecourses.nptel.ac.in/noc21_cs06/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	9	**49**
CO2	9	3	3	1	9	3	9	**43**
CO3	9	3	3	1	9	3	9	**37**
CO4	9	3	3	1	9	3	9	**43**
CO5	9	3	3	1	9	3	9	**37**
Total	**45**	**27**	**15**	**5**	**45**	**27**	**45**	**209**

Low-1 Medium-3 High-9

SEC V– Programming in Java Lab

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 2**
Subject Code: IBDSS54P **Credit: 2**

Course Objectives:

1. To make the students to understand Programming language Java to implement sorting and searching techniques
2. To create programs to solve simple calculations, check whether the given number is prime, perfect or Armstrong

List of Programs

Formula Substitution

1. Find the factorial and binomial coefficient
2. Calculate mean, variance and standard deviation
3. Develop the programs for Number conversions (Decimal to Binary, etc.)

VK ACADEMIC COUNCIL

Checking

4. Develop the programs for Number checking (prime, perfect, etc.)

Generation

5. Develop the programs for Number generation (prime, perfect, etc.)

Array

6. Arrange numbers and names in order
7. Perform matrix addition, subtraction, multiplication & transpose

Searching

8. Develop the programs for performing Linear search and binary search

String

9. Develop the programs for String manipulations (case conversion, reversing, etc.)

OOP Concepts

10. Develop the program for implementing inheritance
11. Develop the program for implementing exception handling
12. Develop the program for implementing multithreading

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Outline Java programs that solve simple mathematical problems, number checking and number generation

CO2: Demonstrate the concepts of String Manipulation, Linear Search and Binary Search

CO3: Illustrate OOP in Java programming like inheritance

CO4: Evaluate the multi-threaded programs

CO5: Develop Exception handling programs

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	3	9	**39**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	9	9	9	9	9	9	**63**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**33**	**27**	**33**	**45**	**33**	**45**	**261**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core XIV- Computer Vision

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 5**
Subject Code: IBDSC63 **Credit: 4**

Course Objectives:

1. To know the fundamentals of Image Processing, Formation Models and Model Estimation Techniques
2. To able to implement fundamental image processing required for computer vision

Unit I **(15 hours)**

Introduction: Image Processing- Computer Vision and Computer Graphics- Levels in Computer Vision- Applications- Document Image Analysis- Biometrics- Object Recognition- Tracking- Medical Image Analysis- Content-Based Image Retrieval- Video Data Processing.

Unit II **(15 hours)**

Image Formation Models: Monocular Imaging System- Radiosity- Radiance- Irradiance- Colour- Orthographic and Perspective Projection- Camera Model and Camera Calibration- Binocular Imaging Systems- Multiple Views Geometry- Structure Determination- Photometric Stereo- Depth from Defocus- Construction of 3D Model from Images.

Unit III **(15 hours)**

Image Processing and Model Estimation: Image Representation and Processing- Continuous and Discrete Processing Methods- Edge Detection- Regularization Theory- Optical Computation- Motion Estimation Techniques- Structure from Motion- Stereo Vision.

Unit IV **(15 hours)**

Shape Representation and Segmentation: Contour Based Representation- Region Based Representation- Deformable Curves and Surfaces- Snakes and Active Contours- Level Set Representations- Fourier and Wavelet Descriptors- Medial Representations- Multi Resolution Analysis.

Unit V **(15 hours)**

Applications of Computer Vision: Object Detection and Recognition- Face Detection- Face Recognition- Eigen Faces- Active Appearance and 3D Shape Models of Faces- Surveillance- Foreground and Background Separation- Particle Filters- Chamfer Matching- Tracking and Occlusion- Combining Views from Multiple Cameras.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Interpret the image formation process.

CO2: Determine the fundamental image processing techniques required for computer vision.

XII ACADEMIC COUNCIL

CO3: Illustrate shape analysis, extract features, and generate 3D Models from Images.
CO4: Evaluate video processing, motion capturing, and 3D Vision
CO5: Develop applications using computer vision techniques.

Text Book:

1. D. Forsyth and J. Ponce. (2018). *Computer Vision – A Modern Approach*. Prentice Hall.

Reference Books:

1. E. Trucco. (2017). *Introductory Techniques for 3D Computer Vision.* Prentice Hall.
2. R.C. Gonazlez. (2017). *Digital Image Processing.* Addison Wesley.
3. Mark Nixon (2016). *Feature Extraction and Image Processing for Computer Vision*. Academic Press.
4. Simon J. D. Prince (2015). *Computer Vision – Models, Learning and Inference*. Cambridge.
5. Richard Szeliski (2013). *Computer Vision – Algorithms and Applications*. Springer.

E-Resources:

1. https://nptel.ac.in/courses/108103174
2. https://onlinecourses.nptel.ac.in/noc19_cs58/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	1	9	9	9	**49**
CO2	9	3	3	1	9	9	9	**43**
CO3	9	3	9	1	9	9	9	**49**
CO4	9	3	9	1	9	9	9	**49**
CO5	9	3	3	1	9	9	9	**43**
Total	**45**	**15**	**33**	**5**	**45**	**45**	**45**	**233**

Low-1 Medium-3 High-9

DSE III - a) Data Structures and Algorithms

(For Students Admitted from 2024-25)

Semester: VI **Hours / week: 4**
Subject Code: IBDSE6A **Credit: 4**

Course Objectives:

1.To understand the concepts of abstract data types. linear and nonlinear data structures
2.To be able to implement the ADTs stack, queue, and dequeue and to provide students with solid foundations to deal with variety of computational problems

XV ACADEMIC COUNCIL

Unit I **(12 hours)**

Introduction: Mathematical Notations and Functions - Algorithmic Notations - Complexity of Algorithms - Other Asymptotic Notations for Complexity of Algorithms- Sub algorithms. **Linear Data Structures:** List ADT, Singly linked lists - Doubly linked lists and Circular Linked Lists - Stack ADT, Implementation of Stacks and applications. Queue ADT, Implementation of Queue and applications.

Unit II **(12 hours)**

Non-Linear Data Structure: Trees: Introduction – Binary Trees-Representing Binary Trees in memory-Traversing Binary Trees - Traversal algorithms using Stacks- **Graphs:** Graph Notation – Searching a Graph- Kruskal's algorithm-Dijkstra's algorithm- Graph representations.

Unit III **(12 hours)**

Balanced Binary Search Trees: Binary Search Trees-AVL Trees - Splay Trees- Iterative Splaying - Recursive Splaying - Performance Analysis.

Unit IV **(12 hours)**

B-Trees: Relational Databases - B-Tree Organization -The Advantages of B-Trees - B- Tree Implementation -B-Tree Insert - B-Tree Delete. **Sorting:** Preliminaries – Insertion Sort – Shell sort – Heap sort – Merge sort – Quicksort - Bucket Sort.

Unit V **(12 hours)**

Algorithm Design Techniques: Greedy Algorithms – Huffman Codes – Approximate Bin Packing- Divide and Conquer – Running Time of Divide and Conquer Algorithms– Dynamic Programming- Backtracking Algorithms.

Course Outcomes:

After successful completion of the course, the students will be able to

CO 1: Explain the basics concept of data structures and Algorithm stacks, queues and lists
CO 2: Distinguish about knowledge of tree and graphs concepts
CO 3: Analyze the concepts about searching and sorting techniques
CO 4: Demonstrate the types of Trees
CO 5: Evaluate about Algorithm and step by step approach in solving problems with the help of fundamental data structure

Text Books:

1. Seymour Lipchutz, *Data Structures,* Special Indian Edition, Revised First Edition, 2014.
2. Mark Allen Weiss — *Data Structures and Algorithm Analysis in C++,* Pearson Education Limited, 4th Edition, 2014.
3. Kent D. Lee, Steve Hubbard, *Data Structures and Algorithms with Python* Springer International Publishing, Switzerland, 2015.

XV ACADEMIC COUNCIL

Reference Books:

1. Ellis Horowitz & Sartaj Sahni, *Fundamentals of Data Structures*, Galgotia Book Source, 2nd Edition, New Delhi, 1992.
2. Alfred V.Aho Johne, Hopcroft, *Data Structures and Algorithm*, 3rd Edition, Addison-Wesley, 2012.
3. S.Sridhar, *Design and Analysis of Algorithms*, 2014.

E-Resources:

1. http://www.math.tau.ac.il/~matias/ds03.html
2. https://onlinecourses.nptel.ac.in/noc20_cs70/preview
3. https://www.tutorialspoint.com/python_data_structure/python_data_structure_tutorial.pdf

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	1	1	**19**
CO2	9	3	9	1	9	1	3	**35**
CO3	9	1	9	9	1	1	3	**33**
CO4	9	3	3	3	3	3	3	**27**
CO5	9	1	1	9	9	9	3	**41**
Total	**45**	**11**	**23**	**23**	**25**	**15**	**13**	**155**

Low-1 Medium-3 High-9

DSE III - b) Database Security

(For Students Admitted from 2024-25)

Semester: VI **Hours / week: 4**
Subject Code: IBDSE6B **Credit: 4**

Course Objectives:

1. To understand the fundamentals of security, and how it relates to information Systems
2. To provide an overview of database security concepts and techniques and describe new directions of database security in the context of information technology

Unit I **(12 hours)**

Security and Information Technology: Why Database Security? - A Secure Data Environment - Database Security Objectives - Who Are We Securing Ourselves Against? - Hackers - Network and Database Administrators-E-Mails. Malware: Computer Viruses - Worms-Trojan Viruses-Bots. Security Architecture: Assessment and Analysis-Design and Modeling - Deployment-Management and Support.

VK ACADEMIC COUNCIL

Unit II **(12 hours)**

Global Policies for the Database Environment: Security Policies- Update and Upgrade Management- Backup Management Plan- The Disaster Plan. Database Review: Database Structure Components - Database Models-Database Types- Database Management Systems.

Unit III **(12 hours)**

Oracle Architecture: The Instance and the Database- The Physical Structure- The Memory Structure- The Processes. Password, Profiles, Privileges, and Roles: Authentication - Authorization. Security Auditing: Security Auditing - Audit Classification - The Goal of an Audit - The Auditing Process.

Unit IV **(12 hours)**

Database Auditing: Preparation and Planning for a Database Security Audit-**The Database**. Audit-Reporting a Database Security Audit-Vendor-Specific Auditing Information.

Unit V **(12 hours)**

Security Testing: Security Testing Classification- The Goal of Security Testing. **Testing Methodology**: Planning and Preparation Phase- Execution Phase- Escalating Privileges- Reporting Phase.

Course Outcomes:

After successful completion of this course, student will be able to

CO 1: Describe the concepts of Database security and access control
CO 2: Demonstrate the database systems structure
CO 3: Analyze security auditing and security testing
CO 4: Determine Database issues in Trust Management
CO 5: Build skill for solving complex problems in a team of database workers

Text Book:

1. Alfred Basta and Melissa Zgola, *Database Security*, Course Technology, Cengage Learning, 2012.

Reference Books:

1. Alan Williams, Angeline Janet Dhanarani, Ashok Swaminathan, Bettina Schäumer, Manish Choudhary, Michael Mesaros, *Securing the Oracle Database A technical primer***,** Fourth Edition, 2021.
2. Michael Gertz, Sushil Jajodia George Mason, *Handbook of Database Security Applications and Trends*, Springer Science + Business Media, LLC, 2008.

E- Resources:

1. https://nptel.ac.in/courses/106/104/106104135/
2. https://www.careers360.com/courses-certifications/swayam-database- management-courses-brp-org

XAC ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	3	1	3	9	1	3	29
CO2	9	3	1	1	9	1	1	25
CO3	9	3	3	3	9	3	3	33
CO4	9	3	1	1	9	3	3	29
CO5	9	3	9	3	9	9	3	45
Total	45	15	15	11	45	17	13	161

Low-1 Medium-3 High-9

SEC VI - Data Mining Lab

(For Students Admitted from 2024-25)

Semester: VI **Hours / week: 2**
Subject Code: IBDSS65P **Credit: 2**

Course Objectives:

1. To understand data mining process and important issues around data cleaning, pre-processing and integration, principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.
2. To get exposure to real life data sets for analysis and prediction and learn performance evaluation of data mining algorithms in a supervised and an unsupervised learning

List of Programs

1. Demonstration of preprocessing on dataset student.arff
2. Demonstration of preprocessing on dataset labor.arff
3. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm
4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
5. Demonstration of classification rule process on dataset student.arff using j48 Algorithm
6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
8. Demonstration of classification rule process on dataset empl
9. Demonstration of clustering rule process on dataset iris.arff using simple k-means
10. Demonstration of clustering rule process on dataset student.arff using simple k means

XLI ACADEMIC COUNCIL

Note: Questions for the internal and external examination will be based on the concepts learnt

Course Outcomes:
After successful completion of this course, student will be able to

CO 1: Apply Data mining concept
CO 2: Extract knowledge using data mining techniques
CO 3: Adapt to new data mining tools
CO 4: Explore recent trends in data mining such as web mining, spatial-temporal mining
CO 5: Explore different types of algorithm

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	1	9	9	**43**
CO2	9	1	9	3	1	9	9	**41**
CO3	9	1	9	3	1	9	9	**41**
CO4	9	1	9	3	1	9	9	**41**
CO5	9	3	9	3	1	9	9	**43**
Total	**45**	**9**	**45**	**15**	**5**	**45**	**45**	**209**

Low-1 Medium-3 High-9

B.Com Fin Tech

Three Year Regular Programme
(For Students Admitted from 2024-25)

Programme Specific Outcomes:
On completion of this Programme, student will be able to

PSO 1: Disciplinary Knowledge: Apply computing theory, languages and algorithms, as well as mathematical and statistical models and the principles of optimization to appropriates, formula and use data analyze. Formulate and use appropriate models of data analysis to solve hidden solution to business related challenges
PSO 2: Effective Communication: Organize, visualize and analyze large, complex datasets using descriptive statistics and graphs to make decisions
PSO 3: Research Skill and Critical Thinking: Critically apply the theories and methodologies of data science to new research in their primary area of study.
PSO 4: Ethical Awareness: Develop and implement data analysis Strategies base on theoretical principles, ethical considerations and detailed knowledge of the underlying data
PSO 5: Digital Literacy: Demonstrate an ability to articulate, assess and apply appropriate

ACADEMIC COUNCIL

theories and principles of information management. Student can construct complex statistical models, assess the fit of such models to the data and apply the models in real-world contexts

PSO 6: Problem Solving Skill: Identify, assess and select appropriate among data analytics methods and models for solving a particular real-world problem, weighing their advantages and disadvantages.

PSO 7: Self-Learning: Recognize the need for lifelong learning and have the ability to engage independent learning keeping in mind the rapid technological changes

PREAMBLE

The Board of Studies of Computer Science not revamped the curriculum with the following syllabus

PROGRAMME STRUCTURE – PROGRAMME CODE: UFT

Sem	Sub Code	Part	Course	Subject Title	Hours/ Week	Credit	CIA	ESE	TOTAL
I	IBLT112/ IBLA111/ IBLH111	I	Language I	Tamil I/ Arabic I(a(or)b) / Hindi I (a(or) b)	5	3	25	75	100
	IBLEI12/ IBLEII12	II	Language II	English I (a (or)b)	5	3	25	75	100
	IBFTC11	III	Core I	Business Mathematics	6	4	25	75	100
	IBFTC12	III	Core II	Accounting Package for Business(Tally Prime)	5	5	25	75	100
	IBFTA13	III	AECCI	**Introduction to Financial Markets**	5	4	25	75	100
	IBFTS14	IV	SEC	Logical Reasoning	2	2	-	50	50
				Library/ Browsing	1		-	-	-
				Games/ Remedial	1		-	-	-
	Total				**30**	**21**	**125**	**425**	**550**
II	IBLT212/ IBLA211/ IBLH211	I	Language I	Tamil II/ Arabic II (a(or)b) / Hindi II (a(or)b)	5	3	25	75	100
	IBLEI22/ IBLEII22	II	Language II	English II (a (or)b)	5	3	25	75	100
	IBFTC21	III	Core III	**Introduction to Financial Technology**	4	4	25	75	100
	IBFTC221	III	Core IV	**R & Python for Finance ***	5	5	25	75	100
	IBFTA23	III	AECC II	Financial Accounting	5	4	25	75	100
	IBFTS24P	IV	SEC	**# PC Package Lab**	2	2	-	50	50
		IV	GICI	Environmental Science	2	2	-	50	50
				Library/Browsing/Lectures	1		-	-	-

ACADEMIC COUNCIL

				Games	1		-	-	-
	IBFTX2/ IBFTX2O		Extra Credit	Business Communication/Online Course*		2	-	100	100
	Total				**30**	**23+2**	**125**	**475+ 100**	**600+ 100**
III	IBFTC31	I	Core V	Business Statistics	5	4	25	75	100
	IBFTC32	III	Core VI	**Fintech & Cyber Security**	5	4	25	75	100
	IBFTC33	III	Core VII	**Digital Marketing for Financial Sector**	4	3	25	75	100
	IBFTC34	III	Core VIII	**AI / ML for Financial Sector***	4	3	25	75	100
	IBFTA35	III	AECCIII	Banking Theory Law & Practice	4	4	25	75	100
	IBFTS36	IV	SEC	○ Customer Relationship Management	2	2	-	50	50
		IV	OEC		2	2	-	50	50
	IBHR3	IV	GICII	Human Rights	2	2	-	50	50
	IBXTN3	V	Extension	NSS/CSS	2	2	100	-	100
	IBFTX3/I BFTX3O		Extra Credit	International Marketing/Online Course*		2	-	100	100
	Total				**30**	**26+2**	**225**	**525 +100**	**750+ 100**
IV	IBFTC41	I	Core IX	Management Accounting	4	4	25	75	100
	IBFTC42	II	Core X	**Block Chain Management**	5	4	25	75	100
	IBFTC43	III	Core X I	Corporate Accounting	5	3	25	75	100
	IBFTC44	III	Core XII	**Financial Derivatives**	5	3	25	75	100
	IBFTA45	III	AECCIV	Fin Tech Ethics and Corporate Governance	5	4	25	75	100
	IBFTS46	IV	SEC	International Financial Reporting and Standards	2	2	-	50	50
	IBLVE4	IV	GICIII	Life Skills and Value Education	2	2	-	50	50
		IV	OEC		2	2	-	50	50
	IBFTX4/ IBFTX4O		Extra Credit	Project/Online Course*		2	-	100	100
	Total				**30**	**24+2**	**125**	**525+ 100**	**650+ 100**
V	IBFTC51	III	Core XIII	Income Tax Theory Law & Practices–I	5	4	25	75	100
	IBFTC52	III	Core XIV	Cost Accounting	5	3	25	75	100
	IBFTC53	III	Core XV	**Analytics for Finance**	4	3	25	75	100
	IBFTC54	III	Core XVI	○ **Big Data Analytics**	4	3	25	75	100

UY ACADEMIC COUNCIL

	IBFTE5A/ IBFTE5B	III	DSEI	Fin Tech Startups and Innovations /Commercial Law	4	4	25	75	100
	IBFTE5C/ IBFTE5D	III	DSE–II	**Financial Modeling** /Company Law	4	4	25	75	100
	IBFTS55	IV	SEC	Corporate Compliance Management	2	2	-	50	50
	IBWE5	IV	GICIV	Women Entrepreneurship	2	2	-	50	50
	IBESX5/ IBFTX5O		Extra Credit	Employability Skills/Online Course*		2	100	-	100
	Total				**30**	**27+2**	**150+ 100**	**550**	**700+ 100**
VI	IBFTC61	III	Core XVII	**FinTech Intelligence**	6	5	25	75	100
	IBFTC62	III	Core XVIII	Income Tax Theory Law & Practices–II	6	5	25	75	100
	IBFTC63	III	Core XIX	Human Resource Management	5	4	25	75	100
	IBFTC64	III	Core XX	Strategic Management	6	4	25	75	100
	IBFTE6A/ IBFTE6B	III	DSE III	Security Analysis and Portfolio Management / Logistics And Supply Chain Management	4	4	25	75	100
	IBFTS65	IV	SEC	Total Quality Management	2	2	-	50	50
				Library/Browsing	1				
	IBFTX6/ IBFTX6O		Extra Credit	Principles and Practices of Insurance/Online Course*		2	-	100	100
	Total				**30**	**24+2**	**125**	**425 +100**	**550+ 100**
	Grand Total				**180**	**145+10**	**875 + 100**	**2925 +400**	**3800 +500**

***** For Online certification credit alone will be assigned on submission of certificate obtained through appearing for Online Examination from SWAYAM, EDX, Spoken Tutorial, NPTEL or Coursera.

#For internship course, refer www.internshala.com or any online internship course

- For online course integration, syllabus will be taken from spoken tutorial.

AECC–Ability Enhancement Compulsory Course
SEC–Skill Enhancement Course
DSE – Discipline Specific Elective
OEC–Open Elective Course

XXACADEMIC COUNCIL

AECC I - Introduction to Financial Markets

(For Students Admitted from 2024-25)

Semester: I **Hours/week: 5**
Subject Code: IBFTA13 **Credit: 4**

Course Objectives:

1. To get a basic understanding of the products, players and functioning of financial markets, particularly the capital market.
2.To understand the terms and jargons used in the financial newspapers and periodicals
3.To understand the concepts of derivatives

Unit I **(15 hours)**

Markets and Financial Instruments : Types of Markets: Equity Debt, Derivatives Commodities; Meaning and features of private, Public companies; Types of investment avenues

Unit II **(15 hours)**

Primary Market : Initial Public Offer (IPO); Book Building through Online IPO; Eligibility to issue securities; Pricing of Issues; Fixed versus Book Building issues; allotment of Shares; Basis of Allotment; Private Placement.

Unit III **(15 hours)**

Secondary Market :Role and functions of Securities and Exchange Board of India (SEBI); Depositories; Stock exchanges Intermediaries in the Indian stock market Listing; Membership; Trading Clearing and settlement and risk management; Investor protection fund (IPF); and Do's and Don'ts for investors, Equity and debt investment.

(15 hours)

Unit IV

Derivatives : Types of derivatives; Commodity and commodity exchanges; Commodity versus financial derivatives

Unit V **(15 hours)**

Financial Statement Analysis : Balance sheet; Profit & loss account; Stock market related ratios; Simple analysis before investing in the shares; understanding annual report; Director's report

Course Outcomes:

After completion of this course, student will be able to
CO1: Understand various constituents of capital market
CO2: Remember the basic concepts relating to different avenues of investment
CO3: Evaluate the difference between primary and the secondary market
CO4: Apply knowledge related to derivatives market
CO5: Analyze financial statement

ACADEMIC COUNCIL

Text Book:
1. NCFM -Financial Markets: Beginners Module, Mumbai: NSE

Reference Books:
1. H.R. Machiraju (2019). Indian Financial System. New Delhi: Vikas Publishing
2. J. K. Sharma, *Business Mathematics*, Dreamtech Publisher, 3rd Edition 2019.
3. Joydeep Sen, Abhishek Apte (2013), Fixed Income Markets in India. Mumbai: Shroff Publishers & Distributors Pvt. Ltd

E-Resources:
MOOC, NSE Website etc.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	9	3	3	**39**
CO2	9	3	3	9	3	3	3	**33**
CO3	9	3	3	3	9	3	9	**39**
CO4	9	9	3	9	3	3	3	**39**
CO5	9	3	3	9	3	3	9	**39**
Total	**45**	**21**	**21**	**33**	**27**	**15**	**27**	**189**

Low–1 Medium– 3 High– 9

Core - III Introduction to Financial Technology

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 4**
Subject Code:IBFTC21 **Credit: 4**

Course Objectives:
1.To have an in-depth understanding of the relationships existing among the key global financial systems
2.To demonstrate and advanced knowledge of key theoretical finance and economic concepts under pinning financial markets

(12 hours)

Unit I
Introduction: Introduction of Fintech industry-Areas of Fintech-History of Fintech- Fintech importance-**New Entrants to Banking:** New banking entrants in a flash-The traditional banking Landscape-New Operating Models for Banking-Banking as a service and Open APIs-Neo-banks, Challenger banks and I Banks.**Rethinking payments and remittances:** Payments adremittancesinaflash-Traditionalremittances-sizeoftheremittances market-upcoming trends in

KX ACADEMIC COUNCIL

remittances–Innovative ways of sending money.

(12 hours)

Unit II

Digital Lending innovation: Digital Lending innovation in a flash- short history of lending-peer-to-peerlending-P2Pmarket place lending business model-consumer lending-digital lending for students-digital lending for SMEs-digital mortgages .**Commercial banking transactions:** Commercial banking transactions in a flash- Working Nature of commercial banking-SME market size –the impact of Fintech on business banking-the impact of Fintech on corporate banking Online accounting for SMEs and integration with business banking-Tools for SMEs

Next Generation Commerce: Next Generation Commerce in a flash- changes in customer shopping behaviour -point of sales(POS)evolution-mPOS Business Model-Tablet based cash registers-Online acquiring.

(12 hours)

Unit III

Crowd funding and Crowd investing: Crowd funding and Crowd investing in flash – Businesses traditionally fund – Crowd funding business model-market size-key crowd funding platforms-top crowd funding campaigns-crowd investing.**Innovative wealth management: Innovative wealth management in** flash-Wealth management works-changes in customer expectations-changes in advisors-changes in data analytics-changes in access to products-social investing-Personal finance management.

(12 hours)

Unit IV

The power of big data: The power of big data in a flash- History of Data- Big Data Working principles- Uses Big Data Innovatively-Big Data in the Financial Services Industry.**The Internet of Things:** The Internet of Things in a Flash- Growth of IoT- The Impact of IoT on Businesses- The IoT in Categories- Combining IoT and Block chain- The IoT in Financial Services- O2O and IoT in FinTech- Challenges Faced by the IoT.**Block chain and Distributed Ledgers** Block chain and DistributedLedgersinaFlash-AboutDistributedLedgers-Blockchain-TheComponentsofBlockchain-TopCryptocurrencies- Impacts of Financial Services-Investment in Block chain-Use Cases for Block chain.

(12 hours)

Unit V

The Rise of Insurtech: The Rise of Insurtech in a Flash- Insurance Working principle- Market Size- DriversofDisruption-Peer-to-PeerInsurance-BlockchainedInsuranceandMachineLearning WearablesinInsurance- Working Principle of Traditional Insurance Firms-Interesting Insurtech Ideas.**Identification, Cyber security, and Regtech:** Identification, Cyber security, and Regtechina Flash-Traditional Ways of Using Identification-Unique Identification System in India-Identification for the Unbanked-Using Biometrics as Identification- Using Biometrics in Bank Transactions- Using a Distributed Ledger forIdentification-TheUNIdentityAspiration-CybercrimeandItsHistory-TheCybersecuritySector-Typesof Cybercrime-Cyber security Categories and Players-Regulation Technology(Regtech).

ACADEMIC COUNCIL

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Definethefinancial technology
CO2: Apply the digital lending innovation and IoT
CO3: Analyze the cyber security and block chain
CO4: Evaluate the crowd funding and crowd investing funding models
CO5: Create the distributed ledgers

Textbook:
1. Agustin Rubini, *Fintech in a Flash: Financial Technology Made Easy*, Walter de Gruyter Publisher, Third Edition, 2018.

Reference Books:
1. Susanne Chishti and Janos Barberis, *The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries*, JohnWiley Publisher, First Edition, 2016.
2. The oLynn, JohnG. Mooney, Pierangelo Rosati,Mark Cummins, *Disrupting Finance: FinTech and Strategy inthe21st Century*, Palgrave, First Edition,2018.
3. Abdul Rafay, *FinTech, as a Disruptive Technology for Financial Institutions*, IGIGlobal, 2019.
4. Bernardo Nicoletti, *The Future of FinTech: Integrating Finance and Technology in Financial Services*, Palgrave Macmillan, 2018.

E-Resources:
1. https://www.coursera.org/courses?query=fintech
2. https://www.edx.org/course/introduction-to-fintech

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	3	3	9	9	**51**
CO2	9	9	9	9	9	9	9	**63**
CO3	9	3	9	3	9	9	9	**51**
CO4	9	9	9	3	9	9	9	**57**
CO5	9	3	9	9	9	9	9	**57**
Total	**45**	**33**	**45**	**27**	**39**	**45**	**45**	**279**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core IV – R & Python for Finance

(For Students Admitted from 2024 -25)

Semester: II **Hours/week: 5**
Subject Code: IBFTC221 **Credit: 5**

Course Objectives:

1. To provide a broad understanding of the principles and techniques of Python coding for finance applications.
2. Illustrate how data analytics can improve financial decision-making.
3. Provide students with a foundation for performing data analytics in finance-related roles both inside the financial sector and outside the financial sector.

Unit I **(15 hours)**

Python and Finance : Python- History of Python- Python Ecosystem- Technology in Finance- Rise of Real-Time Analytics- Finance and Python Syntax- Efficiency and Productivity Through Python- From Prototyping to Production- Python Deployment- Anaconda.

Unit II **(15 hours)**

Data Types and Structures: Basic Data Types-Integers-Floats-Strings-Basic Data Structures: Tuples- Lists- Sets- NumPy Data Structures: Arrays with Python Lists-Regular NumPy Arrays-Structured Arrays **Data Visualization:** Two-Dimensional Plotting- One-Dimensional Data Set-Two-Dimensional Data Set.

Unit III **(15 hours)**

History and Overview of R: Definition of R-Basic Features of R-Design of the R System-Limitations of R-**R Nuts and Bolts:** Entering Input-R Objects-Numbers-Attributes-Matrices-Missing Values-Getting Data In and Out of R: Reading and Writing Data-Reading Data Files with read.table ( )-Reading Data Files with read.table-Calculating Memory Requirements for R Objects.

Unit IV **(15 hours)**

Factor Models: Arbitrage pricing theory-Fama-French three-factor model-Modeling in R:Data Selection-Forecasting Volume: The intensity of trading-The volume forecasting model-Implementation in R:The data-Loading the data-SETAR estimation and forecasting.

Unit V **(15 hours)**

Interest Rate Derivatives and Models: The Black model: Pricing a Cap with Black's model-The Vasicek model-The Cox-Ingersoll-Ross model-Parameter estimation of interest rate models-Using the SMF15 package.

Course Outcomes:

After completion of this course, student will be able to

CO1: Understand the need and advantages of using python for financial analytics.

KU ACADEMIC COUNCIL

CO2: Apply data types and structures, data visualization for making effective data analysis.
CO3: Remember R models and techniques that aid design, analysis and evaluation of financial decision-making.
CO4: Analyze advanced factor models in finance using R**.**
CO5: Create model for interest calculation for trading platforms to support analytics.

Text Books:

1. Hilpisch, Y. *Python for Finance: Analyze Big Financial Data*. United States: O'Reilly Media,2015
2. Roger D.Peng , *R Programming for Data Science.* Lean Publishing, 2015
3. Edina Berlinger (). *Mastering R for Quantitative Finance.* Packt Publishing Ltd, 2015

Reference Books:

1**.** Naik, K. (2019). Hands-On Python for Finance: A Practical Guide to Implementing Financial Analysis Strategies Using Python. United Kingdom: Packt Publishing.
2. Website Link: Molin, S. (2019). Hands-On Data Analysis with Pandas: Efficiently Perform Data Collection, Wrangling, Analysis, and Visualization Using Python. United Kingdom: Packt Publishing.

E-Resources:

1.https://towardsdatascience.com/python-for-finance-the-complete-beginners-guide-764276d74cef
2.https://pythonforfinance.net/
3.https://github.com/yhilpisch/py4fi
4.https://github.com/wilsonfreitas/awesome-quant

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	9	3	9	**45**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	3	3	3	9	9	9	**45**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	9	3	9	9	9	**57**
Total	**45**	**21**	**21**	**21**	**45**	**27**	**45**	**225**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

SEC II– PC Package Lab

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 2**
Subject Code: IBFTS24P **Credit: 2**

Course Objectives:

1. To explain the basic concepts of windows operating systems
2. To emphasize the students to practically demonstrate the windows operating system

Unit I **(6 hours)**

Word Processor

1. Document creation, text manipulation with scientific notation
2. Table creation with formatting & conversion
3. Mail merge and letter preparation
4. Drawing flow chart- auto shapes Alignment setup and hyperlink

Unit II **(6 hours)**

Electronic Spreadsheet

1.Spreadsheet chart
2.Formula editor- functions
3. Sorting data, filter

Unit III **(6 hours)**

Professional Presentation

1.Slidescreation (blank and presentation templates)
2.Changingslidedesignandlayout
3. Setting animation effects

Unit IV **(6 hours)**

Database Management Tool

1.Tablecreation
2.Queries (total, average)

Unit V **(6 hours)**

Personal Information Management

1.SetupanE-mail
2.Exchangeemailandpublicfolders
3.Setup calendar
4. a. Create, edit and delete new appointments
5. b. Create recurring appointments

Note: Questions for the internal and external examination will be based on the concepts learnt

ACADEMIC COUNCIL

Course Outcomes:
After completion of this course, student will be able to
CO1: Acquirepracticalknowledgein word processor
CO2: Demonstrate the concepts of electronic spreadsheet management for business
CO3: Use professional presentation for business purpose
CO4: Explain database management tool
CO5: Develop personal information management system

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO 3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	3	3	3	**27**
CO2	9	3	9	3	3	3	3	**33**
CO3	9	3	3	3	9	3	3	**33**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	9	3	9	3	9	**51**
Total	**45**	**21**	**27**	**15**	**33**	**15**	**27**	**183**

Low–1 Medium– 3 High– 9

Core VI - Fintech and Cyber Security

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 5**
Subject Code:IBFTC32 **Credit: 4**

Course Objectives:
1.To understand the impact of digital transformation on cyber security
2.To understand financial and operation a implications of cyber security

Unit I **(15 hours)**

Introduction to Cyber Security and the Economy: Introduction of Cyber security-The scope of cyber security-General Description of Hacking groups and Cyber espionage-Cyber security Objectives-Financial repercussion of reputational damage caused by cyber-attacks Introduction to cybercrime-Threat actors.

Unit II **(15 hours)**

Counting the Costs: Cost of a cyber-security attack-Breakdown of the cost of a cyber-attack-Break down of the cost of securing an organization- Bonus. **The Threat Landscape**: Threat against end Customers-Threat against Financial Institutes.

KX ACADEMIC COUNCIL

Unit III **(15 hours)**

Phishing, Spamming and scamming to steal data: Phishing scams-Spamming-**The Malware Plague**: Malware Categories- Malware trends- Malware Infection vectors-Vulner abilities and Exploits detecting Vulner abilities Exploitation techniques.

Unit IV **(15 hours)**

Attacking online e-banking systems- Online banking benefits for financial services-Online Banking Process-Attack techniques. **Vulnerable networks and services**-A Gateway for Intrusion-Vulnerable network Protocols and network Intrusions-Attacking Web servers and web-based system-Hacking Wireless networks

Unit V **(15 hours)**

Responding to service disruption: Cyber security incidents fundamentals-Incident response, Management-Securing, Perimeter, and protecting the assets-Network Models-Endpoint security-**Audit, Risk Management, and Incident Handling:** IT Auditing-Risk Management- Incident Handling.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Classifyand develop a Security model to prevent, detect and recover from the Attacks
CO2: Illustrate the methods and tools used for cybercrime investigation
CO3: Develop various cyber threat models and threat management
CO4: Examine Audit risk, management and protecting the assets
CO5: Apply security principles to system design

Text Book:

1. Erdal Ozkaya and Milad Aslane**,** *Hands-On Cyber security for Finance: Identify Vulnerabilities and Secure Your Financial Services from Security Breaches,* Packet Publishing, 2019.

Reference Books:

1. Ec -Council, *Ethical Hacking and Counter measures: Attack Phases,* Delmar Cen gage Learning, 2009.
2. Kimberly Graves, *CEH™ Certified Ethical Hacker Study Guide,* Wiley Publishing Inc., 2013.

Note: The questions should be asked in the ratio of 70% problem and 30%theory.

E-Resources:

1. https://www.udemy.com/topic/ethical-hacking/
2. https://www.coursera.org/courses?query=ethical%20hacking
3. https://nptel.ac.in/courses/110/107/110107073/
4. https://onlinecourses.swayam2.ac.in/cec22_lw07/preview

KK ACADEMIC COUNCIL

5. https://nptel.ac.in/courses/106/106/106106129/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	3	3	9	9	**51**
CO2	9	9	9	9	9	9	9	**63**
CO3	9	3	9	3	9	9	9	**51**
CO4	9	9	9	3	9	9	9	**57**
CO5	9	3	9	9	9	9	9	**57**
Total	**45**	**33**	**45**	**27**	**39**	**45**	**45**	**279**

Low-1 Medium-3 High-9

Core VII – Digital Marketing for Financial Sector

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 4**
Subject Code: IBFTC33 **Credit: 3**

Course Objectives:

1 .To understands the impact of technology on the traditional marketing mix.
2. To provide a broad understanding of the principles and techniques of digital marketing for financial applications.
3.To become familiar with the elements of the digital marketing plan
4.To understand how to reach your online target market and develop basic digital marketing objectives
5. Illustrate the use of Facebook, Google Ad words, Youtube and Email in various contexts of Digital Marketing.
6. Design digital media campaign using appropriate mix of Facebook, Google Ad words, Youtube and Email.

Unit I **(12 hours)**

Digital Marketing Planning and Structure : Inbound vs. Outbound Marketing- Content Marketing- Understanding Traffic- Understanding Leads- Strategic Flow for Marketing Activities- WWW- Domains- Buying a Domain- Website Language & Technology- Core Objective of Website and Flow- One Page Website- Strategic Design of Home Page- Strategic Design of Products & Services Page- Strategic Design of Pricing Page- Portfolio- Gallery and Contact Us Page- Call to Action (Real Engagement Happens)- Designing Other Pages- SEO Overview- Google Analytics Tracking Code- Website Auditing- Designing Word press Website.

AA ACADEMIC COUNCIL

Unit II **(12 hours)**

Facebook Marketing Fundamentals: Profiles and Pages- Business Categories- Getting Assets Ready- Creating Facebook Pages- Page Info and Settings- Facebook Page Custom URL- Invite Page Likes- Featured Video- Pin Post and Scheduling Posts- Facebook Events- Reply and Message- Facebook Insights Reports- Competitor's Facebook Page- Ban User on Facebook Page- Connect with Twitter. Facebook Ad Campaigns: Organic v/s Paid- Defining Ad Objective- Performance Matrix- Ad Components- Designing Creative Image- Facebook Ad Structure- Setting Up Facebook Ad Account- Create Ad –Targeting- Create Ad –Budgeting- Create Ad –Creative- Content and CTA- Boosting Page Posts- Page Promotion- Video Promotion- Similar Ads and Audiences- Tracking Pixels Code- Remarketing -Website Visitors- Custom Audiences -Look Alike- Custom Audience -Saved Group- Managing and Editing Ads- Ad Reports and Ad Insights- Billing and Account. Facebook Business Manager- People- Pages and Roles- Ad Accounts Configurations- Ad Agencies and Assigning- Shared Login for FB Business A/c- Power Editor- Email Targeting on Facebook- Facebook Offers- CTA on Page- Posts for Location- Save Time with Third Party Tools- Case Studies.

Unit III **(12 hours)**

Google Ad words: Understanding Ad words- Google Ad Types- Pricing Models- PPC Cost Formula- Ad Page Rank- Billing and Payments- Ad words User Interface- Keyword Planning- Keywords Control- Creating Ad Campaigns- Creating Text Ads- Creating Ad Groups- Bidding Strategy for CPC- Case Studies. PPC- CPM- CPA - Other Measuring Tools- Bidding Strategy on Location- Bidding Strategy on Schedule- Bidding Strategy on Devices- Conversion Tracking Code- Designing Image Ads- Creating Animated Ads- Examples on Animated Ads- Creating Video Ads- Youtube Video Promotion- Hi-Jack Competitor’s Video Audience- Case Studies. Remarketing Strategies- Remarketing Rules- Remarketing Tracking Code- Linking Google Analytics- Designing Remarketing Images- Shared Budget- GWD Software- Case Studies.

Unit IV **(12 hours)**

YouTube Marketing : Video Flow- Google Pages for YouTube Channel- Verify Channel- Webmaster Tool –Adding Asset- Associated Website Linking- Custom Channel URL- Channel ART- Channel Links- Channel Keywords- Branding Watermark- Featured Contents on Channel- Channel Main Trailer- Uploading Videos- Uploading Defaults- Creator Library- Case Studies. Channel Navigation- Video Thumbnail- CTA –Annotation- CTA –Extro- CTA –Cards for Mobile- Redirect Traffic to Website- Post Upload Enhancements- Live Broadcasting- Managing Playlists- Managing Comments- Managing Messages- Monetization with Adsense- Paid Youtube Channel- Channel Analytics- Real Time Analytics- Case Studies.

Unit V **(12 hours)**

Email Marketing - Content Writing: Email Machine –The Strategy- Email Frequency- Why People Don’t Buy- The Fuel –Value- Triggers in Email using 4Ps- Sequence of Email Triggers- Email Example - Topic- Intro- Product- Secondary Value- Fear- Regret- Ask for Sales- Reinforcement- Offers Announcements- Urgency- Cross Sales- Re-Engagement- Buyer vs Consumer. Email Software and Tools- Importing Email Lists- Planning Email Campaign- Email

XXACADEMIC COUNCIL

Templates and Designs- Sending HTML Email Campaigns- Web Forms Lead Importing- Integrating Landing Page Forms- Campaign Reports and Insights- Segmentation Strategy- Segmentation Lists- Auto-Responder Series- Triggering Auto – Responder Emails- Auto Responder Actions- Case Studies.

Course Outcomes:
After successful completion of this course, student will be able to
CO1: Demonstrate the understanding of Digital marketing and media concepts.
CO2: Describe, define and apply the major components of Digital Marketing
CO3: Learn and apply Facebook Marketing strategies.
CO4: Utilize Google Adwords for efficient digital marketing scenarios
CO5: Learn and implement techniques using youtube for real time marketing analytics and apply email marketing and content writing for developing and enhancing digital marketing.

Text Book:
1. Digital Marketing, Vandhana Ahuja, Oxford University Press

E-Resources:
1. https://www.naukri.com/learning/basics-of-digital-marketing-by-nptel-course-nptel43
2. https://www.classcentral.com/course/swayam-digital-marketing-14006

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	1	9	9	9	**43**
CO2	9	3	3	1	9	3	9	**37**
CO3	9	3	3	1	9	3	9	**37**
CO4	9	3	3	1	9	3	9	**37**
CO5	9	3	3	1	9	3	9	**37**
Total	**45**	**15**	**15**	**5**	**45**	**21**	**45**	**191**

Low-1 Medium-3 High-9

Core VIII– AI / ML for Financial Sector

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 4**
Subject Code: IBFTC34 **Credit: 3**

Course Objectives:
1. To identify, formulate, and implement a machine learning project.
2. To explore various applications of machine learning in all business aspects.
3. To introduce the basic concepts, theories and state-of-the-art techniques of artificial intelligence.

EXACADEMIC COUNCIL

4. To introduce basic concepts and applications of machine learning.
5. To help students to learn the application of machine learning /A.I algorithms in the different fields of science, medicine, finance etc.

Unit I **(12 hours)**

Basics concepts of Machine Learning: ML Definition- Various kind of problems tackled using ML- Some standard learning tasks- Learning Stages- Learning Scenarios- Generalization- Data, Models and Learning- Parameter Estimation- Probabilistic Modeling and Inference- Directed Graphical Models- Setting up your working Environment- Supervised vs. Unsupervised Learning- Cross Validation- Evaluation metrics.

Unit II **(12 hours)**

Advanced concepts of Machine Learning: Fundamentals of statistical learning theory- Convergence and learnability- Kullback-Leibler Information- Model selection and the bias variance trade-off- Cross-validation- Regularization- Generative vs. Discriminative models- Neural Networks- The Perceptron- Feed-Forward Neural Networks- Back-propagation and stochastic gradient descent- Regularization and drop-out-Application to investment management.

Unit III **(12 hours)**

Supervised Learning: Linear Regression- Parametric Problems- Decision trees- Random forests- Classifications- K Nearest Neighbors- Support Vector- Naive Bayesian Model.

Unit IV **(12 hours)**

Unsupervised Learning: Clustering- K-Means clustering- Dimensionality Reduction- Principle Component Analysis- Hierarchical Clustering- DBSCAN- Semi-supervised learning- Reinforcement Learning.

Unit V **(12 hours)**

Advanced Neural Networks: Convolutional Neural Networks- Recurrent Neural Networks- Long Short-Term Memory (LSTM)- Autoencoders- Applying Learning to Real problems- Image Classification & Segmentation- Scoring Opinion and Sentiments- Recommending Products and Movies- Bitcoin Prediction- Predicting from the Limit Order Book.

Unit VI **(12 hours)**

Applications of AI/ML in Financial Markets: Webinars – Quiz - Online Assignments

Course Outcomes:

After completion of this course, student will be able to

CO1: Understand the basic definition and need for machine learning

CO2: Understand the core aspects behind any machine learning project

VK ACADEMIC COUNCIL

CO3: Ability to implement a machine learning project
CO4: Ability to identify potential applications of machine learning in real time
CO5: Apply the machine learning concepts in real life problems

Text Books:

1. Mac Namee, B., D'Arcy, A., Kelleher, J. D. (2015). *Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies*. United Kingdom: MIT Press
2. N P Padhy, *Artificial Intelligence and Intelligent Systems*, Oxford University Press
3. Lopez de Prado, M. (2018). *Advances in Financial Machine Learning*. Germany: Wiley
4. Dixon, M. F., Halperin, I., Bilokon, P. A. (2020). *Machine Learning in Finance: From Theory to Practice*. Germany: Springer International Publishing
5. Mueller, J. P., Massaron, L. (2021). *Machine Learning For Dummies*. United States: Wiley

Reference Books:

1. Guido, S., Müller, A. C. (2016). *Introduction to Machine Learning with Python: A Guide for Data Scientists*. United States: O'Reilly Media
2. Mueller, J. P., Massaron, L. (2021). *Machine Learning For Dummies*. United States: Wiley
3. Cooper, S. (2018). *Machine Learning for Beginners: An Introduction for Beginners, Why Machine Learning Matters Today and How Machine Learning Networks, Algorithms, Concepts and Neural Networks Really Work.* (n.p.): Steven Cooper

E-Resources:

1. https://www.kdnuggets.com/2020/03/trends-machine-learning-2020.html
2. https://mobidev.biz/blog/future-ai-machine-learning-trends-to-impact-business
3. https://venturebeat.com/2020/01/02/top-minds-in-machine-learning-predict-where-ai-is-going-in-2020/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	3	9	**39**
CO2	9	3	3	9	1	1	9	**35**
CO3	3	3	3	9	1	1	9	**29**
CO4	9	1	3	9	1	1	9	**33**
CO5	9	3	1	9	1	3	9	**35**
Total	**39**	**13**	**13**	**45**	**7**	**9**	**45**	**171**

Low-1 Medium-3 High-9

XXI ACADEMIC COUNCIL

Core X – Block Chain Management

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 5**
Subject Code: IBFTC42 **Credit: 4**

Course Objectives:

1. To give an overview on block chain technology
2.To gain knowledge on Bit coin and network structure
3. Familiarize with crypto currencies.
4. To learn the technical challenges in Block chain technology.
5. To develop & integrate ideas from various domains and implement the technology in different perspectives

Unit I **(15 hours)**

Overview of Block Chain: A Payment System- Two types of Software Architecture- Advantages of Distributed Systems- Disadvantages of Distributed Systems- Mixing Centralized and Distributed Systems- Purpose of Block chain- Layers of Block chain- Block chain Uses and Use Cases- Laying the Block chain Foundation- Cryptography- The Structure of Block chains- Block chain Applications- The Block chain Life Cycle-Block chains in Use.

Unit II **(15 hours)**

Overview of Bitcoins : History of Money- Dawn of Bitcoin- Bitcoin Definition- Working with Bitcoins- The Bitcoin Block chain- Block Structure- Merkle Tree- The Genesis Block- The Bitcoin Network- Network Discovery for a New Node- Bitcoin Transactions- Consensus and Block Mining- Block Propagation- Bitcoin Scripts- Bitcoin Wallets.

Unit III **(15 hours)**

Block Chain 1.0, 2.0 and 3.0: Block chain 1.0: Currency- How a Crypto currency Works- Block chain 1.0 in Practical Use- Block chain 2.0: Contracts- Financial Services- Crowd funding- Bitcoin Prediction Markets- Smart Property- Smart Contracts- Block chain 2.0 Protocol Projects- Ethereum: Turing Complete Virtual Machine- Automatic Markets and Trade nets- The Block chain as a Path to Artificial Intelligence- Block chain 3.0: Applications - Beyond Currency, Economics, and Markets- Block chain Science: Grid coin, Folding coin.

Unit IV **(15 hours)**

Impacts of Block Chain: Block chain Learning: Bitcoin MOOCs and Smart Contract Literacy- Learn coin- Currency, Token, Tokenizing- Community coin- Campus coin- Currency Multiplicity-Demurrage Currencies- Technical Challenges- Business Model

XX ACADEMIC COUNCIL

Challenges- Scandals and Public Perception- Government Regulation- Privacy Challenges for Personal Records- Block chain Genomics- Block chain Health.

Unit V **(15 hours)**

The Real Business Block chain : Block chain Inspired Solution- Business Currencies with Block chain Inspired Solution- Block chain complete solution- Seeking Value Consorting with the Enemy- Game on for Tokenization- Embracing Consensus through Decentralization- Market Access and Participation- Enhanced Block chain Solutions- Unleashing the Power of Smart Things- The Block chain Organization- The Block chain Society.

Course Outcomes:

After completion of this course, student will be able to

CO1: Learn the basic concepts of distributed systems and structure of Block chain
CO2: Gain insights on Bitcoin and understand the mechanics of Bitcoin transactions
CO3: Know the importance of various crypto currencies
CO4: Understand Block chain Learning and its application for various Business Models
CO5: Analyze the Block chain Solutions and understand the idea of Block chain Society

Text Books:

1. Block chain Basics: A Non-Technical Introduction in 25 Steps, Daniel Drescher, Apress Publishers,2017
2. Dhameja, G., Singhal, B., Panda, P. S. (2018). Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions. Germany: Apress
3. Swan, M. (2015). Blockchain: Blueprint for a New Economy. United States: O'Reilly Media
4. Uzureau, C., Furlonger, D. (n.d.). The Real Business of Blockchain: How Leaders Can Create Value in a New Digital Age. United States: Harvard Business Review Press

Reference Books:

1.Daniel Drescher, “Block Chain Basics”, Apress; 1stedition, 2017
2/Anshul Kaushik, “Block Chain and Crypto Currencies”, Khanna Publishing House, Delhi
3.Imran Bashir, “Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained”, Packt Publishing, first edition – 2012

E-Resources:

1. https://www.blockchain.com/learning-portal/bitcoin-faq
2. https://www.bitdegree.org/crypto/tutorials/blockchain-explained
3. https://link.springer.com/article/10.1007/s00287-020-01246-7

XX ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Total
CO1	9	1	3	3	3	3	3	25
CO2	9	1	1	3	3	3	3	23
CO3	9	3	3	3	9	9	9	45
CO4	9	1	9	3	9	9	9	49
CO5	9	3	9	3	9	9	9	51
Total	45	9	25	15	33	33	33	193

Low-1 Medium-3 High-9

Core XII– Financial Derivatives

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 5**

Subject Code: IBFTC44 **Credit: 3**

Course Objectives:

1.To understand the fintech ethical and social responsibilities

2.To tackle the current corporate governance issues in the techno era

Unit I **(15 hours)**

Basics of Derivatives & Understanding Index: Basics of Derivatives - Evolution - Indian Derivatives Market - Market participants – Types - Significance - Various risk faced by the participants - Introduction to Index - Significance - Types – Attributes - Index management - Major Indices in India, - Applications of Index.

Unit II **(15 hours)**

Introduction to Forwards, Futures & Options : Payoff Charts - Futures pricing - Cash and carry / Non-arbitrage model - Expectancy model of futures pricing - Concept of convergence of cash and futures prices - Basic differences in Commodity - Equity and Index Futures - Uses of futures - Role of different players - Use of futures contract as an effective instrument for managing risk, Strategies for hedging, speculation and arbitrage.

Unit III **(15 hours)**

Option Trading Strategies & Systems: Option spreads - Payoff charts - Straddle - Strangle - Covered Call - Protective Put Collar - Butterfly spread. Trading Systems, Corporate hierarchy, Order types and conditions, Selection criteria of Stock for trading and Index for trading - Adjustments for Corporate Actions - Position Limits - Daily newspapers to track

Unit IV **(15 hours)**

Clearing and Settlement system & Legal and Regulatory Environment: Clearing Members - Role and Eligibility norms - Mechanism and computation of open positions - Settlement of stock

XX ACADEMIC COUNCIL

and index - margining and mark to market under SPAN, Risk Management features and position limits. - Rules and regulations - Recommendations of the L.C Gupta Committee, Recommendations of the J R Verma Committee.

Unit V **(15 hours)**

Taxation & Sales Practices and Investors Protection Services: Accounting of contracts, Taxation of securities. Risk profile - Importance of Sales process, Importance of KYC, Documents to trade in Derivatives contract, Best practices in Derivatives sales, Investors Grievance Mechanism.

Unit VI **(15 hours)**

Contemporary Issues: Webinars – Quiz - Online Assignments

Course Outcomes:

After completion of this course, student will be able to

CO1: Understand business ethics
CO2: Outline Fintech ethics and its principles
CO3: Explicate computer ethics and business values
CO4: Execute and justify corporate governance
CO5: Discuss governance and ethics in practice

Text Books:

1.NISM (2019), NISM Series VIIIA Equity Derivative Module, Delhi: Taxman
2.NCFM – Derivatives Market – Dealers Module, by NSE Academy, Mumbai
3. Robert Baker (2010), "The Trade Lifecycle: Behind the Scenes of the Trading Process. New Delhi, Wiley India

Reference Books:

1. Franklin R. Edwards (1992) Cindy W.Ma. Futures & Options. Bangalore: McGraw Hill
2. Jagadish R. Raiyani (2011).Financial Derivatives in India, Chennai: New Century Publication
3. Bhushan Vijay Kumar Jadhav (2018), Option Trading Strategies: Independently Published

E–Resources:

MOOC, SWAYAM, NPTEL, Websites etc.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	1	1	**19**
CO2	9	3	9	1	9	1	3	**35**
CO3	9	1	9	9	1	1	3	**33**
CO4	9	3	3	3	3	3	3	**27**
CO5	9	1	1	9	9	9	3	**41**
Total	**45**	**11**	**23**	**23**	**25**	**15**	**13**	**155**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Core XV– Analytics for Finance

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBFTC53 **Credit: 3**

Course Objectives:

1. To gain understanding on the need and significance of Financial Analytics for various business requirements.
2.To understand the Basic concepts of R
3.To gain financial analytics knowledge using python
4.To identify, formulate, and implement a Fintech project using R
5.To prepare the project using Python.

Unit I **(12 hours)**

Financial Analytics

Introduction: Meaning-Importance of Financial Analytics Uses-Features-Documents used in Financial Analytics: Balance Sheet, Income Statement, Cash flow statement-Elements of Financial Health: Liquidity, Leverage, Profitability. Analysts: Role and Responsibilities Information and Knowledge-Methodology-Data-Required Competencies for the Analyst-Hypothesis Driven Methods-Data Mining with Target Variables-Explorative Methods-Business requirements.

Unit II **(12 hours)**

Financial Analytics with R:

What is R and its application - Language features: functions, Assignment, Arguments and types. financial Statistics: Concept and mathematical expectation - Probability - Mean; SD and Variance - Skewness and Kurtosis - Covariance and correlation - Capital Asset Pricing model. Financial Securities: Bond and Stock investments - Housing and Euro crisis - Securities Datasets and Visualization - Plotting multiple series. Time Series and Sharpe ratio: Examining and Stationary - Auto Regressive and integrated moving average Processes. Time periods and Annualizing - Ranking investment candidates - Sharpe Ratio for Income Statement growth.

Unit III **(12 hours)**

Financial Analytics with Python

Numbers in Python: Using type with different and creating an imaginary number - using numbers: using math operations and number formats. Python ingredients: Variables, names and objects - Numbers: Integers - Precedence - Bases - type. Conversion, Strings: Create coin Quotes-Reading Crossovers- Pairs trading- Financial Plots- Financial Data- Regression Analysis. Supervised Learning: Linear Regression- Ordinary Least Squares- Regularized Regression- Logistic Regression- K-Nearest Neighbors- Linear Discriminant Analysis- Classification and Regression Trees- Unsupervised Learning: Dimensionality Reduction- Clustering Techniques- k-means Clustering.

KU ACADEMIC COUNCIL

Unit IV **(12 hours)**

Financial Analytics Applications using R:

Ganging the market Sentiment: Mark or Regime Switching model - Bayesian reasoning - Beta distribution. Stimulating Trading Strategies: Foreign exchange markets - Chart analytics - Initialization and finalization - Bayesian Reasoning within Positions. Prediction using fundamentals and binomial model for options: Best income statement Portfolio - obtaining Price Statistics - combining the income statement with Price statistics - Prediction using classification trees and Recursive Partitioning. Applying Computational finance - risk Neutral Pricing and No Arbitrage - High Risk - Free Rate Environment.

Unit V **(12 hours)**

Financial Analytics and Development using Python

Excel Integration- Basic Spreadsheet Interaction- Scripting Excel with Python- Object Orientation and Graphical User Interfaces- Object Orientation- Basics of Python Classes- Simple Short Rate Class- Cash Flow Series Class- Graphical User Interfaces- Short Rate Class with GUI- Updating of Values- Cash Flow Series Class with GUI- Web Integration- Web Basics- Web Plotting- Static Plots- Interactive Plots- Real-Time Plots- Rapid Web Applications- Web Services.

Unit VI **(12 hours)**

Contemporary Issues: Webinars – Quiz - Online Assignments

Course Outcomes:

After completion of this course, student will be able to

CO1: Describe, define and apply the major components of the Financial Analytics and its importance in Fintech

CO2: Describe, define and apply the major components of the Financial Analytics and its importance in Fintech

CO3: Learn and apply the financial analytics process in Python

CO4: Learn and implement the applications of Financial Analytics using R

CO5: Apply python concepts and practices to advanced financial analytics

Text Book:

1.Financial Analytics with R _ Mark J. Bennets, Cambridge University Press

2.Introducing Python - OREILLY modern computing in simple packages - BILL LUBANOVIC - Shroff Publishers & Distributors Pvt. Ltd, Sep, 2015 , Mumbai

3. Beginning Python - Peter Norton Ctl, - WILEY - 2005 , New Delhi

4. Mac Namee, B., D'Arcy, A., Kelleher, J. D. (2015). Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies. United Kingdom: MIT Press

5. Lopez de Prado, M. (2018). Advances in Financial Machine Learning. Germany: Wiley

6. Dixon, M. F., Halperin, I., Bilokon, P. A. (2020). Machine Learning in Finance: From Theory to Practice. Germany: Springer International Publishing

ACADEMIC COUNCIL

Reference Books:

1. Fundamentals of Business Analytics -R N Prasad,. Seema Achavya,Wiley India PVT Ltd, New Delhi, P.No: 87-100, P.No:115-125 3Prof. M.L. Agarwa l& Dr. K.L.Gupta, *Cost Accounting*, Sahitya Bhawan Publications, 1st January,2021
2. Naik, K. (2019). Hands-On Python for Finance: A Practical Guide to Implementing Financial Analysis Strategies Using Python. United Kingdom: Packt Publishing
3. Molin, S. (2019). Hands-On Data Analysis with Pandas: Efficiently Perform Data Collection, Wrangling, Analysis, and Visualization Using Python. United Kingdom: Packt Publishing

Note: Question paper shall cover 100% theory.

E-Resources:

1. https://towardsdatascience.com/python-for-finance-the-complete-beginners-guide-764276d74cef
2. https://pythonforfinance.net/
3. https://github.com/yhilpisch/py4fi
4. https://github.com/wilsonfreitas/awesome-quant
5. https://www.incworx.com/blog/sql-server-2020

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	1	1	**19**
CO2	9	3	9	1	9	1	3	**35**
CO3	9	1	9	9	1	1	3	**33**
CO4	9	3	3	3	3	3	3	**27**
CO5	9	1	1	9	9	9	3	**41**
Total	**45**	**11**	**23**	**23**	**25**	**15**	**13**	**155**

Low-1 Medium-3 High-9

Core XVI - Big Data Analytics

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**

Subject Code: IBFTC54 **Credit: 3**

Course Objectives:

1. To understand the Big Data Platform and its Use cases and Map Reduce Jobs
2. To provide an overview of Apache Hadoop, HDFS Concepts and Interfacing with HDFS and apply analytics on Structured, Unstructured Data

XX ACADEMIC COUNCIL

Unit I **(12 hours)**

Introduction to Big Data: Introduction-Understanding Big data-Capturing Big data-Volume-velocity-variety-veracity-Benefiting Big Data- Management of big data-Organizing big data- Technology challenges.

Unit II **(12 hours)**

Big data Sources and Architecture: Big data sources-People to people communication-m2m- Big data applications- Examining big data types- Structured data – Unstructured data- Semi structured data-Integrating data type into big data environment-Big data Architecture.

Unit III **(12 hours)**

HADOOP: Big Data – Apache Hadoop &Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of Map Reduce - Data Serialization- Hadoop Architecture, Hadoop Storage. Hadoop Map Reduce paradigm, Map and Reduce tasks, Job, Task trackers: HDFS- Hive Architecture and Installation, Comparison with Traditional Database, Hive QL - Querying Data - Sorting and Aggregating, Map Reduce Scripts, Joins &Sub queries, HBase.

Unit IV **(12 hours)**

Analytics and Big Data: Basic analytics-Advanced analytics-Operationalized analytics-Monetizing analytics-Modifying business intelligence products to handle big data- Big data analytics solution-Understanding text analytics-Tools for Big data.

Unit V **(12 hours)**

Data Visualization and R: Introduction-Excellence in visualization- Types of chart-Business Intelligence: Tools-Skills applications – Health care- Education-retail- E-Governance- Working with R- Import a dataset in R Plotting a histogram-Big data mining.

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Describe Data sources, generations, data formats, Data Evolution, Data from various domains

CO2: Determine Big Data Characteristics, Frameworks, components and Limitation of traditional approaches and map Big Vs. to Data Domains

CO3: Analyse various domains of Data Characteristics, Platform, Programming Model and Design Data Analytic ecosystem, and data processing framework

CO4: Evaluate the Concepts of Data Analytics Phases and Techniques

CO5: Formulate Data Analytics Techniques practically using R environment

Text Books:

1. Anil Maheshwari, *Data Analytics Made Accessible,* Kindle Edition, 2017.
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, *Big Data for Dummies*, Wiley India Private Limited, 2014.

ACADEMIC COUNCIL

Reference Books:

1. Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich, *Professional Hadoop Solutions*, Wiley India Private Limited, 2013.
2. Chris Eaton, Dirk Deroos, Understanding *Big data*, McGraw Hill, 2012.
3. Tom White, *HADOOP: The definitive Guide*, O Reilly, 2012.
4. Tom Plunkett, Brian Macdonald, *Oracle Big Data Handbook*, Oracle Press, 2014.
5. JyLiebowitz, *Big Data and Business analytics*, CRC Press, 2013.
6. VigneshPrajapati, *Big Data Analytics with R and Hadoop*, Packet Publishing, 2013.

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc20_cs92/preview
2. https://nptel.ac.in/courses/110/106/110106072/

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	9	9	1	9	**55**
CO2	9	9	9	9	9	1	9	**55**
CO3	9	9	9	9	9	1	9	**55**
CO4	9	9	9	9	9	1	9	**55**
CO5	9	9	9	9	9	1	9	**55**
Total	**45**	**45**	**45**	**45**	**45**	**5**	**45**	**275**

Low-1 Medium-3 High-9

DSE II - a) Financial Modeling

(For Students Admitted from 2024-2025)

Semester: V **Hours/week: 4**
Subject Code: IBFTE5C **Credit: 4**

Course Objectives:

1.To make the students understand how Financial models are used to estimate the valuation of a business
2. To apply knowledge and understanding of financial statements
3. To learn to compare businesses to their peers in the industry through various models.
4. To understand how financial models are used in strategic planning to test various scenarios,
5. Calculate the cost of new projects, decide on budgets, and allocate corporate resources.
6. To build valuation models using different methods

ACADEMIC COUNCIL

Unit I **(12 hours)**

Principles of Modeling :A Good Model- Model Design- Selection of Model Variables and their Dependencies- Level of Detail or Aggregation- Model Structure and Planning- Model Building- Results Presentation and Other Uses of Sensitivity Analysis- Model Auditing.

Unit II **(12 hours)**

Financial Statement, Cash Flow and Valuation Modeling

Financial Statement Modeling: Core Points and Example- Income Statement Forecasting- Sales Forecasts- Cost Forecasts- Operating Profit- Taxable Profit, Tax and Net Income- Dividends and Retained Earnings Balance Sheet Forecasting- Error Checks and Feasibility Checks- Cash Flow Statement Forecasting- Cash Flow Valuation.

Unit III **(12 hours)**

Developing Financial Models : Financial Modeling- Basics of Design- Design process and method- Menu structure- Management reports and summaries- Development- Testing and auditing- Protection as an application- Documentation- Features and techniques - Data validation- Controls- Graphics- Sample model planning- Example model.

Unit IV **(12 hours)**

Applications of Financial Modeling: Analyzing performance- Forecasting models- Portfolio analysis- Cost of capital- Bonds- Investment analysis- Risk- Depreciation- Leasing- Company valuation- Optimization- Decision trees- Risk management- Modeling checklist.

Unit V **(12 hours)**

Financial Modeling in Python: Welcome to Python- PPF package- Basic Mathematical Tools- Data Model- Timeline- The Hull White Model- Pricing using Numerical Methods- Pricing Financial Structures in Hull White-Python Excel Integration.

Course Outcomes:

After completion of this course, student will be able to

CO1: Learn the basic concepts of modeling and its perspective in analysis and auditing.
CO2: Gain insights on Financial Statement and forecasting various finance parameters.
CO3: Develop a financial model suitable that aids management and documentation
CO4: Understand potential applications of Finance Models and its implementation
CO5: Practice and implement Financial modeling in Python Environment.

Text Books:

1. Rees, M. (2015). Financial Modeling in Practice: A Concise Guide for Intermediate and Advanced Level. United Kingdom: Wiley.
2. Day, A. (2012). Mastering Financial Modeling in Microsoft Excel 3rd Edn: A Practitioner's Guide to Applied Corporate Finance. United Kingdom: Pearson Education

KAC ACADEMIC COUNCIL

Limited.
3. Gardner, C., Fletcher, S. (2010). Financial Modeling in Python. Germany: Wiley.

Reference Books:
1. Mastering Financial Modeling In Microsoft Excel: A Practitioner'S Guide To Applied Corporate Finance, 2/E. (2008). India: Pearson Education.
2. Benninga, S. Z., Benninga, D. F. o. M. S., Benninga, S., Czaczkes, B. (2000). Financial Modeling. United Kingdom: MIT Press.

E-Resources
1.https://corporatefinanceinstitute.com/resources/knowledge/modeling/types-of-financial-models
2.https://www.wallstreetprep.com/knowledge/financial-modeling-best-practices-and-conventions/
https://www.ey.com/en_nl/finance-navigator/the-ultimate-guide-to-financial-modeling-for-startups

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	1	1	3	1	1	**19**
CO2	9	3	9	1	9	1	3	**35**
CO3	9	1	9	9	1	1	3	**33**
CO4	9	3	3	3	3	3	3	**27**
CO5	9	1	1	9	9	9	3	**41**
Total	**45**	**11**	**23**	**23**	**25**	**15**	**13**	**155**

Low -1 Medium- 3 High – 9

DSE III – Fin Tech Intelligence

(For Students Admitted from 2024-25)

Semester: VI **Hours/week: 6**
Subject Code: IBFTC61 **Credit: 5**

Course Objectives:
1. To learn emerging trends in Financial Technology
2. To understand global trends in Digital Banking and Blockchain Technology, AI/ML
3. To understand applications based on treands in Fin Tech

Unit I **(18 hours)**
Digital Banking

Unit II **(18 hours)**
Blockchain and Crypto currency

XXA ACADEMIC COUNCIL

Unit III **(18 hours)**
RPA(Robotic Procss Automation)

Unit IV **(18 hours)**
Artificial Intelligence and Machine Learning

Unit V **(18 hours)**
Fin Tech -as-a-Service Platforms

Course Outcomes:
After completion of this course, student will be able to
CO1: Understand emerging trends in Fin Tech
CO2: Gain insights on global trends in Digital Banking, Blockchain Technology, AI/ML
CO3: Understand applications based on trends in Fin Tech
CO4: Discover the new ideas in Artificial Intelligence for digital banking
CO5: Build a program using Artificial Intelligence and blockchain for digital banking

Text Book:
1.Eliot P. Reznor (2017), Fintech, Independent Publishing Platform

Reference Books:
1. Parag Y Arjunwadkar (2018) , Fin Tech: The Technology Driving Disruption in the Financial Services Industry, Boca Raton, F, USA Auerbach Publications
.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	9	3	9	9	**45**
CO2	9	3	3	3	9	9	9	**45**
CO3	9	3	9	9	3	9	9	**51**
CO4	9	3	9	3	9	9	9	**51**
CO5	9	3	9	9	9	9	9	**57**
Total	**45**	**15**	**33**	**33**	**33**	**45**	**45**	**249**

Low-1 Medium-3 High-9

XX ACADEMIC COUNCIL

Ability Enhancement Compulsory Course (AECC) for BSc Maths
(For Students Admitted From 2024-25)

Sem	Subject Code	Course	Subject Title	Hours / week	Credit	CIA	ESE	Total Marks
III	IBMXA33P	AECC	Programming in C lab	4	4	25	75	100
IV	IBMXA43	AECC	Programming in Java	5 (T-3, P-2)	4	25 (T-15, P-10)	75	100
IV	IBMXS44P	SEC	R Tool Lab	2	2		50	50

AECC III – Programming in C Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 4**
Subject Code: IBMXA33P **Credit: 4**

Course Objectives:

1. To implement formula substitution using C language
2. To gain knowledge in implementing numerical methods using C language

List of Programs

Formula substitution

1. Develop a C Program to check whether the given number is odd or even
2. Develop a C Program to find sum of the digits
3. Develop a C Program to find whether a given number is Armstrong or not
4. Develop a C Program to find the area of various shapes using switch case

Array

5. Develop a C Program to Check whether the element is present in the given list or not

Functions & Structures

6. Develop a C Program to find the factorial of a given number using recursion function
7. Develop a C Program to prepare student mark list using structure

String Manipulation

8. Develop a C Program to count the vowels in the given string

Pointers

9. Develop a C Program to find average of two numbers using pointers

Numerical methods

10. Develop a C program to illustrate the use of Taylor Series method
11. Develop a C program to implement Euler's method

XX ACADEMIC COUNCIL

12. Develop a C program to implement Newton Raphson method
13. Develop a C program to implement bisection method
14. Develop a C program to implement Simpson's 1/3 rule
15. Develop a C program to implement Runge Kutta Method
16. Develop a C program to implement Fixed point iteration Method

Note:-Questions for internal and external examination will be based on concepts learnt

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Illustrate the different concepts of C language
CO2: Identify the steps to implement functions, structures and pointers in C language
CO3: Simplify the process of solving differential equations using numerical methods
CO4: Discover new logic to solve the critical problems
CO5: Design algorithm with simple problems and control structures

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	9	9	9	**51**
CO2	9	1	9	1	9	9	9	**47**
CO3	9	3	9	3	3	9	9	**45**
CO4	9	9	9	3	3	9	9	**51**
CO5	9	9	9	3	9	9	9	**57**
Total	**45**	**25**	**45**	**13**	**33**	**45**	**45**	**251**

Low-1 Medium-3 High-9

AECC IV – Programming in Java

(For Students Admitted From 2024-25)

Semester: IV **Hours/week: 5 (T: 3 P: 2)**
Subject Code: IBMXA43 **Credit: 4**

Course Objectives:

1. To gain knowledge about basic Java language syntax and semantics to write Java programs and useconcepts such as variables, conditional and iterative execution methods etc
2. Understand the fundamentals of object-oriented programming in Java, including defining classes,object invoking methods etc and exception handling mechanisms

Unit I **(9 hours)**

Fundamentals of Object Oriented Programming: Introduction, object oriented paradigm-basic concepts of oops – benefits of oops – applications of OOPs. **Java Evolution**: java features –java Versus C and C++ - java and internet – java and WWW – web browsers **Overview of Java**

XAVIER ACADEMIC COUNCIL

Language: simple java program - more of java – application with two classes –java program structure – java tokens – java statements implementing a java program.

Unit II **(9 hours)**

Constants, Variables, data types: Declaration of variables- giving values to variables – scope of variables –symbolic constants – type casting – getting values of variables – standard default values – **Operators and Expressions**: Arithmetic operators –Relational operators- logical operators – assignment operators – increment and decrement operators –conditional operator – bitwise operator – special operators –arithmetic expressions –evaluation of expressions –precedence of arithmetic operators-type conversion in expression –operator precedence and associativity – mathematical functions.

Unit III **(9 Hours)**

Decision making and Branching: if statement-switch - ? : Operator –**Decision Making and Looping:**while statement -do statement - for statement- jumps in loops - labeled loops. **Classes, Objects and Methods**: Introduction – defining a class, field declaration–methods declaration– creating objects -accessing class members- constructors- methods overloading -static members – nesting of methods - inheritance -overriding methods – final variables and methods – final classes.

Unit IV **(9 Hours)**

Arrays Strings and Vectors: one dimensional array – creating an array –two dimensional arrays – strings –vectors –wrapper classes – **Interfaces, Multiple Inheritance**: defining interfaces – extending interfaces –implementing interfaces –accessing interface variables. **Packages , Putting classes together :** Introduction - java API packages : using system packages – naming conventions –creating packages –accessing a package –using a package – adding a class to a package –hiding classes.

Unit V **(9 Hours)**

Multithreaded Programming: creating threads – extending the thread class– stopping and blocking a thread - life cycle of a thread – using thread methods – thread exceptions – thread priority – synchronization – implementing the runnable interface. **Managing Errors and Exception:** Introduction – types of errors –exceptions -syntax of exception handling code – multiple catch statements –using finally statement –throwing our own exceptions – using exceptions for debugging.

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Identify the importance of java with its data types, control statements and class fundamentals

CO2: Make use of inheritance, method overriding and implement packages and interfaces

CO3: Experiment with exception handling and multithreading

CO4: Apply string and string buffer handling functions and analyze the concept of interfaces and streams

CO5: Build Java programs for real time applications

BY ACADEMIC COUNCIL

Text Book:

1. E. Balaguruswamy, *Programming with JAVA - A Primer*, McGraw Hill Professional, 2015

Reference Books:

1. Herbert Schildt, *Java: The Complete Reference***,** McGraw Hill Professional, 2017.
2. Robert Sedgewick & Kevin Wayne, *Introduction to Programming in Java*, Addison Wesley, 2017.
3. Y. Daniel Liang**,** *Introduction to Java Programming*, Brief Version Pearson Education, 2017.

E-Resources:

1. https://spoken-tutorial.org/tutorial-search/?search_foss=Java&search_language=English
2. https://onlinecourses.swayam2.ac.in/aic20_sp13/preview
3. https://spoken-tutorial.org/watch/Java/First+Java+Program/English/
4. https://onlinecourses.nptel.ac.in/noc19_cs84/preview

Programming in Java (Lab)

Hours/week: 2

List of Programs

Formula Substitution

1. To find the factorial and binomial coefficient
2. To calculate mean, variance and standard deviation
3. To perform number conversions (Decimal to Binary, etc.)

Checking

4. To check whether the given number is perfect or not

Generation

5. To perform prime number generation

Array

6. To arrange numbers in order
7. To perform matrix addition and subtraction

Searching

8. To perform Linear search and binary search

String

9. To perform String manipulation (case conversion, reversing, etc.)

OOPs Concept

10. To implement inheritance
11. To implement exception handling
12. To implement multithreading

Note: -Questions for the internal and external examination will be based on the concepts learnt

AK ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	3	9	**39**
CO2	9	3	3	3	9	3	9	**39**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	9	9	9	9	9	9	**63**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**33**	**27**	**33**	**45**	**33**	**45**	**261**

Low-1 Medium-3 High-5

SEC IV - R Tool Lab

(For Students Admitted from 2024-25)

Semester: IV **Hours / week: 2**
Subject Code: IBMXS44P **Credit: 2**

Course Objectives:

1. To navigate and optimize the R integrated development environment (IDE) R Studio and install and load add-in packages
2. To import external data into R for data processing and statistical analysis, learn the main R data structures and compute basic summary statistics

List of Programs

1. Develop a program to implement correlation analysis
2. Develop a program to implement regression analysis
3. Develop a program to implement t-test
4. Develop a program to implement z-test
5. Develop a program to implement f-test
6. Develop a program to implement chi-square test
7. Develop a Program to implement analysis of variance (ANOVA)

Course Outcomes:

After successful completion of this course, student will be able to

CO 1: Classify the basics concept in R programming in terms of constructs, control statements and functions
CO 2: Identify data analytics software
CO 3: Enhance the problem solving, programming and debugging skill
CO 4: Apply the R programming from a statistical perspective

ACADEMIC COUNCIL

CO 5: Learn and implement the various data structures of R

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	1	3	9	3	1	9	**35**
CO2	9	1	9	1	3	1	3	**27**
CO3	3	3	3	9	3	1	9	**31**
CO4	3	9	9	9	9	3	9	**51**
CO5	3	9	1	9	9	3	1	**35**
Total	**27**	**23**	**25**	**37**	**27**	**9**	**31**	**179**

Low-1 Medium-3 High-9

Open Elective Course

(For Students Admitted From 2024-25)

PROGRAMME STRUCTURE

Sem	Subject Code	Course	Subject Title	Hours / Week	Credit	CIA	ESE	Total Marks
III	IBOE31TP	OEC	PC Package Lab	2	2	-	50	50
IV	**IBOE41T1P**	**OEC**	**Web Designing Lab**	**2**	**2**	**-**	**50**	**50**

OEC- PC Package Lab

(For Students Admitted From 2024-25)

Semester: III **Hours/week: 2**
Subject Code: IBOE31TP **Credit: 2**

Course Objectives:

1. To acquire knowledge about word processing, spread sheet, Data base creation and slide preparation
2. To improve creative thinking in presentations

List of Programs

Word Processing

1. Create a word processing document consists of two pages in a Book named "XX" and then do the following:

XX ACADEMIC COUNCIL

a. Formatting Text, Alignment and Font Style
b. Perform Find and Replace
c. Add Header and Footer option to specify name of the Book Chapter Heading and page number in all pages

2. Create a word processing document having details of our college courses using bulleted and numbered lists. Type the title using Word Art
3. Design an invitation to invite seniors for a farewell party and use Font Setting/PageBorders / Word Art / Clip Art / Symbols in it
4. Create your class time table (using Table)
5. Use Mail Merge to create many letters to send it to more recipients
6. Create your resume in a word document

Spread Sheet

1. Create a Spreadsheet consists of Student details and then do the following:
   i. Calculate student wise total and subject wise total.
   ii. Find maximum and minimum marks of the subject.
   iii. Grade is calculated as
      a) If % of marks >=90, then grade A
      b) If % >=80 and <90, then grade B
      c) If % >=70 and <80, then grade C
      d) If % >=60 and <70, then grade D
      e) If % < 60, then grade F
2. Create a Spreadsheet having employee details suitably and then do following.
   a) Use functions to calculate Net Pay and Gross Pay.
   b) Perform conditional formatting and validation.
   c) Create a chart for these details
3. Create a purchase order list for a company.
   a) Prepare a purchased item list with price
   b) Prepare a flow chart for the price wise item.
4. Create a macro

Presentation

1. Create a presentation showing various activities of your department and apply Slide transition and background designs
2. Create a presentation showing various activities of your college. Apply animations and insert audio in this presentation
3. Create a presentation using design templates and then perform the following one:
   a) Include Table and Pictures
   b) Set time duration for each slide
4. Include Hyperlink within slides and link other documents

Database

1. Create a Student Database having Name, Reg no, Tamil, English, Maths, Total, and Average.

XX ACADEMIC COUNCIL

Calculate Total and Average and apply validation
2. Create an Inventory database having Item Name, Item no, Quantity and PricePerform query operation to retrieve data
3. Create a form to enter the details of the Book database
4. Create a report for the Book database

Note:- Questions for Internal and External examination will be based on concepts learnt.

Course Outcomes:

After successful completion of this course, students will be able to

CO1: Recall various options of Office Applications
CO2: Identify the icons to work with document, presentation, spreadsheet and database
CO3: Simplify the process of creating reports to solve the problems of manual report handling
CO4: Compare the options of different Office Applications to use appropriately
CO5: Create Presentations, Advertisements, Reports etc for enterprises

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	**45**
CO2	9	9	3	9	9	9	9	**57**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	3	3	9	3	9	**45**
Total	**45**	**39**	**15**	**27**	**45**	**27**	**45**	**243**

Low-1 Medium-3 High-9

OEC- Web Designing Lab

(For Students Admitted from 2024 -25)

Semester: IV **Hours/week: 2**
Subject Code: IBOE41T1P **Credit: 2**

Course Objectives:

1. To analyze a web page and identify its elements and attributes
2. To build dynamic web pages by using script languages

List of Programs

HTML

1. Create a HTML page for displaying the personal information by using various tags such as backgroundcolor, heading tag, font tag
2. Create a HTML page, which includes images and audio for any application.
3. Create a HTML page for displaying the Tender notice which is given to you

AKACADEMIC COUNCIL

4. To create a Time Table of your class using HTML
5. Creation of Lists in HTML
6. Design a dictionary using frames. The words are displayed in one frame and when you click the word,the meaning will be displayed on the other frame
7. Design webpage for your company product advertisement using frames

VBScript

8. Write a VBScript program to generate random number
9. Write a VBScript program to check whether the given number is odd or even
10. Write a VBScript program to find the largest of three given integers
11. Write a VBScript program to sort the numbers in ascending order

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Understand the basics of HTML and Scripting Language
CO2: Implement webpages using basic tags
CO3: Examine the use of tables in webpages
CO4: Develop a web pages with frames
CO5: Design interactive web pages using VBScript

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	9	9	**45**
CO2	3	3	9	9	3	9	9	**45**
CO3	3	3	9	9	1	9	9	**43**
CO4	3	3	9	9	3	3	3	**33**
CO5	3	3	3	9	1	9	3	**31**
Total	**21**	**15**	**33**	**39**	**17**	**39**	**33**	**197**

Low-1 Medium-3 High-9

B A Arabic

(For Students Admitted from 2024-25)

PROGRAMME STRUCTURE

Sem	Subject Code	Course	Subject Title	Hours / week	Credit	CIA	ESE	Total Marks
III	IBARS341P	SEC	**PC Package Lab**	2	2	-	50	50
IV	IBARS44P	SEC	Designing Lab	2	2	-	50	50

XV ACADEMIC COUNCIL

SEC III - PC Package Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 2**
Subject Code: IBARS34P **Credit: 2**

Course Objectives:

1. To acquire knowledge about word processing, spread sheet, Data base creation and slide preparation
2. To improve creative thinking in presentations

List of Programs

Word Processing

1. Create a word processing document consists two pages in a Book named "XX" and then do the following:
   a. Formatting Text, Alignment and Font Style
   b. Perform Find and Replace
   c. Add Header and Footer option to specify name of the Book Chapter Heading and Page number of total pages
2. Create a word processing document having details of our College courses using bulleted and number lists.Type the title using Word Art.
3. Design a Letter to felicitate Farewell Address to our seniors with Font Setting/Page Borders/Word Art/Clip Art/Symbols.
4. Create a Newsletter Article (using Columns, Drop cap)

Spread Sheet

1. Create a spreadsheet consists of Student details and then do the following:
   a. Calculate student wise total and subject wise total
   b. Find the Maximum and Minimum marks of the subject
2. Grade is calculated as
   vi. If %>=90, then grade A
   vii. If %>=80 and <90, then grade B
   viii. If %>=70 and <80, then grade C
   ix. If %>=60 and <70, then grade D
   x. If %<60, then grade F
3. Create a spreadsheet having Employee details suitably and then do the following
   a. Use functions to calculate Net Pay and Gross Pay
   b. Perform conditional formatting and validation

Presentation

1. Create a presentation showing your various activities of the department a Performslide translation and Setting background designs
2. Create a presentation showing various aspect of your college and perform custom animation and import sound.

Database

KAU ACADEMIC COUNCIL

1. Create a Student Database having Name, Regno, Tamil, English, Maths, Total, and Average Perform to findtotal and average and check data entered.
2. Create an Inventory database having Item Name, Item no. Quantity and Price. Perform query operation toretrieve data.

Note: Questions for internal and external examination will be based on concept learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Illustrate various options of office application
CO2: Demonstrate different types of formats, formulas and transition in office application
CO3: Develop reports to solve the problems of manual report handling
CO4: Compare the options of different Microsoft office applications to use appropriately
CO5: Build a presentation, advertisement, reports etc for enterprises

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	3	9	3	9	**45**
CO2	9	9	3	9	9	9	9	**57**
CO3	9	9	3	9	9	9	9	**57**
CO4	9	3	3	3	9	3	9	**39**
CO5	9	9	3	3	9	3	9	**45**
Total	**45**	**39**	**15**	**27**	**45**	**27**	**45**	**243**

Low-1 Medium-3 High-9

SEC IV- Designing Lab

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 2**
Subject Code: IBARS44P **Credit: 2**

Course Objectives:

1. To understand the basic concepts of GIMP
2. To gain knowledge about various tools of GIMP

GIMP

1. Design a Business card
2. Create a logo
3. Convert an image into pencil drawing
4. Design a scenery using various brushes
5. Design a greeting card
6. Create clipping mask – place an image inside text
7. Create passport size photo

KV ACADEMIC COUNCIL

8. Animate a still photo
9. Create a shadow effect for an object
10. Create a mirror effect for an image
11. Apply the following tools in an image:
    i) Smudge ii) Blur/Sharpen iii) Dodge/Burn
12. Create a mosaic photo collage

Note: Questions for the internal and external examinations will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Recognize the uses of various tools and effects in Photoshop
CO2: Identify the steps to start designing with images
CO3: Simplify the process of designing, editing, masking, morphing to solve the difficulties of designers
CO4: Support studios to create passport size photo
CO5: Design Visiting card, ID card, Birthday card, logo etc.

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	9	3	9	9	1	**43**
CO2	9	1	9	9	3	9	3	**43**
CO3	9	3	9	9	3	9	9	**51**
CO4	9	1	3	9	3	9	3	**37**
CO5	9	9	9	9	9	9	9	**63**
Total	**45**	**17**	**39**	**39**	**27**	**45**	**25**	**237**

Low-1 Medium-3 High-9

Discipline Specific Elective (DSE) for M. Com

(For Students Admitted from 2024-25)

Sem	Subject Code	Course	Subject Title	Hours / week	Credit	CIA	ESE	Total Marks
II	IMCOE2B	DSE	Web Designing	6 (T-4, P-2)	4	25 (T-15 P-10)	75	100
III	IMCOE31AP	DSE	**Statistics through R Tool Lab**	6 (P- 5, Libary-1)	4	25	75	100

XX ACADEMIC COUNCIL

DSE - Web Designing

(For Students Admitted from 2024-25)

Semester: II **Hours/week: 6 (T: 4 P: 2)**
Subject Code: IMCOE2B **Credit: 4**

Course Objectives:

1. To understand the uses of various HTML elements
2. To gain knowledge in designing web pages using CSS & Java Script

Unit I **(12 hours)**

Learning the basics of HTML: Structuring your HTML: The <html> Tag – The <head> Tag – The <body> Tag – The Title – Headings – Paragraphs – Comments. **Organizing information with lists:** Lists: An Overview – Numbered Lists – Unordered Lists – Definition Lists – Nesting of Lists – Otheruses of Lists.

Unit II **(12 hours)**

Working with Links: Creating Links – Linking local pages using relative and absolute path names – Links to other documents on the web – Linking to specific places within documents. Formatting Text with HTML and CSS: Character Level Elements – Character formatting using CSS – Preformatted Text– Horizontal Rules – Line Break – Addresses – Quotations – Special Characters – Fonts and Font Sizes.

Unit III **(12 hours)**

Using CSS to style a site: Including Style Sheets in a page – Selectors – Units of measure – Using Color– Links – The Box Model. **Using CSS to position elements on the page:**Positioning schemes- Abso lute positioning – Fixed Positioning- Controlling Stacking – Creating Drop Down Menus. **Using images on your web pages: Inline Images in HTML:** The <img> Tag –Images and Text – Images and Links – Image Background - Image Map.

Unit IV **(12 hours)**

Building Tables: Creating Tables – Table Parts – Sizing tables, borders and cells – Table and cell color-Aligning your table content – Spanning multiple rows or columns. **Designing forms:** Using the<form> tag – Using the <label> tag – Creating form controls with the <input> tag – Using other form controls. **Integrating Multimedia: Video and Sound:** Embedding video the simple way – hosting yourown video – Embedding video using <video>.

Unit V **(12 hours)**

Introducing JavaScript: The <script> tag – The JavaScript Language -Events. **Working with Frames and Linked Windows:** What are frames? – Working with Linked Windows – Inline Frames – Opening Linked Windows with JavaScript. **Using javascript in your pages:** Validating forms with java script- Hiding and showing content-Adding new content to a page.

TX ACADEMIC COUNCIL

Course Outcomes:

After successful completion of this course, student will be able to
CO1: Explain the uses of various HTML tags
CO2: Solve the problems of website users by using CSS for effective designing
CO3: Associate web developers to include frames, forms, tables while designing web pages
CO4: Discover different kinds of web pages using Java script
CO 5: Create websites for enterprises, educational institutions etc

Text Book:

1. Laura Lemay, Rafe Colburn, Jennifer Kyrnin, *SamsTeach Yourself HTML, CSS & JavaScript Web Publishing in one hour a day*, Pearson Education, Seventh Edition, 2016.

Reference Books:

1. Wendy Willard, *HTML: A Beginner's Guide*, McGraw-Hill Education, Fifth edition, 2013.
2. John Docket, *HTML and CSS: Design and Build Websites*, John Wiley & Sons, First Edition,2011.
3. Marijn Haverbeke, *Eloquent JavaScript: A modern introduction to Programming*, No Starch Press, Second Edition, 2014.

E - Resources:

1. https://dpmishra.com/study-materials/web-design-notes-pdf-for-bca/
2. https://www.tutorialspoint.com/internet_technologies/website_designing.htm
3. https://www.udemy.com/topic/html/

2.

Web Designing (Lab)

Hours/week: 2

List of Programs

1. Creation of Lists in HTML
2. Creation of hyperlinks and frames in HTML
3. Create mark sheet preparation using table in Html
4. Linking documents and images
5. Create TBAK college website using HTML tags
6. Create style sheets with the style elements
7. Demonstration of dialog boxes using JavaScript
8. Perform arithmetic operations using JavaScript
9. Create rollover buttons
10. Create login format using JavaScript

Note: - Questions for the internal examination will be based on the concepts learnt

XV ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	3	3	3	9	9	9	**45**
CO2	9	9	9	3	9	9	3	**51**
CO3	9	1	9	9	9	9	9	**55**
CO4	9	1	9	3	9	9	9	**49**
CO5	9	1	9	9	9	9	9	**55**
Total	**45**	**15**	**39**	**27**	**45**	**45**	**39**	**255**

Low-1 Medium-3 High-9

DSE – Statistics through R Tool Lab

(For Students Admitted from 2024-25)

Semester: III **Hours/week: 6 (P -5: Lib-1)**
Subject Code: IMCOE31AP **Credit: 4**

Course Objectives:

1. To navigate and optimize the R integrated development environment (IDE) R Studio and install andload add-in packages
2. To import external data into R for data processing and statistical analysis, learn the R data structures and compute basic summary statistics

List of Programs

1. Develop a Program to implement correlation analysis
2. Develop a Program to implement regression analysis
3. Develop a Program to implement t-test
4. Develop a Program to implement z-test
5. Develop a Program to implement f-test
6. Develop a Program to implement chi-square test
7. Develop a Program to implement kruskal-wallis test
8. Develop a Program to implement likert scaling techniques
9. Develop a Program to implement analysis of variance (ANOVA)
10. Develop a Program to implement factor analysis
11. Develop a Program to implement cluster analysis
12. Develop a Program to calculate financial losses and generate financial report for a bank
13. Develop a program to mine data and generate actionable insights to improve customer experience for an insurance company

Note: - Questions for internal and external examination will be based on concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Demonstrate the basics in R programming in terms of constructs, control statements and

ACADEMIC COUNCIL

functions

CO2: Apply data analytics software
CO3: Enhance problem solving, programming and debugging skills
CO4: Plan the R programming from a statistical perspective
CO5: Analyze and implement the various data structures of R

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	3	1	9	9	3	**43**
CO2	9	3	9	3	9	9	9	**51**
CO3	3	9	1	1	3	1	9	**27**
CO4	9	3	9	1	9	9	3	**43**
CO5	9	1	9	3	9	9	3	**43**
Total	**39**	**25**	**31**	**9**	**39**	**37**	**27**	**207**

Low-1 Medium-3 High-9

Skill Enhancement Course for Chemistry Department

(For Students Admitted From 2023 – 24)

Sem	Subject Code	Course	Subject Title	Hours / week	Credit	CIA	ESE	Total Marks
IV	IBCHS45	SEC	Computer Fundamentals and C Programming	2	2	25	75	100

SEC IV - Computer Fundamentals and C Programming

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 2**
Subject Code: IBCHS45 **Credit: 2**

Course Objectives:

1. Demonstrate a basic understanding of computer hardware and software
2. Apply logical skills to programming in a variety of languages

KU ACADEMIC COUNCIL

Unit I **(6 hours)**

Introduction to Computer: Introduction-Types of Computer-Characteristics of Computer-Input Devices-Output Devices **Networking Fundamentals:** introduction to Computer network – Network component.

Unit II **(6 hours)**

Introduction to C Programming: C Character Set – Writing first program of C – Identifiers and Keywords – A more useful C Program – Entering the program into the computer – Data types – Constants – Variables and Arrays – Declarations – Expressions – Statements – Symbolic constants

Operators and Expressions: Arithmetic Operators – Unary Operators – Relational and logical Operators – Assignment Operators – The conditional Operators – Library functions.

Unit III **(6 hours)**

Data Input and Output: Preliminaries – The getchar function – The putchar function – The scanf function – The printf function – gets and puts function

Control Statements: Preliminaries – Branching: The If-else Statement - Looping – while statement – do-while statement –for statement – nested control structures – switch statement – break statement – continue statement.

Unit IV **(6 hours)**

Functions: A brief overview **–** Defining function – Accessing a function - Function prototypes – Passing arguments to a function - Recursion

Program Structure: Storage classes **–** Automatic variables – External variables – Static variables**:** Defining an Array – Processing an Array – Passing arrays to Functions.

Unit V **(6 hours)**

Strings: Defining a String – NULL Character – Initialization of Strings – Reading and writing a string – Processing strings – Character arithmetic – Searching and sorting of strings –**Pointers:** Fundamentals – Pointer Declarations – Operations on pointers.

Course Outcomes:

After successful completion of this course, student will be able to

CO 1: Summarize the concept of Computer System, Network components, c programming functions

CO 2: Describe the basic programming knowledge of C and list operators and expressions

CO 3: Demonstrate data input and output and illustrate control statements & functions

CO 4: Analyse unary operators, program structure and categorize arrays

CO 5: Evaluate strings and operations on pointers

Text Books:

1. Anita Goel, *Computer Fundamentals***,** Pearson Education Published by Dorling Kindersley.
2. Pradeep pkohriyal, *Computer Networking*, published by S.B Nangia APH Publishing Corporation.
3. Byron Gottfried, *Programming with C*, Tata McGraw Hill Education, Fourth Edition, 2018.

Reference Books:

1. Andrew S Tanenboum, *Computer Networks,* Prentice Hall of India ,Fourth Edition, 2007.

KKA ACADEMIC COUNCIL

2. Byron Gottfried, *Programming with C*, Tata McGraw Hill Education, Third Edition, 2011.

E - Resources:

1. https://www.coursera.org/courses?query=computer%20fundamentals
2. https://onlinecourses.swayam2.ac.in/ugc19_cs10/preview\
3. https://onlinecourses.nptel.ac.in/noc19_cs42/preview

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	3	3	3	9	3	1	1	**23**
CO2	9	1	9	9	3	3	3	**37**
CO3	9	3	9	3	3	9	9	**45**
CO4	9	3	3	9	3	3	3	**33**
CO5	9	3	3	9	3	9	3	**39**
Total	**39**	**13**	**27**	**39**	**15**	**25**	**19**	**177**

Low-1 Medium-3 High-9

B Com Honours

(For Students Admitted from 2024-25)

PROGRAMME STRUCTURE – PROGRAMME CODE: UHO

Sem	Subject Code	Course	Subject Title	Hours / week	Credit	CIA	ESE	Total Marks
IV	IBHOC44	Core	Business Intelligence using Excel and Access	5 (T-3, P-2)	3	25 (T-15,P-10)	75	100
V	IBHOC54	Core	Business & Technology	4	3	25	75	100

XX ACADEMIC COUNCIL

Business Intelligence Using Excel and Access

(For Students Admitted from 2024-25)

Semester: IV **Hours/week: 5 (T-3: P-2)**
Subject Code: IBHOC44 **Credit: 3**

Course Objectives:

1. Demonstrate a basic understanding of computer Excel and Access.
2. To enable the learner to describe and use query, form, and reports

Unit I **(9 Hours)**

Understanding Formula Basics: Introducing Formula and Functions, Working with Dates and Times, Creating Formula that Count and Sum, Creating Formula that Look Up Values, **Creating Formulas for financial applications**: Present Value, Future Value, Payment, Interest Rate, Period, Term.

Unit II **(9 Hours)**

Creating Chart and Graph: Introduction, Working with Chart, Understanding Chart Type, Chart Customization, Visualizing Data Using Conditional Formatting.

Unit III **(9 Hours)**

Analyzing Data With Excel: Introduction of Pivot table; Analyzing Data with Pivot Table: Working with Non-Numeric Data, Grouping Pivot Table Items, Creating Frequency Distribution, Creating Calculated Field or calculated item, Creating Pivot Chart, Producing a Report with Pivot Table.

Unit IV **(9 Hours)**

Introduction to Data Base: Database, Table, Record and Fields Values, Concept of Relational Database; Access Database Objects and Views: Ribbon, Datasheets, Queries, Data-entry and display forms, Reports, Creating Access Table: Table design and process, Using the Design ribbon tab, Working with fields, Creating contacts table

Unit V **(9 Hours)**

Selecting Data with Queries: About the Query, Types of Queries; Creating Query: Using Query Window, Using Query Design window and ribbon, Selecting Fields, Providing an alias for the field name, Introduction of forms in Access, Preparation of Access Report.

Text Books:

1 Michael Alexander, Richard Kusleika, "*Access 2019 Bible"*, Wiley, USA, 2018
2 John Walkenbach, *"Access 2016 Bible"*, Wiley, USA, 2015

KA ACADEMIC COUNCIL

Reference Books:

1 Lokesh Lalwani, 'Excel 2019 All-in-One', BPB Publications; 1st edition (1 January 2019), India
2 Joan Preppernau, M. Lambert, Steve Lambert, 'Windows Vista Step by Step Deluxe Edition (Step By Step)', Microsoft Press US; 1st edition, USA, 2007
3 "Access video training - Access - support.microsoft.com." https://support.microsoft.com/en-us/office/access-video-training-a5ffb1ef-4cc4-4d79-a862-e2dda6ef38e6.
4 "Excel video training - Office Support - support.microsoft.com." https://support.microsoft.com/en-us/office/excel-video-training-9bc05390-e94c-46af-a5b3-d7c22f6990bb.

Business Intelligence Using Excel and Access(Lab)

Hours/week: 2

List of Programs

MS-Excel

1. Prepare a bar chart using chart wizard representing rainfall for the last 5 years in MS-EXCEL. Assume the rainfall indices
2. Prepare student's mark list and calculate total, average, result, rank and grade.
3. Prepare the electricity bill.
4. Illustrate the numeric functions
5. Illustrate the character functions
6. Calculate Mean, Median, and Mode.
7. Prepare Sales details.
8. Prepare employees to pay bills and order them according to their salaries.

MS-Access

1. Create a table on student Marks details and query the table to list students who are getting greater than 90 marks in Mathematics.
2. Create a table on player details and prepare report.
3. Create a table on Employee details and query the table using wizard to list employees who are getting salary more than Rs. 10,000.
4. Create a table on Employee details and prepare report using wizard.
5. Create a table on Employee details and update the salary using a form using wizard.

Course Outcomes:

On successful completion of this course, students will be able to

CO 1: Summarize the concept of excel formulas, tables, and queries
CO 2: Demonstrate the data in chart and graph. and report
CO 3: Utilize the data analysis tools and techniques to convert the data into information.
CO 4: Evaluate on pivot table, queries, working with fields, and the queries
CO 5: Develop the query, form, and report in Excel and Access.

ACADEMIC COUNCIL

Course Outcomes	Programme Outcomes							
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	3	3	3	9	3	1	1	23
CO2	9	1	9	9	3	3	3	37
CO3	9	3	9	3	3	9	9	45
CO4	9	3	3	9	3	3	3	33
CO5	9	3	3	9	3	9	3	39
Total	39	13	27	39	15	25	19	177

Low-1 Medium-3 High-9

Core - XVI Business &Technology

(For Students Admitted from 2024-25)

Semester: V **Hours/week: 4**
Subject Code: IBHOC54 **Credit: 3**

Course Objectives:

1.To have an in-depth understanding of the relationships existing among the key global financial systems

2.To demonstrate and advanced knowledge of key theoretical finance and economic concepts under pinning financial markets

Unit I **(12 hours)**

Introduction: Introduction of Fintech industry-Areas of Fintech-History of Fintech- Fintech importance-**New Entrants to Banking:** New banking entrants in a flash-The traditional banking Landscape-New Operating Models for Banking-Banking as a service and Open APIs-Neo-banks, Challenger banks and I Banks

Rethinking payments and remittances: Payments adremittancesinaflash-Traditionalremittances-sizeoftheremittances market-upcoming trends in remittances–Innovative ways of sending money.

Unit II **(12 hours)**

Digital Lending innovation: Digital Lending innovation in a flash- short history of lending-peer-to-peerlending-P2Pmarket place lending business model-consumer lending-digital lending for students-digital lending for SMEs-digital mortgages

XX-ACADEMIC COUNCIL

Commercial banking transactions: Commercial banking transactions in a flash- Working Nature of commercial banking-SME market size –the impact of Fintech on business banking-the impact of Fintech on corporate banking Online accounting for SMEs and integration with business banking-Tools for SMEs

Next Generation Commerce: Next Generation Commerce in a flash- changes in customer shopping behaviour -point of sales(POS)evolution-mPOS Business Model-Tablet based cash registers-Online acquiring

(12 hours)

Unit III

Crowd funding and Crowd investing: Crowd funding and Crowd investing in flash –Businesses traditionally fund – Crowd funding business model-market size-key crowd funding platforms-top crowd funding campaigns-crowd investing

Innovative wealth management: Innovative wealth management in flash-Wealth management works-changes in customer expectations-changes in advisors-changes in data analytics-changes in access to products-social investing-Personal finance management.

Unit IV **(12 hours)**

The power of big data: The power of big data in a flash- History of Data- Big Data Working principles- Uses Big Data Innovatively-Big Data in the Financial Services Industry.

The Internet of Things: The Internet of Things in a Flash- Growth of IoT- The Impact of IoT on Businesses- The IoT in Categories- Combining IoT and Block chain- The IoT in Financial Services-O2O and IoT in FinTech- Challenges Faced by the IoT.

Block chain and Distributed Ledgers Block chain and DistributedLedgersinaFlash-AboutDistributedLedgers-Blockchain-TheComponentsofBlockchain-TopCryptocurrencies- Impacts of Financial Services-Investment in Block chain-Use Cases for Block chain.

Unit V **(12 hours)**

The Rise of Insurtech: The Rise of Insurtech in a Flash- Insurance Working principle- Market Size-DriversofDisruption-Peer-to-PeerInsurance-BlockchainedInsuranceandMachineLearning-WearablesinInsurance- Working Principle of Traditional Insurance Firms-Interesting Insurtech Ideas

Identification, Cyber security, and Regtech: Identification, Cyber security, and Regtechina Flash-Traditional Ways of Using Identification-Unique Identification System in India-Identification for the Unbanked-Using Biometrics as Identification- Using Biometrics in Bank Transactions- Using a Distributed Ledger forIdentification-TheUNIdentityAspiration-CybercrimeandItsHistory-TheCybersecuritySector-Typesof Cybercrime-Cyber security Categories and Players-Regulation Technology(Regtech).

Course Outcomes:

After successful completion of this course, student will be able to

CO1: Definethefinancial technology

CO2: Apply the digital lending innovation and IoT

CO3: Analyze the cyber security and block chain

CO4: Evaluate the crowd funding and crowd investing funding models

VX ACADEMIC COUNCIL

CO5: Create the distributed ledgers

Text Book:

1. Agustin Rubini, *Fintech in a Flash: Financial Technology Made Easy,* Walter de Gruyter Publisher, Third Edition, 2018.

Reference Books:

1. Susanne Chishti and Janos Barberis, *The FINTECH Book: The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries,* JohnWiley Publisher, First Edition, 2016.
2. The oLynn, JohnG. Mooney, Pierangelo Rosati,Mark Cummins, *Disrupting Finance: FinTech and Strategy inthe21st Century,* Palgrave, First Edition,2018.
3. Abdul Rafay, *FinTech, as a Disruptive Technology for Financial Institutions*, IGIGlobal, 2019.
4. Bernardo Nicoletti, *The Future of FinTech: Integrating Finance and Technology in Financial Services*, Palgrave Macmillan, 2018.

E-Resources:

1. https://www.coursera.org/courses?query=fintech
2. https://www.edx.org/course/introduction-to-fintech

Course Outcomes	Programme Outcomes							
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**Total**
CO1	9	9	9	3	3	9	9	**51**
CO2	9	9	9	9	9	9	9	**63**
CO3	9	3	9	3	9	9	9	**51**
CO4	9	9	9	3	9	9	9	**57**
CO5	9	3	9	9	9	9	9	**57**
Total	**45**	**33**	**45**	**27**	**39**	**45**	**45**	**279**

Low-1 Medium-3 High-9

Value Added Programme in Web Designing

(For Students Admitted From 2023-24)

Programme Specific Outcomes:

PSO1: Demonstrate the fundamental technical skills to build and implement a web site
PSO2: Develop basic programming skills using Java Script to create interactive webpage
PSO3: Understand techniques to embed text/image/video content into web pages
PSO4: Design and Develop dynamic websites using CSS

PREAMBLE

The Board of Studies of Computer Science revamped the curriculum with the following change

1. Web designing theory course has been removed

XX ACADEMIC COUNCIL

Programme Structure

Course	Subject Code	Subject Title	Contact Hours	Credit	External Marks
Core I	ECWD21P	Web Designing Lab	50	50	100
Total			50	50	100

Core I - Web Designing Lab

(For Students Admitted From 2023-24)

Subject Code: ECWD21P **Hours: 50**

Course Objectives:

1. To build web pages using basic HTML elements, CSS and JavaScript
2. To make use of frames, forms, hyperlink to design an interactive web pages

HTML

1. Create a HTML page to illustrate all basic tags
2. Create a HTML page to display study time table
3. Create a HTML page to display a menu list for bakery
4. Create a HTML page to use all style sheets
5. Create a HTML page to demonstrate frame
6. Create a HTML page to use hyperlink for both text and image
7. Create a HTML page to demonstrate forms

JavaScript

8. Write a JavaScript program to display the current day and time
9. Write a JavaScript program to check leap year
10. Write a JavaScript program to convert temperature from Fahrenheit to Celsius
11. Create a HTML page to create login form
12. Create a HTML page to demonstrate validation in any forms

Note: - Questions for the external examination will be based on the concepts learnt

Course Outcomes:

After successful completion of this course, student will be able to

CO 1: Understand the basics of all HTML tags to create the static web page

XX ACADEMIC COUNCIL

CO 2: Apply the concepts of table and list
CO 3: Examine the use of style sheets, frames and hyperlinks
CO 4: Evaluate the concept of VBScript and validation using JavaScript
CO 5: Create a dynamic website

XX ACADEMIC COUNCIL