MAZHARUL ULOOM COLLEGE
(AUTONOMOUS)

(Established & Managed by the Ambur Muslim Educational Society)
Accredited by NAAC with Grade 'A" CGPA 3.23 in Cycle 3
Affiliated to Thiruvalluvar University, Vellore

Ambur 635802 (Tirupattur District)

COURSE STRUCTURE & SYLLABUS
(For the students admitted from year 2025-2026 onwards)

Programme: M.Sc.

Course: Information Technology

At the end of the M.Sc Information Technology Programme, the student will:

Program Outcomes (POs)	
PO Code	**Program Outcome Statement**
PO1	Critical Thinking: Demonstrate advanced proficiency in critical thinking skills, evidenced by their ability to analyze complex datasets, and identify patterns. Ability to apply the knowledge of Information Technology with recent trends aligned with research and industry.
PO2	Effective Communication: Demonstrate proficiency in presenting data – driven insights through compelling visualizations and articulate documentation, fostering collaboration and facilitating informed decision - making in diverse professional settings.
PO3	Usage of Technology: Exhibit a mastery of cutting – edge technologies, harnessing advanced tools and platforms to manipulate, analyze and visualize complex datasets.
PO4	Individual and Team Work: Excel in collaborative team environments, effectively contributing their expertise to interdisciplinary projects, thereby fostering a synergetic approach to addressing complex challenges in the field of data science.
PO5	Project Management: Demonstrate the ability to lead multidisciplinary teams, applying project management principles to optimize resources and successfully navigate the dynamic landscape of data –driven initiatives.
PO6	Ethics and Values: Integrate ethical considerations into decision – making processes, emphasizing the responsible and respectful use of data to address societal challenges and contribute positively to the evolving field of data science.
PO7	Life Long Learning : Proactively engage in continuous professional development, fostering adaptability and a thirst for knowledge to remain at the forefront of advancements in data science throughout their careers.

After the successful completion of the programme, the students are expected to

Program Specific Outcomes (POs)	
PSO Code	**Program Specific Outcome Statement**
PSO1	Able to analyze, design and develop problem solving skills in the discipline of Information Technology.
PSO2	Demonstrate hands-on expertise through practical labs in web development, mobile app development, database systems, and software engineering projects.
PSO3	Understand and manage operating systems, computer networks, and security principles to design secure and efficient IT infrastructures.
PSO4	Acquire evaluation of potential benefits of alternative solution in designing software and/or hardware systems in broad range of open source programming languages to withstand technological changes.
PSO5	Apply the practices and strategies of computer science for software project development to deliver a quality software product and contribute to research in the chosen field and perform effectively.

Cognitive Levels of Learning

The cognitive domain is the first and most common hierarchy of learning objectives (Bloom, 1956). It focuses on the acquisition and application of knowledge and is widely used in the educational setting. It aims to develop the mental skills and the acquisition of knowledge of the individual. The cognitive domain encompasses of six categories which include remembering, understanding, applying, analyzing, evaluating and creating.

Level	Definition	Key Actions
K1 : Remembering	Ability to recall or recognize facts, terms, basic concepts, or answers without necessarily understanding them.	Retrieve, Memorize, Repeat, Define, Identify, Recognize
K2 : Understanding	Comprehending the meaning of information, interpreting or translating knowledge into your own words.	Explain, Describe, Summarize, Interpret, Paraphrase
K3 : Applying	Using knowledge in new situations, such as solving problems or applying theories to real-world situations.	Use, Demonstrate, Implement, Calculate, Practice
K4 : Analyzing	Breaking information into parts to explore understandings and relationships; identifying motives or causes.	Compare, Contrast, Categorize, Distinguish, Examine, Organize
K5 : Evaluating	Making judgments based on criteria and standards, often involving checking and critiquing.	Judge, Critique, Justify, Assess, Prioritize, Recommend
K6 : Creating	Putting elements together to form a new coherent whole or original product.	Design, Develop, Invent, Compose, Construct, Generate

PG Department of Information Technology

SYLLABUS AND SCHEME OF EXAMINATIONS – I & II SEMESTER

Sem	Course Code	Course Category	Course Title	Ins. Hrs/ Week	Credit	Marks CIA - ESE		Total
M .Sc(Information Technology)								
Semester I	25MIT11	Core -I	Python Programming	7	5	25	75	100
	25MEIT12A	Elective I	1.Data Structures	5	3	25	75	100
	25MEIT12B		2.Compiler Design					
	25MEIT12C		3.Natural Language Processing					
	25MEIT13A	Elective II	1.Operating Systems	5	3	25	75	100
	25MEIT13B		2.Digital Logic and Computer Architecture					
	25MEIT13C		3.Human Computer Interaction					
	25MPIT14	Core-II	Python Programming - Practical	7	5	25	75	100
	25MPIT15	Core-III	Web Development– Practical	6	4	25	75	100
	Total			**30**	**20**			**500**
Semester - II	25MIT21	Core - IV	Database Systems	5	5	25	75	100
	25MEIT22A	Elective III	Computer Network and Security	4	3	25	75	100
	25MEIT22B		Biometric Techniques					
	25MEIT22C		Block Chain Technology					
	25MEIT23A	Elective IV	Software Engineering	4	3	25	75	100
	25MEIT23B		Object oriented analysis and design					
	25MEIT23C		Software Project Management					
	25MSIT24	Skill Enhancement Course -SEC -I	Mobile Application Development	3	2	25	75	100
	25MHR20	Compulsory Paper	Human Rights	2	2	25	75	100
	25MMO20		MOOC Course	-	2	25	75	100
	25MPIT25	Core - V	RDBMS – Practical	6	5	25	75	100
	25MPIT26	Core - VI	Mobile Application Development - Practical	6	4	25	75	100
	Total			**30**	**26**			**800**

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25MIT11	Core -I	7	5	25	75	100

Course Title	PYTHON PROGRAMMING

Learning Objectives	
LO1	**Understand and apply core Python programming concepts**, including syntax, variable assignment, data types, operators, conditionals, and loops to write efficient Python programs.
LO2	**Develop proficiency in functions and functional programming**, including creating and calling functions, managing variable scope, using recursion, and applying functional programming paradigms.
LO3	**Gain expertise in Python modules and object-oriented programming**, with a focus on module usage, namespaces, encapsulation, inheritance, polymorphism, and handling exceptions effectively.
LO4	**Design and implement graphical user interfaces (GUIs) in Python** using core widgets and their properties, enabling interaction through buttons, menus, text inputs, and other GUI elements.
LO5	**Connect Python applications to databases** by setting up and interacting with SQL and NoSQL databases (MySQL and MongoDB), performing CRUD operations, and understanding database integration concepts.

SYLLABUS		
Unit	Contents	Hours
I	**Core Python:** Introduction - Python Basics: Comments - Statements and syntax - variable Assignment - Identifiers – **Python objects:** Built-in-types - Internal types - Standard Type operators - Standard type Built-in-functions. **Numbers :** Introduction to Numbers - Integers - Floating point numbers - Complex numbers - Operators - Built-in and factory functions – Conditionals and Loops	21
II	Mapping and set types.- **Functions and functional programming**: Introduction - Calling functions - Creating functions - passing functions - Formal arguments - Variable - Length Arguments - Functional Programming - Variable Scope – Recursion	21
III	**Modules:** Modules and Files – namespaces - Importing Modules - Features - Built-in functions. **Object Oriented Programming**: Introduction - Object Oriented Programming – Encapsulation Inheritance – Polymorphism – **Errors and Exceptions**: Introduction – Exceptions in Python – Multithreading.	21
IV	**GUI Programming**: Introduction – **Using Widgets**: Core widgets- Generic widget properties – Labels – Buttons – Radio Buttons – Check Buttons – Text – Entry – List Boxes – Menus – Frame – Scroll Bars	21
V	**Database Programming**: Connecting to a database using MongoDB - Creating Tables-INSERT-UPDATE -DELETE - READ operations. Introduction to SQL and NoSQL databases - Setting up MySQL and MongoDB with Python (pymongo)	21

Text Book(s):

1. Wesley J. Chun, (2007), "Core Python Programming", Pearson Education, Second Edition – (Unit I, II, III).
2. Charles Dierbach, (2015), "Introduction to Computer Science Using Python A Computational Problem-Solving Focus", Wiley India Edition- (Unit III- Object Oriented Programming)
3. Martin C Brown, (2018), "The Complete Reference Python", McGraw Hill Education (India) Private Limited – (Unit IV)

Reference Book(s):

1. Dr.P.Rizwan Ahmed (2023), Python Programming, Margham Publications, Chennai.
2. Timothy A. Budd, (2011), "Exploring Python", Tata MCGraw Hill Education Private Limited, First Edition.
3. Allen Downey, Jeffrey Elkner, Chris Meyers, (2012), "How to think like a computer scientist: learning with Python"

Web Resource(s):
1. http://interactivepython.org/courselib/static/pythonds
2. http://www.ibiblio.org/g2swap/byteofpython/read/
3. http://www.diveintopython3.net/
4. http://docs.python.org/3/tutorial/index.html

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Explain the basic concepts in python language.	K1,K2
CO 2	Apply the various data types and identify the usage of control statements, loops, functions and modules in python for processing the data	K1,K2,K3
CO 3	Analyze and solve problems using basic constructs and techniques of python.	K2,K3,K4
CO 4	Assess the approaches used in the development of interactive application.	K3,K4,K5
CO 5	To build real time programs using python	K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	3	2	3	3	3	2	2	2.4
CO2	3	3	3	2	2	3	2	3	3	3	3	2	2.6
CO3	3	2	3	2	2	3	3	3	3	3	3	3	2.75
CO4	2	3	2	2	2	3	3	2	3	3	2	2	2.41
CO5	3	3	3	3	3	2	2	3	3	3	3	3	2.83
												Mean Overall Score	2.6
												Correlation	High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25MPIT14	**Core -II**	7	5	25	75	100

Course Title	PRACTICAL:PYTHON PROGRAMMING LAB

Learning Objectives

LO 1	**Write and debug basic Python programs using fundamental programming concepts and control structures** such as loops and conditionals to solve problems effectively.
LO 2	**Manipulate data collections in Python**, including lists, dictionaries, and sets, to organize, store, and retrieve data efficiently.
LO 3	**Create reusable code by defining functions and implementing recursion**, enhancing program modularity and problem-solving skills.
LO 4	**Apply object-oriented programming principles** including classes, objects, inheritance, and polymorphism to design scalable and maintainable software.
LO 5	**Develop Python applications with graphical user interfaces (GUIs) and integrate them with databases** to build interactive, data-driven programs.

SYLLABUS		
Unit	Contents	Hours
	1. Python Basic programs 2. Control Structures 3. Lists 4. Functions and Recursions 5. Modules 6. String Processing 7. Dictionaries and Sets 8. Classes and Objects 9. Polymorphism 10. Inheritance 11. GUI Application 12. Working with Database	105

Text Book(s):
1. Wesley J. Chun, (2007), "Core Python Programming", Pearson Education, Second Edition –

Reference Book(s):
1. Mark Lutz, (2013), "Learning Python Powerful Object Oriented Programming", O"reilly Media, 5 th Edition.   2. Timothy A. Budd, (2011), "Exploring Python", Tata MCGraw Hill Education Private Limited, First Edition.   3. Allen Downey, Jeffrey Elkner, Chris Meyers, (2012), "How to think like a computer scientist: learning with Python"

Web Resource(s):
1. http://interactivepython.org/courselib/static/pythonds   **2.** http://www.ibiblio.org/g2swap/byteofpython/read/   **3.** http://www.diveintopython3.net/ http://docs.python.org/3/tutorial/index.html

	Course Outcomes	
	Upon successful completion of this course ,the student will be able to:	
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Understand the significance of control statements, loops and functions in creating simple programs.	K1,K2,K3
CO 2	Apply the core data structures available in python to store, process and sort the data.	K2,K3,K4
CO 3	Analyze the real time problem using suitable python concepts	K3,K4,K5
CO4	Assess the complex problems using appropriate concepts in python	K3,K4,K5
CO 5	Develop the real time applications using python programming language.	K4,K5,K6

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	2	2	2	2	2	2	3	3	3	2	2	2.25
CO2	3	2	3	2	2	2	2	3	3	3	2	3	2.5
CO3	3	2	3	2	2	2	3	3	3	3	3	3	2.66
CO4	3	2	3	2	2	3	3	3	3	3	3	3	2.75
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3
												Mean Overall Score	2.63
												Correlation	High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25MPIT15	Core-III	6	4	25	75	100

Course Title	WEB DEVELOPMENT - PRACTICAL

Learning Objectives	
LO1	**Understand and apply fundamental HTML concepts** including lists, tables, graphics, forms, frames, and linking documents to create well-structured web pages.
LO2	**Design and style web pages effectively using Dynamic HTML and Cascading Style Sheets (CSS)**, leveraging SPAN and DIV tags, external stylesheets, and layout techniques for responsive websites.
LO3	**Develop interactive web pages using JavaScript**, mastering basic programming constructs, functions, events, and DOM manipulation to enhance user experience.
LO4	**Utilize JavaScript to handle form elements and browser events**, improving client-side validation and dynamic content updating on websites.
LO5	**Install, configure, and manage WordPress websites**, including theming, navigation, widgets, and page setup, culminating in deploying a functional and dynamic website.

SYLLABUS		
Unit	Contents	Hours
I	**Introduction to HTML** - Lists - Adding Graphics to HTML Documents - Tables -Linking Documents - Frames- Developing HTML Forms	18
II	**Dynamic HTML** - Cascading Style Sheets - Use of SPAN Tag - External Style Sheets - Use of DIV Tag - Developing Websites	18
III	**Introduction to JavaScript** - JavaScript in Web Pages - Advantages - Writing JavaScript into HTML - Basic Programming Techniques - Operators and Expressions- JavaScript Programming Construct: Conditional Checking, Controlled Loops, Functions: Built-in Functions, User-Defined Functions - Placing Text in a Browser - Dialog Boxes.	18
IV	**JavaScript Document Object Model:** Introduction - Understanding Objects in HTML - Handling Events using JavaScript. Forms used by a Website: Form Object - Built-in Objects.	18
V	**Word Press:** Installation - Stetting and administration- Word press: Theming basics - Our First Word Press Website - Theme Foundation - Menu and navigation - Home page - Dynamic Sidebars and Widgets - Page - archive Page results - Testing and Launching	18

Text Book(s):
1. Ivan N. Bayross, (2005), Web Enabled Commercial Applications Development Using HTML, DHTML, JavaScript, perlCGI, 3rd Edition, BPB Publications. (Unit I, II, III and IV) 2. Jesse Friedman,(2012), Web Designer's Guide to Word Press: Plan, Theme, Build, Launch (Voices That Matter), 1st Edition , New Riders. (Unit V)
Reference Book(s):
1. Dr.P.Rizwan Ahmed(2018), Open Source Programming, Margham Publications, Chennai. 2. Deitel & Deitel, (2000), Internet and World Wide Web How to program, Prentice Hall. 3. Jon Duckett, (2004), Beginning Web Programming with HTML, XHTML, and CSS, Wiley

	Publishing, Inc.
Web Resource(s):	

1. http://www.sergey.com/web_course/content.html
2. http://www.pageresource.com/jscript/index.html
3. **http://www.peachpit.com/guides/content.aspx**
4. https://www.tutorialspoint.com/wordpress/index.htm

Course Outcomes

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

CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Identify the tools which will be suitable for the requirement of the webpage.	K1,K2,K3
CO 2	Implement Java script and Style Sheets effectively in the Web Pages	K2,K3,K4
CO 3	Analyze the different tools and built-in functions available to be applied in the webpage	K3,K4,K5
CO 4	Rate the design and effectiveness of the Web Pages created.	K2,K3,K4,K5
CO 5	Design and publish a website using Word press	K2,K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	2	3	3	3	3	2	3	3	2	2	2	2.5
CO2	2	3	3	2	3	3	3	3	3	2	2	3	2.67
CO3	3	2	3	2	3	2	3	3	3	2	2	3	2.58
CO4	2	2	3	3	2	2	3	3	3	2	2	3	2.50
CO5	2	3	3	3	3	2	3	3	3	2	3	3	2.75
												Mean Overall Score	2.6
												Correlation	High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25MEIT12A	Elective - I	5	3	25	75	100

Course Title	1.DATA STRUCTURES

Learning Objectives	
LO1	**Understand fundamental data structures such as arrays, stacks, and queues**, including their definitions, representations, and common operations, and apply them to solve computational problems.
LO2	**Implement and manipulate linked lists** (single, circular, double, and circular double linked lists) to efficiently manage dynamic data storage.
LO3	**Comprehend tree data structures and their applications**, including binary trees, expression trees, and binary search trees, and perform various tree traversals and operations.
LO4	**Analyze and apply sorting and searching algorithms** such as bubble sort, quick sort, merge sort, linear search, and binary search to organize and retrieve data efficiently.
LO5	**Explore graph theory concepts and algorithms**, including graph representation, traversal methods (DFS), shortest path algorithms, minimum spanning trees, and backtracking techniques for solving complex problems.

SYLLABUS		
Unit	Contents	Hours
I	**Introduction and Overview:** Definitions – Concept of Data Structures – **Arrays**: Definition – One Dimensional Array – Multidimensional Arrays: Two Dimensional Array – Sparse Matrices – Three dimensional and n-dimensional Arrays – **Stacks** : Introduction – Definition – Representation of Stack – Operations on Stack – Applications of Stacks: Evaluation of Arithmetic Expressions	15
II	**Queues:** Introduction – Definition – Representation of Queues – **Various Queue Structures :** Circular Queue – Deque – Priority Queue – Round Robin Algorithm – **Linked Lists:** Single Linked List – Circular Linked List – Double Linked List – Circular Double Linked List	15
III	**Trees:** Basic Terminologies – Representation of Binary Tree: Linear Representation – Linked Representation – **Operations:** Traversals – **Types of Binary Trees**: Expression Tree – Binary Search Tree – Splay tree	15
IV	**Sorting:** Bubble Sort, Insertion Sort, Selection Sort, Shell Sort – Quick Sort - Merge Sort - Radix Sort - Heap Sort – **Searching:** Linear Search - Binary Search	15
V	**Graphs:** Introduction – Graph representation and its operations-Path Matrix – Graph Traversal - Application of DFS – Shortest Path Algorithm - **Minimum Spanning Tree :** Prim‟s Algorithm – Kruskal‟s Algorthim - Greedy – Knapsack Back Tracking – 8 Queens	15

Text Book(s):
1. Debasis Samantha (2013), Classic Data Structures, Second Edition, PHI Learning Private Limited.
2. Dr.P.Rizwan Ahmed(2018), Programming in C++ and Data Structures, Margham Publications,

Chennai.

3. Ellis Horowitz, SartajSahni, Sanguthevar Rajeshakaran,(2007), Fundamentals of Computer Algorithms, Second Edition, Universities Press (P) Limited

Reference Book(s):

1. Sara Baase, (1991), Computer Algorithms – Introduction to Design and Analysis, Addison-Wesley Publishing Company
2. Robert Kruse, C.L.Tondo, Bruce Leung, Data Structures and Program Design in C ,2nd Edition, PHI Publications.

Web Resource(s):

1. http://www.cs.sunysb.edu/~skiena/214/lectures/
2. http://datastructures.itgo.com/graphs/dfsbfs.htm
3. http://oopweb.com/Algorithms/Documents/PLDS210/Volum eFrames.html
4. http://discuss.codechef.com/questions/48877/data-structures- and-algorithms
5. http://code.tutsplus.com/tutorials/algorithms-and-data- structures--cms-20437

Course Outcomes		
Upon successful completion of this course ,the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Outline the basic data structures	K1,K2
CO 2	Identify the different operations and memory representations	K2,K3
CO 3	Interpret different techniques with their complexities	K2,K3,K4
CO 4	Compare the applications of various data structures	K3,K4,K5
CO 5	Choose an algorithm to solve simple problems suited for appropriate situations	K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	3	3	3	3	3	2	3	2	2	2.75
CO2	3	3	2	2	3	3	3	3	3	2	2	2	2.58
CO3	3	2	3	3	2	2	3	3	3	3	2	3	2.67
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3
											Mean Overall Score		2.8
											Correlation		High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25MEIT12B	Elective - I	5	3	25	75	100
Course Title	2.COMPILER DESIGN						

Learning Objectives	
LO 1	**Understand the fundamental concepts of compilers and translators**, including the structure and phases of a compiler such as lexical analysis, syntax analysis, semantic analysis, intermediate code generation, optimization, and code generation.
LO 2	**Design and implement lexical analyzers and parsers** using regular expressions, finite automata, context-free grammars, and parsing techniques like shift-reduce and operator-precedence parsing.
LO 3	**Manage symbol tables effectively** by exploring data structures such as lists, search trees, and hash tables, and understand error detection and handling during various compiler phases.
LO 4	**Apply optimization techniques** including loop optimizations, basic block analysis, data flow analysis, and memory management strategies to improve the efficiency of generated code.
LO 5	**Develop code generation strategies** including register allocation, code optimization (e.g., peephole optimization), and handle challenges like redundant code elimination and machine-level code improvements.

SYLLABUS		
Unit	Contents	Hours
I	Compilers & Translators, Need of Translators, Structure of a Compiler, Phases, Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Code Optimization, Code Generation, Book Keeping, A Symbol Table in brief, Semantic Analysis, L-value, r-values, Error Handling	15
II	Rules of Lexical Analyser, Need for Lexical Analysis, Input Buffering, Preliminar Scanning, A simple Approach to the Design of Lexical Analysers, Transition Diagrams Regular Expression, String & Languages, Finite Automata, Non- deterministic Automata Deterministic Automata, From regular Expression to Finite Automata, Context fre Grammars, Derivations & Parse Trees, Parsers, Shift Reduce Parsing, Operator-Precedenc Parsing	15
III	Symbol Table Management, Contents of a Symbol Table, Names & Symbol table records, reusing of symbol table spaces, array names, Indirection in Symbol Table entries, Data Structures for Symbol Tables, List, Self Organizing Lists, Search Trees, Hash Tables, Errors, Reporting Errors, Sources of Errors Syntactic Errors, Semantic Errors, Dynamic Errors, Lexical Phase Errors, Minimum Distance Matching, Syntactic Phase Error, Time of Detection, Ponic mode, Case study on Lex and Yacc	15
IV	Principal Sources of Optimization, Inner Loops, Language Implementation Details Inaccessible to the User. Further Optimization, Algorithm Optimization, Loop Optimization , Code Motion, Induction Variables, Reduction in Strength, Basic Blocks, Flow Graphs, DAG Representation of Basic Blocks, Value Numbers & Algebraic Laws, Global Data Flow Analysis, Memory Management Strategies , Fetch Strategy, Placement Strategies, Replacement Strategies, Address Binding, Compile Time, Load Time, Execution Time, Static Loading, Dynamic Loading, Dynamic Linking	15
V	Problems in Code Generation, a Simple Code Generator, Next-Use Information, Register Descriptors, Address Descriptors, Code Generation Algorithm, Register Allocation & Assignment, Global Register Allocation, Usage Counts, Register Assignment for Outer Loops, Register Allocation by Graph Coloring, Code Generation from DAG's, Peep-Hole Optimization, Redundant Loads & Stores, Un-Reachable Code, Multiple Jumps, Algebraic Simplifications, Use of Machine Idioms	15

Text Book(s):
1. Compilers: Principles, Techniques & Tools, Second Edition by A. V.Aho, Monicas. Lam, Ravi Sethi, J. D. Ullman
Reference Book(s):
1. Dhamdhere D.M., "Compiler Construction: Theory and Practice", McMillan India Ltd., 1983   2. Holub Allen, "Compiler Design in C", Prentice Hall of India, 1990
Web Resource(s):
1. https://www.geeksforgeeks.org/compiler-design-tutorials/   2. https://www.tutorialspoint.com/compiler_design/   3. https://www.javatpoint.com/compiler-tutorial   4. https://onlinecourses.nptel.ac.in/noc19_cs01/preview   5. http://ecomputernotes.com/compiler-design

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Identify the major phases of compilation and the functionality of LEX and YACC	K1,K2
CO 2	Describe the functionality of compilation process and symbol table management	K1,K2,K3
CO 3	Apply the various parsing, optimization techniques and error recovery routines to have a better code for code generation	K2,K3,K4
CO 4	Analyze the techniques and tools needed to design and implement compilers.	K3,K4,K5
CO 5	Test a compiler and experiment the knowledge of different phases in compilation	K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	2	2	3	2	3	2	2	2.25
CO2	3	3	2	2	3	3	3	3	2	2	3	2	2.58
CO3	3	3	3	3	2	3	3	3	3	3	2	3	2.83
CO4	3	3	3	3	2	3	3	3	3	3	3	3	2.92
CO5	3	3	3	3	2	3	3	3	3	3	3	3	2.92
											Mean Overall Score		2.7
											Correlation		High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25MEIT12C	Elective - I	5	3	25	75	100

Course Title	3.NATURAL LANGUAGE PROCESSING

Learning Objectives	
LO 1	**Understand the foundational concepts of NLP**, including language modeling, morphology, tokenization, and methods for detecting and correcting spelling errors.
LO 2	**Apply word-level analysis techniques**, such as n-gram models, part-of-speech tagging using rule-based, stochastic, and machine learning methods, and handle issues related to tagging accuracy.
LO 3	**Analyze syntactic structures of language** by working with context-free grammars, parsing algorithms, and probabilistic models to resolve ambiguity and perform shallow parsing.
LO 4	**Analyze syntactic structures of language** by working with context-free grammars, parsing algorithms, and probabilistic models to resolve ambiguity and perform shallow parsing.
LO 5	**Perform discourse analysis and utilize lexical resources** for tasks such as anaphora and coreference resolution, and leverage tools and corpora like WordNet, Penn Treebank, and Brill's Tagger for advanced NLP applications.

SYLLABUS		
Unit	Contents	Hours
I	Introduction: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance	15
II	Word Level Analysis: Unsmoothed N-grams, Evaluating N- grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rulebased, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models	15
III	Syntactic Analysis: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification offeature structures	15
IV	Semantics and Pragmatics: Requirements for representation, FirstOrder Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selection restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods	15
V	Discourse Analysis and Lexical Resources: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC)	15

Text Book(s):
1. Daniel Jurafsky, James H. Martin;Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech; Pearson Publication; 2014.
2. Steven Bird, Ewan Klein and Edward Loper, ―Natural Language Processing with Python , First Edition, OReilly Media, 2009.
Reference Book(s):

1. Breck Baldwin, ―Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.
2. Richard M Reese, ―Natural Language Processing with Java , O_Reilly Media, 2015.
3. Nitin Indurkhya and Fred J. Damerau, ―Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
4. Tanveer Siddiqui, U.S. Tiwary, ―Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

Web Resource(s):

1. http://www.cse.iitb.ac.in/~pb/papers/nlp-iitb.pdf
2. https://www.nitk.ac.in/faculty/dr-sarika-jain
3. https://www.simplilearn.com/tutorials/artificial-intelligence- tutorial/what-is-natural-language-processing-nlp
4. https://www.sas.com/en_us/insights/analytics/what-is- natural-language-processing-nlp.html
5. https://towardsdatascience.com/your-guide-to-natural-language-processing-nlp-48ea2511f6e1

Course Outcomes		
Upon successful completion of this course,the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Describe the concepts of morphology, syntax, semantics, discourse & pragmatics of natural language	K1,K2
CO2	Identify various linguistic and statistical features relevant to the basic NLP task, namely, spelling correction, morphological analysis, parsing and semantic analysis	K2,K3
CO3	Classify the text into an organized group using a set of handicraft linguistic rules with appropriate NLP processes and algorithms	K2,K3,K4
CO4	Analyze the system with various language analysis methods and interpret the result	K2,K3,K4,K5
CO5	Assess NLP systems, identify and suggest solutions for the shortcomings	K2,K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	3	2	2	3	2	2	3	2	2.42
CO2	3	3	2	3	3	3	3	3	3	2	3	2	2.75
CO3	3	3	3	3	2	3	3	3	3	3	2	3	2.83
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3.00
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3.00
												Mean Overall Score	2.8
												Correlation	High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25MEIT13A	Elective - II	5	3	25	75	100

Course Title	1.OPERATING SYSTEMS

Learning Objectives	
LO 1	**Understand the fundamental concepts and evolution of operating systems**, including process management, inter-process communication, and various CPU scheduling algorithms.
LO 2	**Explain memory management techniques** such as swapping, virtual memory, segmentation, and page replacement algorithms to efficiently utilize system resources.
LO 3	**Analyze deadlock conditions and mechanisms** for deadlock detection, avoidance, prevention, and recovery, along with synchronization techniques like semaphores and shared memory.
LO 4	**Describe file system organization and management**, including file and directory structures, I/O management, and disk scheduling algorithms.
LO 5	**Gain practical knowledge of Linux operating system**, including shell programming, file system calls, Linux commands, and file system implementation details.

SYLLABUS		
Unit	Contents	Hours
I	**Introduction :** Evolution of Operating System - Structure - Processes - The Process Concepts - Inter Process Communication - IPC Problems - Scheduling Levels - Preemptive Vs Non- Preemptive Scheduling - **Scheduling Algorithms:** First Come First Served - Shortest Job First - Shortest Remaining Time Next - Three Level Scheduling - Round Robin Scheduling - Priority Scheduling -Multiple Queues - Shortest Process Next - Guaranteed Scheduling - Lottery Scheduling - Fair-Share Scheduling - Thread Scheduling	15
II	Swapping - Virtual Memory - Page Replacement Algorithm - Segmentation	15
III	**Deadlock** - Examples of Deadlock - Detection - Recovery - Avoidance - Prevention – Semaphore -Shared Memory	15
IV	**File System** - Files - Directories - I/O Management - Disks - Disk Arm Scheduling Algorithm	15
V	**Introduction to Linux:** Introducing Shell Programming - Linux File Systems - Linux File system calls - Implementation of Linux File systems - Linux Commands - Directory Oriented Commands - File Oriented Commands - Communication Oriented Commands- General Purpose Commands	15

Text Book(s):
1. Andrew S. Tanenbaum, (2001), Modern Operating Systems, 2nd Edition, Prentice Hall of India.
2. B.Mohamed Ibrahim, (2005) Linux Practical Approach,Firewall Media.
3. Dr.P.Rizwan Ahmed(2020), Operating System, Margham Publications, Chennai.

Reference Book(s):
1. Silberchatz, Galvin, Gagne, (2003), Operating Systems Concepts, 6th Edition Wiley India Edition.
2. JhonGoerzen, (2002), Linux Programming Bible, 4th Edition, Wiley- dreamtech India (P) Ltd.

Web Resource(s):
1. https://www.webopedia.com/TERM/O/operating_system.ht ml
2. https://www.tutorialspoint.com/operating_system/operating_ system_tutorial.pdf

3. http://iips.icci.edu.iq/images/exam/Abraham- Silberschatz-Operating-System-Concepts--- 9th2012.12.pdf
4. https://www.informatics.indiana.edu/rocha/academics/i101/p dfs/os_intro.pdf
5. https://www.youtube.com/watch?v=oJMYYMIGVMU

Course Outcomes		
Upon successful completion of this course,the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Outline the fundamental concepts of an OS and their respective functionality	K1,K2
CO2	Demonstrate the importance of open-source operating system commands	K1,K2,K3
CO3	Identify and stimulate management activities of operating system	K1,K2,K3,K4
CO4	Analyze the various services provided by the operating system	K3,K4,K5
CO5	Interpret different problems related to process, scheduling, deadlock, memory and files	K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	3	3	3	3	3	2	3	2	2	2.58
CO2	2	2	3	3	3	3	3	3	3	3	2	2	2.67
CO3	3	2	3	2	2	2	3	3	3	3	3	3	2.67
CO4	3	2	3	2	2	2	3	3	3	3	3	3	2.67
CO5	3	2	3	2	2	2	3	3	3	3	3	3	2.67
Mean Overall Score													2.65
Correlation													High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25MEIT13B	Elective - II	5	3	25	75	100

Course Title	2.DIGITAL LOGIC AND COMPUTER ARCHITECTURE

Learning Objectives	
LO 1	**Understand data representation and number systems**, including various coding schemes, complements, fixed-point and floating-point formats, and error detection codes.
LO 2	**Analyze and design digital circuits**, applying Boolean algebra, Karnaugh maps, logic gates, combinational and sequential circuits, flip-flops, and digital components like multiplexers and counters.
LO 3	**Explain register transfer operations and micro-operations**, including arithmetic, logic, and shift micro-operations, along with computer instruction formats and control timing.
LO 4	**Describe the organization and functioning of the Central Processing Unit (CPU)**, including instruction formats, addressing modes, program control, and I/O organization with interrupt handling.
LO 5	**Understand memory organization and hierarchy**, covering main memory, cache, virtual memory, associative memory, and memory management hardware to optimize computer performance.

SYLLABUS		
Unit	Contents	Hours
I	Data Representation - Data Types - Number Systems - Decimal and Alphanumeric Representation - Complements- (r-1)'s complement - (r's) complement - Fixed- point Representation - Floating-point Representation - Binary Codes - Gray Codes - Decimal Codes - Alphanumeric Codes– Error Detection Codes	15
II	Digital Computers - Logic Gates - Boolean Algebra - K-Map Simplification - Combinational Circuits - Half Adder - Full Adder - SR, D, JK and T Flip Flops - Sequential Circuits - State Table - State Diagram - Digital Components: Integrated Circuits - Decoders - NAND Gate Decoder - Encoders - Multiplexers - Registers - Shift Registers - Binary Counters - Memory Unit	15
III	Register Transfer and Micro-operations: Register Transfer Language - Register Transfer - Bus and Memory Transfers - Arithmetic Micro-operations - Logic Micro-operations - Shift Micro- operations - Arithmetic Logic Shift Unit. Computer Organization and Programming: Instruction Codes - Computer Registers - Computer Instructions - Timing and Control - Instruction Cycle - Memory Reference Instructions - Input-Output and Interrupt	15
IV	Central Processing Unit: General Register Organization - Instruction Formats - Addressing Modes - Data Transfer and Manipulation - Program Control. I/O Organization: Peripheral Devices - I/O Interface - Asynchronous Data Transfer - Modes of Transfer - Priority Interrupt – DMA	15
V	Memory Organization and CPU: Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory - Virtual Memory - Memory Management Hardware	15

Text Book(s):
1. M. Morris Mano, "Computer System Architecture", Prentice Hall ofIndia, 2001

Reference Book(s):

1. John P. Hayes, "Computer Architecture and Organization", Tata McGraw Hill, 1996.
2. Dr.P.Rizwan Ahmed, Digital Logic and Microprocessor, Margham Publications, Chennai, 2017

Web Resource(s):

1. http://www.labri.fr/perso/strandh/Teaching/AMP/Common/Stran dh-Tutorial/Dir.html
2. http://www.computer-pdf.com/architecture/
3. http://www.uotechnology.edu.iq/depcse/lectures/3/
4. http://www.csie.nuk.edu.tw/~kcf/course/ComputerArchitecture/
5. http://www.ecs.csun.edu/~cputnam/Comp546/Putnam/Cach e%20Memory.pdf(UnitV: Cache Memory)

Course Outcomes		
Upon successful completion of this course,the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Demonstrate the fundamental concept of binary representation and codes, combinational circuits, Instruction formats, register operations and memory organization	K1,K2
CO2	Explain the various types of flip flops, different types of micro operations, as well as the addressing modes in the instruction set	K1,K2,K3
CO3	Apply the various number conversion systems and simplification of equations using K-map	,K2,K3,K4
CO4	Analyze the various design of combinational circuits and flip flops to design a computer	K2,K3,K4,K5
CO5	Distinguish the major components of a computer including CPU, memory, I/O and storage	K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	3	3	3	3	3	2	3	3	3	2.75
CO2	3	3	2	3	3	3	3	3	3	3	3	2	2.83
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3.00
CO4	3	3	3	2	3	3	3	3	3	3	2	3	2.83
CO5	3	3	3	2	2	2	3	3	3	3	2	3	2.67
											Mean Overall Score		2.82
											Correlation		High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
I	25MEIT13C	Elective - II	5	3	25	75	100
Course Title	3.HUMAN COMPUTER INTERACTION						

Learning Objectives	
LO 1	**Understand the foundational concepts of Human-Computer Interaction**, including human and computer characteristics, interaction models, ergonomics, and interaction styles within various contexts.
LO 2	**Apply design principles and processes** to create user-focused interfaces, emphasizing scenarios, navigation, screen layout, prototyping, and usability guidelines.
LO 3	**Develop and implement user interfaces** using windowing systems, toolkits, and user interface management systems, ensuring practical application of HCI theories.
LO 4	**Evaluate user interfaces effectively** through expert analysis and appropriate evaluation methods to improve usability and user satisfaction.
LO 5	**Incorporate universal design principles and user support systems**, designing adaptive help and support mechanisms that cater to diverse user needs and cognitive models.

SYLLABUS		
Unit	Contents	Hours
I	Foundations: The Human: Introduction-Input-Output Channels- Memory. The Computer: Introduction- Text Entry Devices- Display Devices- Memory. The Interaction: Introduction – Models of Interaction-Frameworks and HCI Ergonomics-Interaction Styles-Elements of the WIMP Interface-Interactivity - The Context of the Interactions	15
II	Design Process: Design Basics- Introduction - Process- User Focus-Scenarios-Navigation Design- Screen Design and Layout-Interaction and Prototyping. Design Rules- Introduction- Principles to Support Usability-Guidelines- Golden Rules and Heuristics-HCI Patterns	15
III	Implementation Support: Introduction - Elements of Windowing Systems - Programming the Application- Using Toolkits-User Interface Management Systems. Evaluation Techniques: What is an Evaluation- Goal of Evaluation- Evaluation Through Expert Analysis-Choosing an Evaluation Method	15
IV	Universal Design: Introduction - Universal Design Principles-Designing for Diversity. User Support: Introduction-Requirements of User Support-Approaches to User Support-Adaptive Help Systems-Designing User Support Systems	15
V	Models: Cognitive Models: Introduction-Goals and Task- Linguistic Models- Challenge of Display Based System- Physical and Device Models - Cognitive Architectures	15

Text Book(s):
1. Alan dix, Janet finlay, Gregory D. Abowd and Russell Beale,(2004),Human Computer Interaction, 3rd edition, Pearson Education

Reference Book(s):
1. John C. Caroll, (2002), Human Computer Interaction in the new millennium, Pearson Education
2. Jenny Preece, Yvonne Rogers, Helen Sharp (2019), Interaction Design: Beyond Human–Computer Interaction, fifth edition, John Wiley & Sons Inc.

Course Outcomes

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

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms	K1,K2
CO2	Identify the usability and the beneficiary factors of User support systems	K1,K2,K3
CO3	Analyze the core theories, models and methodologies in the field of HCI	,K2,K3,K4
CO4	Evaluate interactive systems based on the human factor theories	K2,K3,K4,K5
CO5	Elaborate an interactive system based on the design principles, standards and Guidelines	K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	2	3	2	2	3	3	2	3	3	2	2.58
CO2	2	3	3	2	2	3	3	3	2	3	3	2	2.58
CO3	2	2	3	3	3	3	3	3	3	3	2	3	2.75
CO4	3	3	3	3	2	2	2	3	2	3	3	3	2.67
CO5	3	2	3	2	2	3	2	3	2	2	3	3	2.50
											Mean Overall Score		2.62
											Correlation		High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25MIT21	Core–IV	5	5	25	75	100
Course Title	**DATABASE SYSTEMS**						

Learning Objectives	
LO1	**Understand the fundamentals of database systems**, including relational database structures, relational algebra, tuple relational calculus, and the roles of database users and administrators.
LO2	**Design efficient database schemas** using the Entity-Relationship model, normalization techniques (up to 5NF), and understand functional dependencies to ensure data integrity and reduce redundancy.
LO3	**Manage transactions and concurrency control**, ensuring atomicity, consistency, isolation, and durability (ACID properties), and apply recovery mechanisms for database reliability.
LO4	**Explore distributed database systems**, including data storage, distributed transactions, concurrency control, and query processing in both homogeneous and heterogeneous environments.
LO5	**Develop and manage databases using SQL and PL/SQL**, mastering data manipulation, querying, control structures, exception handling, and advanced database objects such as triggers, packages, and procedures.

SYLLABUS		
Unit	**Contents**	**Hours**
I	**Introduction**: Database System Applications-Purpose of Database Systems-View of Data-Database Users and Administrators. **Relational Database**: Structure of Relational Databases- Databases Schema- Keys-Schema Diagrams-**Formal Relational Query Languages**: Relational Algebra-Tuple Relational Calculus	15
II	**Database Design:** Overview of Design Process-The Entity Relationship Model-Constraints - Removing Redundant Attributes in Entity Sets-Entity-Relationship Diagrams-Reduction to Relational Schemas-Extended E-R features -Alternative Notations for Modeling Data**.** **Relational Database Design:** Features of Good Relational Design-Functional Dependency- **Normalization**: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF- Functional Dependency Theory	15
III	**Transaction Management:** Transaction Concept- Simple Transaction Model-Storage Structure- Transaction Atomicity and Durability-Transaction Isolation-Serializability. **Concurrency Control:** Lock Based Protocols-Locks-Granting of Locks-Two Phase Locking Protocol-Time Stamp Based Protocol – **Recovery System:** Failure Classification-**Recovery and Atomicity**: Log Records-Database Modification-Concurrency Control and Recovery-Recovery Algorithm	15
IV	**Distributed Database:** Homogeneous and Heterogeneous Databases-Distributed Data storage- Distributed Transactions-Commit Protocols-Concurrency Control in Distributed Databases- Distributed Query Processing. Case study: MongoDB	15
V	**SQL** - Table Fundamentals - Viewing Data - Inserting- Deleting - Updating - Modifying - Constraints - Functions - Grouping - Subqueries - Joins - Views.**PL/SQL**: Introduction - PL/SQL Block - Data Types And Variables - Control Structure- Cursors - PL/SQL Security - Locks. PL/SQL Database Objects:Exception Handling- Packages - Procedures and Functions - Database Triggers	15

Text Book(s):
1. Abraham Silberchatz, Henry F.Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, Tata Mcgraw Hill.
2. Ivan Bayross, SQL, PL/SQL The Programming Language of ORACLE, Fourth edition, BPB

Publications. Unit IV & V

3. Dr.P.Rizwan Ahmed, RDBMS using Oracle, Margham Publications, Chennai, 2018.

Reference Book(s):

1. AtulKahate, Introduction to Database Management systems, Pearson education.
2. Carlo Zaniolo, Stefano Ceri, Christos Faloustsos, R.T.Snodgrass, V.S.Subrahmanian, (1997), Advanced Database Systems, Morgan Kaufman.
3. George Koch, Kelvin Loney, (2002), Oracle 9i : The Complete Reference, Oracle Press, Tata McGrawHill Publication.
4. RamezElmasri, Shamkant B. Navathe (2014), "Database Systems", Sixth edition, Pearson Education, New Delhi.

Web Resource(s):

1. http://awtrey.com/tutorials/dbeweb/database.php
2. http://www.slideshare.net/SalamaAlbusaidi/emerging- database-technology-multimedia-database.
3. http://www.tutorialspoint.com/dbms/index.htm
4. http://www.tutorialspoint.com/plsql/index.htm
5. https://opentextbc.ca/dbdesign/chapter/chapter-11- functional-dependencies/(Functional Dependencies)

Course Outcomes

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

CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Explain the relational databases and uses of PL/SQL	K1,K2
CO 2	Apply Schema, ER- Model, normalization, transaction, concurrency, and recovery on tables using SQL and PL/SQL.	K1,K2,K3
CO 3	Analyze and manage relational & distributed, database, transaction, concurrency control and query languages	K1,K2,K3,K4
CO 4	Assess databases based on models and Normal Forms.	K2,K3,K4,K5
CO 5	Design and construct tables and manipulate it effectively using PL/SQL database objects	K2,K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	3	2	3	3	2	2	3	2.42
CO2	3	3	3	2	2	3	3	3	3	3	3	3	2.83
CO3	3	2	3	2	3	3	2	3	3	3	2	3	2.67
CO4	3	2	3	2	3	2	3	3	3	3	2	3	2.67
CO5	3	2	3	2	3	2	3	3	3	3	3	3	2.75
												Mean Overall Score	2.67
												Correlation	High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25MPIT25	Core–V	6	5	25	75	100
Course Title	RDBMS PRACTICAL						

Learning Objectives	
LO1	**Understand and apply basic SQL commands**, including Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) for effective database management.
LO2	**Write complex SQL queries using subqueries and built-in functions** to retrieve and manipulate data efficiently.
LO3	**Develop and execute PL/SQL blocks** to implement procedural logic, including control structures and variable management.
LO4	**Handle exceptions and use cursors in PL/SQL programming**, mastering both implicit and explicit cursor usage for data retrieval and manipulation.
LO5	**Create and manage advanced PL/SQL objects**, including stored procedures, user-defined functions, and triggers to enforce business rules and automate database operations.

SYLLABUS		
Unit	Contents	Hours
	1. DDL Commands 2. DML Commands 3. DCL Commands 4. Usage of Sub Queries in DML and Create-SQL 5. Solving queries using built-in functions 6. Simple programs in PL/SQL block 7. Exception Handling in PL/SQL 8. Programs using Implicit Cursors 9. Programs using Explicit Cursors 10. Procedures & User-defined functions 11. Creation of Triggers	90

Text Book(s):

1. Ivan Bayross, SQL, PL/SQL The Programming Language of ORACLE, Fourth edition, BPB Publications
2. Dr.P.Rizwan Ahmed, RDBMS using Oracle, Margham Publications, Chennai, 2018.

Reference Book(s):

1. Ramez Elmasri, Shamkant B. Navathe (2014), "Database Systems", Sixth edition, Pearson Education, New Delhi

Web Resource(s):

1. http://awtrey.com/tutorials/dbeweb/database.php
2. http://www.slideshare.net/SalamaAlbusaidi/emerging- database-technology-multimedia-database.
3. http://www.tutorialspoint.com/dbms/index.html
4. http://www.tutorialspoint.com/plsql/index.htm

Course Outcomes		
Upon successful completion of this course ,the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Choose appropriate SQL queries and PL/SQL blocks for the database.	K1,K2
CO 2	Implement SQL and PL/SQL blocks for the given problem effectively.	K1,K2,K3
CO 3	Analyse the problem and Exceptions using queries and PL/SQL blocks.	,K2,K3,K4
CO 4	Validate the database for normalization using SQL and Pl/SQL blocks.	K2,K3,K4,K5
CO 5	Design Database tables; create Procedures, user-defined functions and Triggers.	K2,K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	2	3	3	2	2	2	2	3	2.42
CO2	3	3	3	2	3	2	2	3	3	3	2	3	2.67
CO3	3	3	3	3	2	2	2	3	3	3	2	3	2.67
CO4	3	3	3	3	3	2	2	3	3	3	2	3	2.75
CO5	3	3	3	3	3	2	2	3	3	3	2	3	2.75
											Mean Overall Score		2.65
											Correlation		High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25MPIT26	Core–VI	6	4	25	75	100
Course Title	MOBILE APPLICATION DEVELOPMENT- PRACTICAL						

Learning Objectives	
LO 1	**Set up the Android development environment** using Eclipse and Android Emulator, and understand the basic components of the Android user interface.
LO 2	**Design and implement user interfaces** with various views, including basic views, picker views, list views, and image display.
LO 3	**Develop and manage Android application components**, such as activities, fragments, intents, and apply styles, themes, and dialogs effectively.
LO 4	**Create and customize menus and action bars**, and integrate multimedia elements like audio and video into Android applications.
LO 5	**Implement messaging features, data persistence, and services**, including SMS, email, database usage, background services, and publishing Android applications.

SYLLABUS		
Unit	Contents	Hours
I	Getting Started with Android Programming – Using Eclipse for Android Development – Using Android Emulator - **Getting to know the Android User Interface:** Understanding the Components of a Screen	90
II	**Designing your User Interface with views:** Basic Views – Picker Views – List Views - Displaying Pictures	
III	**Activities, Fragments and Intents :** Understanding Activities – Applying Styles and Themes to an Activity – Displaying a Dialog Window – Displaying a Progress Dialog – Linking Activities Using Intents – Fragments.	
IV	**Menus with Views:** Option Menu – Context Menu. **Utilizing the Action Bar:** Adding Action Items to the Action Bar – Customizing the Action Items and Application Icon - Working with Audio and Video	
V	**Messaging:** SMS Messaging – Sending E- Mail- Data Persistence: Creating and Using Databases – Developing Android Services – Publishing Android Applications	

Text Book(s):
1. Wei – Meng Lee, (2012), Beginning Android 4 Application Development, Wiley India Edition
2. Dr.P.Rizwan Ahmed,(2020), Mobile Application Development, Margham Publications, Chennai.
Reference Book(s):
1. OnurCinar, (2012), Android Apps with Eclipse, Apress, Springer(India) Private Limited.
2. RetoMeier, (2010), Professional Android 2 Application Development, Wiley India Edition
Web Resource(s):

1. http://devcloper.android.com/training/basics/firstapp/index.html
2. www.vogella.com/articles/Android/article.html
3. www.coreservlets.com/android-tutorial/
4. www.edumobile.org/android/category/android-beginner-tutorial
5. http://www.androidhive.info/2011/11/android-sqlite- database-tutorial/ (Unit V: Ex. No.3 (SQLite Database)

Course Outcomes

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

CO No.	CO Statement	Cognitive Level (K-Level)
CO1	Demonstrate the setup and configuration of Android Development Environment.	K1,K2
CO2	Apply the necessary UI components with different styles, themes, views, and layouts	K1,K2,K3
CO3	Examine and implement the required services such as messaging, mailing, multimedia concepts for the given problem	K1,K2,K3
CO4	Test and debug the Android applications with different inputs.	K2,K3,K4,K5
CO5	Create mobile applications that make use of various android features, functions and database tasks	K2,K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	3	2	2	3	3	2	3	2	2	2.5
CO2	3	3	3	2	3	3	3	3	3	2	2	2	2.67
CO3	3	2	3	3	3	3	3	3	3	2	2	3	2.75
CO4	3	3	3	3	3	3	3	3	2	3	2	2	2.75
CO5	3	3	3	3	3	3	3	3	3	2	2	3	2.83
												Mean Overall Score	2.7
												Correlation	High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25MEIT22A	Elective–III	4	3	25	75	100

Course Title	1.COMPUTER NETWORK AND SECURITY

Learning Objectives	
LO 1	**Understand the fundamental concepts of computer networks**, including network hardware, topologies, transmission modes, and reference models such as OSI and TCP/IP.
LO 2	**Explain data link layer and network layer functions**, focusing on design issues, error detection and correction, and various routing algorithms for efficient data delivery.
LO 3	**Analyze congestion control techniques** and multicast routing strategies to optimize network performance and resource utilization.
LO 4	**Explore network security principles**, including cryptography methods, security services like authentication and digital signatures, and internet security protocols such as IPSec and SSL/TLS.
LO 5	**Apply security measures for wireless networks, smartphones, and web applications**, understanding common threats and protective strategies to safeguard data and communication.

SYLLABUS		
Unit	Contents	Hours
I	Uses of Computer Networks – Network Hardware – Line Configuration – Topology – Transmission Modes – **Reference Models:** OSI Reference Model – TCP/IP Reference Model – **Physical Layer:** Guided Transmission Media – Wireless Transmission – Communication Satellites– **Public Switched Telephone Network**: Local Loop – Multiplexing – Switching	12
II	**Data Link Layer:** Design Issues - Error Detection and Correction - **Network Layer :** Design Issues – **Routing Algorithms** : Shortest Path Routing – Distance Vector Routing – Link State Routing – Broadcast Routing – Multicast Routing – Congestion Control	12
III	**Data Link Layer:** Design Issues - Error Detection and Correction - **Network Layer :** Design Issues – **Routing Algorithms** : Shortest Path Routing – Distance Vector Routing – Link State Routing – Broadcast Routing – Multicast Routing – Congestion Control	12
IV	**Network Security:** Introduction to Cryptography - Symmetric - Key Cryptography - Asymmetric- key Cryptography – Security Services: Message Confidentiality - Message Integrity - Message Authentication - Digital Signature - Entity Authentication – **Security in the Internet:** IPSecurity - SSL/TLS: SSL services - SSL Protocols - Firewalls	12
V	**Security for Wireless Networks:** Introduction – Protecting the wireless networks – Physical Security – Authentication and access control- **Smartphone Security:** Security Threats - Steps to smartphone security –**Websites and Web application Security:** Definition – Available Technologies - Threats - Strategies.	12

Text Book(s):

1. Andrew S.Tanenbaum, David J. Wetherall (2010), Computer Networks, Prentice Hall of India, V Edition. (Unit I - Unit -III) Unit I – Chapter 1,2 Unit II – Chapter 3,5Unit III – Chapter 5,6,7
2. Behrouz A. Forouzan, (2016), Data Communications and Networking, Tata McGraw-Hill Publishing Company Limited, IV Edition. (Unit IV) Unit IV - Chapter 30, 31, 32

Reference Book(s):

1. Charles P. Pfleeger, Shari Lawrence Pfleeger(2002), Security in Computing, 3rd Edition, Pearson Education.

2. James F. Kurose, Keith W. Ross (2005),Computer Networking, 3rd Edition, Addison Wesley,.William Stallings(2006), Cryptography and Network Security: Principles and Practice, 3rd Edition, PHI.

Web Resource(s):

1. http://wndw.net/pdf/wndw3-en/ch09-security-for-wireless- networks.pdf (Unit V- Wireless Networks Security)

2. https://www.fcc.gov/sites/default/files/smartphone_master_document.pdf (Unit V- Steps to smartphone security)

3. https://www.csoonline.com/article/3241727/mobile- security/6-mobile-security-threats-you-should-take- seriously-in-2019.html(Unit V – SmartPhone Security Threats)

4. https://kgk.uni-obuda.hu/sites/default/files/12_Kadena.pdf (Unit V – SmartPhone Security Threats)

5. https://www.goodfirms.co/glossary/web-security/ (Unit V– Web Security)

Course Outcomes		
Upon successful completion of this course ,the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Outline the concepts and fundamentals of data communication and computer networks	K1,K2,K3
CO 2	Identify the usage and importance of layered model, network security and web security	K2,K3
CO 3	Classify the techniques based on required application	K2,K3,K4
CO 4	Analyze the significant applications of protocols and layers used in data communication and networking	K2,K3,K4,K5
CO 5	Explain the functionality of various techniques and algorithms that works at different layers	K2,K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	3	2	2	2	2	3	2	2	2.25
CO2	3	3	3	2	3	2	3	3	3	3	2	3	2.75
CO3	3	2	3	2	3	2	2	2	3	3	3	3	2.58
CO4	3	3	3	3	3	2	3	3	3	3	3	3	2.91
CO5	3	3	3	3	3	2	2	3	3	3	3	3	2.83
											Mean Overall Score		2.66
											Correlation		High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25MEIT22B	Elective–III	4	3	25	75	100
Course Title	**2.BIOMETRIC TECHNIQUES**						

Learning Objectives	
LO 1	**Understand the fundamentals of biometric systems**, including key concepts, differences from traditional identification methods, and accuracy metrics like false match and non-match rates.
LO 2	**Explain physiological biometric modalities**, such as fingerprint, facial, iris, and voice scans, including their components, working principles, strengths, weaknesses, and competing technologies.
LO 3	**Explore additional physiological biometrics** including hand and retina scans, and behavioral biometrics like signature and keystroke dynamics, highlighting deployment considerations.
LO 4	**Examine esoteric biometric techniques**, such as vein pattern, facial thermography, DNA, gait analysis, and brain wave patterns, along with their potential applications and limitations
LO 5	**Analyze biometric applications across various domains**, including law enforcement, surveillance, access control, e-commerce, and telephony, while considering deployment costs, challenges, and standards.

SYLLABUS		
Unit	**Contents**	**Hours**
I	Introduction: Biometric Fundamentals - Biometrics Vs Traditional Techniques - Benefits of Biometrics in Identification Systems - Key Biometric Terms and Processes: Verification, Identification and Biometric Matching - Accuracy in Biometric Systems: False Match Rate, False Non-Match Rate, Failure to Enroll Rate, Derived Metrics	12
II	Physiological Biometrics: Finger Scan: Components-How it works-Competing Technologies- Deployments-Strengths and Weaknesses. Facial Scan: Components- How it Works- Competing Technologies-Deployments-Strengths and Weaknesses	12
III	Other Physiological Biometrics: Iris Scan: Components- How it Works-Competing Technologies-Deployments- Strengths and Weaknesses. Voice Scan: How it Works-Competing Technologies-Deployments-Strengths and Weaknesses. Other Physiological Biometrics: Hand Scan and Retina Scan	12
IV	Behavioural Biometrics: Signature Scan and Keystroke Scan: How it Works-Competing Technologies-Deployments- Strengths and Weaknesses. Esoteric Biometrics: Vein Pattern- Facial Thermography-DNA- Sweat Pores- Hand Grip- Finger Nail Bed- Body Odor- Ear-Gait- Skin Luminescence- Brain Wave Pattern- Foot Print and Foot Dynamics	12
V	Biometric Applications: Categorizing Biometric Applications - Application Areas: Criminal and Citizen Identification, Surveillance, PC/Network Access, E-Commerce/Telephony and Retail/ATM - Costs to Deploy -Issues in Deployment-Biometric Standards	12

Text Book(s):

1. Samir Nanavati, Michael Thieme, Raj Nanavati,(2003),Biometrics - Identity Verification in a Networked World, Wiley-dreamtech India Pvt Ltd, New Delhi
2. John D. Woodward, Nicholas M. Orlans, Peter T. Higgins, Biometrics: the ultimate reference, Dreamtech Press

Reference Book(s):

1. Anil K Jain, Patrick Flynn, Arun A Ross, (2008), Handbook of Biometrics, Springer

	Course Outcomes	
	Upon successful completion of this course, the student will be able to:	
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Outline the existing theories, methods and interpretations in the field of biometrics	K1,K2,K3
CO 2	Identify the deployment areas, competing technologies, strength and weakness of various Physiological and Behavioral Biometrics	K1,K2,K3
CO 3	Analyze various Application areas, Biometric security issues and Biometric standards	K2,K3,K4
CO 4	Assess the methods relevant for design, development and operation of biometric access control systems	K3,K4,K5
CO 5	Determine identification /verification systems to validate the user identity and technological uplifts in biometrics compared to traditional securing mechanisms	K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	2	2	3	2	2	2	2	2.16
CO2	3	2	3	3	3	3	2	3	3	3	3	2	2.75
CO3	3	2	3	3	3	3	3	3	3	3	3	2	2.83
CO4	3	3	3	3	3	3	3	3	2	3	3	2	2.83
CO5	3	3	3	2	2	2	2	3	2	3	3	2	2.5
												Mean Overall Score	2.61
												Correlation	High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25MEIT22C	Elective–III	4	3	25	75	100

Course Title	3.BLOCK CHAIN TECHNOLOGY

Learning Objectives	
LO 1	**Understand the fundamentals of blockchain technology**, including its origins, mechanisms, network structures, transaction processes, and key cryptographic concepts like digital signatures and hashing.
LO 2	**Explore Bitcoin and cryptocurrency concepts**, including terminology, mining processes, wallet management, decentralization, and the impact of blockchain on the cryptocurrency ecosystem.
LO 3	**Gain knowledge of Ethereum platform basics**, such as consensus mechanisms, account management, transactions, and the development and deployment of smart contracts.
LO 4	**Learn about Hyperledger frameworks and Solidity programming**, including distributed ledger technologies, Hyperledger Fabric and Composer, and the structure and syntax of Solidity for writing smart contracts.
LO 5	**Analyze various blockchain applications**, including Internet of Things (IoT), medical record management, domain name services, and emerging altcoins, highlighting future trends and challenges.

SYLLABUS		
Unit	Contents	Hours
I	**Introduction of Cryptography and Blockchain :** Definition of Blockchain - Blockchain Technology Mechanisms & Networks - Blockchain Origins - Objective of Blockchain - Blockchain Challenges - Transactions and Blocks - P2P Systems - Keys as Identity - Digital Signatures, Hashing, and public key cryptosystems - private vs. public Blockchain	12
II	**Bitcoin and Cryptocurrency :** Bitcoin Terminology- The Bitcoin Network - The Bitcoin Mining Process - Mining Developments - Bitcoin Wallets - Decentralization and Hard Forks - Ethereum Virtual Machine (EVM) - Merkle Tree- Transactional Blocks - Impact of Blockchain Technology on Cryptocurrency.	12
III	**Introduction to Ethereum** : Introduction to Ethereum - Consensus Mechanisms-Metamask Setup - Ethereum Accounts - Transactions -Receiving Ethers- Smart Contracts	12
IV	**Introduction to Hyperledger and Solidity Programming** : Definition of Hyperledger - Distributed Ledger Technology & its Challenges - Hyperledger & Distributed Ledger Technology - Hyperledger Fabric -Hyperledger Composer - Solidity - Language of Smart Contracts - Installing Solidity & Ethereum Wallet - Basics of Solidity - Layout of a Solidity Source File & Structure of Smart Contracts - General Value Types	12
V	**Blockchain Applications** : Internet of Things -Medical Record Management System - Domain Name Service and Future of Blockchain -Alt Coins	12

Text Book(s):
1. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained", Second Edition, Packt Publishing, 2018
2. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction" Princeton University Press, 2016
3. Antonopoulos and G. Wood, "Mastering Ethereum: Building Smart Contracts and Dapps", O'Reilly Publishing, 2018

Reference Book(s):

1. Antonopoulos, Mastering Bitcoin, O'Reilly Publishing, 2014
2. D. Drescher, Blockchain Basics. Apress, 2017

Web Resource(s):

1. https://nptel.ac.in/courses/106/104/106104220/#
2. https://www.udemy.com/course/build-your-blockchain-az/
3. https://eduxlabs.com/courses/blockchain-technology- training/?tab=tab-curriculum
4. https://www.geeksforgeeks.org/consensus-algorithms-in- blockchain/
5. https://ec.europa.eu/programmes/erasmus-plus/project-result- content/eb79d492-327b-43d8-b479-dd0fd9fd4490/BLISS%2003 T3%20Unit%201%20slides%20v3.0%20final%20controled.pptx

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Understand and explore the working of Blockchain technology	K1,K2,K3
CO 2	Identify the security and privacy implications of blockchain technology	K1,K2,K3
CO 3	Apply the learning of solidity to build de-centralized apps on Ethereum	K2,K3,K4
CO 4	Analyze the working of Smart Contracts and the working of Hyperledger	K2,K3,K4,K5
CO 5	Assess the methods relevant for design, development and operation of blockchain based applications	K2,K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	2	2	2	2	2	3	2	3	3	2	2.33
CO2	3	2	3	2	2	3	2	3	3	3	3	2	2.58
CO3	3	2	3	3	2	3	3	3	3	2	3	2	2.67
CO4	3	3	3	2	2	3	3	3	3	3	3	2	2.75
CO5	3	3	3	2	2	3	3	3	3	3	3	2	2.75
												Mean Overall Score	2.62
												Correlation	High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25MEIT23A	Elective–IV	4	3	25	75	100
Course Title	**1.SOFTWARE ENGINEERING**						

Learning Objectives	
LO 1	**Understand and compare various software process models**, including traditional approaches like the Waterfall and Incremental models, as well as modern Agile and Unified Process models.
LO 2	**Apply system and requirements engineering techniques**, including system modeling, requirements elicitation, use case development, and multiple modeling approaches such as data, flow, and scenario-based models.
LO 3	**Design effective software systems** using core design principles, architectural and component-level design strategies, pattern-based solutions, and user interface design techniques.
LO 4	**Develop and apply software testing strategies**, including black-box and white-box testing, validation, system testing (recovery, security, performance), and control structure testing.
LO 5	**Estimate software projects and manage risks**, employing empirical models for cost estimation, identifying and mitigating software risks, and ensuring software quality through standards, assurance practices, and reliability measures, with practical exposure to DevOps tools.

SYLLABUS		
Unit	Contents	Hours
I	Introduction: A Generic View of Process - Process Models: The Waterfall Model-Incremental Model-Evolutionary Model-Specialized Model-The Unified Process-Agile Process - Agile process Models	12
II	System Engineering: System Engineering Hierarchy - System Modeling - Requirements Engineering: Tasks- Initiating The Process-Eliciting Requirements-Developing Use Cases- Negotiating Requirements-Validating Requirements - Building the Analysis Models: Data modeling concepts - Scenario based - Flow oriented - Class based Modeling	12
III	Design Engineering: Design Concepts - Design Models - Pattern Based Design - Architectural Design - Component Level Design: Component - Class Based and Conventional Components Design - User Interface Design: Analysis and Design	12
IV	Testing Strategies: Software Testing - Strategies: Conventional - Object Oriented - Validation Testing - System Testing: Recovery - Security - Stress - Performance - Testing Tactics: Testing Fundamentals- Black Box - White Box - Basis Path-Control Structure	12
V	Estimation : Software project Estimation - Empirical Estimation models - Risk management : Software Risks - Risk Identification - Risk Projection - Risk Mitigation, Monitoring and Management - Quality Management: Quality Concepts - Quality Assurance -Software Reliability-Quality Standards. Case Study : Devops Tools	12

Text Book(s):

1. Roger Pressman.S., "Software Engineering: A Practitioner's Approach", 6th Edition, Mcgraw Hill, 2005	

Reference Book(s):

1. Richard Failey, "Software Engineering Concepts", Tata McGraw-Hill, 2004.
2. P. Fleeger, "Software Engineering", Prentice Hall, 1999.
3. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli, "Fundamentals of Software Engineering", Prentice Hall Of India 1991.
4. Sommerville, "Software Engineering" 5th Edition: Addison Wesley, 1996

Web Resource(s):

1. http://productdevelop.blogspot.in/2011/03/what-are- formal-technical-reviews-ftr.html
2. http://basicqafundamentals.blogspot.in/2011/03/difference-between-alpha-testing-beta.html
3. https://www.wiziq.com/tutorials/software-engineering
4. http://www.jkinfoline.com/software-engineering.html
5. http://www.freetutes.com/systemanalysis/
6. http://www.softwaretestingstuff.com/2007/09/white- box-testing.html (Unit IV : White Box Testing)

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	**CO Statement**	**Cognitive Level (K-Level)**
CO 1	Recognize the software process models including the specification, design, implementation, and testing for a software project	K1,K2,K3
CO 2	Use recent and advanced tools necessary for software project development, testing, management and reuse	K1,K2,K3
CO 3	Compare and contrast various design, testing and quality issues	K2,K3,K4
CO 4	Prioritize the requirements and risk accordingly that meet user expected performance, maintenance and quality	K2,K3,K4,K5
CO 5	Design software projects with well-defined architecture, modules, components and interfaces	K2,K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	2	2	2	3	2	3	3	2	2.41
CO2	3	2	3	2	3	3	3	3	3	3	3	2	2.75
CO3	3	3	3	2	2	2	2	3	3	3	3	2	2.58
CO4	3	2	3	3	2	2	2	3	3	3	3	3	2.66
CO5	3	2	3	3	2	2	3	3	3	2	3	2	2.58
											Mean Overall Score		2.6
											Correlation		High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25MEIT23B	Elective–IV	4	3	25	75	100
Course Title							

Course Title	2.OBJECT ORIENTED ANALYSIS AND DESIGN

Learning Objectives

LO 1	**Understand the fundamentals of object-oriented concepts**, including encapsulation, inheritance, polymorphism, class hierarchies, and object behaviors to support modular and maintainable software design.
LO 2	**Apply object-oriented methodologies** such as Rumbaugh's Object Model, Booch Methodology, and Jacobson's Use Case approach, as well as patterns and frameworks within a unified development process.
LO 3	**Conduct object-oriented analysis using use case-driven techniques**, including business object analysis, noun phrase identification, CRC modeling, and object relationship mapping.
LO 4	**Design object-oriented systems** by applying design axioms, principles, and design patterns to create efficient and reusable classes, and ensure software quality through testing strategies and debugging principles.
LO 5	**Model software systems using UML**, including static and dynamic aspects through class diagrams, use case diagrams, and state models to visually represent system behavior and structure.

SYLLABUS		
Unit	Contents	Hours
I	Object Basics: Object- oriented Philosophy – Object – Object State, Behaviors and Methods. **Encapsulation** and Information Hiding – Class Hierarchy – Polymorphism, Aggregation, Object Containment, Meta Classes.	12
II	Object Oriented Methodologies: Rumbaugh Object Model, Booch Methodology-Jacobson Methodology, Patterns, Frameworks and Unified Approach.	12
III	Object Oriented Analysis: Business Object Analysis– Use Case Driven Approach – Use Case Model. Object Analysis – Noun Phrase Approach – CRC – Identifying Object Relationships and Methods.	12
IV	Object Oriented Design: The Design Process – Design Axioms – Corollaries – Design Patterns – Designing Classes. Software Quality: Tests- Testing Strategies – Test Cases – Test Plan – Continuous Testing – Mier"s Debugging Principles.	12
V	UML and Programming: Introduction – State and Dynamic Models – UML Diagrams – Class Diagrams – Use Case Diagrams- UML Dynamic Modeling.	12

Text Book(s):
1. Ali Brahami, Object Oriented Systems Development, Tata-McGraw Hill, New Delhi.
Reference Book(s):
1. Martin Fowler, Kendall Scott, UML Distilled- Applying the Standard Object Modeling Language, Addition Wesley.
2. Grady Booch, (1994), Object-oriented Analysis and Design with applications, 2nd Edition, Addition Wesley
Web Resource(s):
1. http://www.slideshare.net/helghareeb/object-oriented- analysis-and-design-12164752
2. http://www.uml-diagrams.org/uml-object-oriented- concepts.html

3. http://www.tutorialspoint.com/object_oriented_analysis_desi gn/index.htm
4. https://www.mppmu.mpg.de/english/kluth_oo_intro.pdf
5. http://www.agilemodeling.com/artifacts/useCaseDiagram.ht m (Unit V: Use Case Diagrams)

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Recognize the concepts and principles of object-oriented analysis, design and testing	K1,K2,K3
CO 2	Demonstrate the importance of system development process using various approaches and choose the relevant technique for a system in each phases of SDLC	K1,K2,K3
CO 3	Differentiate various object-oriented analysis, design and testing methods and models.	K1,K2,K3,K4
CO 4	Assess various analysis, design and testing strategies appropriate to build high- performance object-oriented system	K1,K2,K3,K4 ,K5
CO 5	Design Object oriented systems using object modeling techniques and analyze them for correctness and quality	K1,K2,K3,K4 ,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	2	3	3	3	3	3	3	2	3	2.83
CO2	3	3	3	3	2	3	3	3	2	3	3	2	2.75
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3	3	2.92
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3
											Mean Overall Score		2.9
											Correlation		High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25MEIT23C	Elective–IV	4	3	25	75	100

Course Title	3.SOFTWARE PROJRCT MANAGEMENT

Learning Objectives

LO 1	**Understand the fundamentals of software project management**, including competencies, product development life cycles, software process models, and international standards like SEI CMM and ISO.
LO 2	**Apply project planning and domain management techniques**, including project selection models, work breakdown structures (WBS), project milestones, scope definition, and team formation strategies.
LO 3	**Estimate software size, cost, and effort** using industry models such as COCOMO and SLIM, and address project risks, reuse strategies, and required organizational roles and skills.
LO 4	**Manage project resources and schedules effectively**, using tools like PERT, CPM, and Critical Chain Scheduling, while accounting for development dependencies and resource leveling.
LO 5	**Ensure software quality and configuration management**, including quality assurance planning, adherence to standards, software configuration tools, and understanding legal aspects through real-world case studies.

SYLLABUS

Unit	Contents	Hours
I	Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and models - The SEI CMM - International Organization for Standardization.	12
II	Managing Domain Processes - Project Selection Models - Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project -Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.	12
III	Tasks and Activities - Software Size and Reuse Estimating - The SEI CMM - Problems and Risks - Cost Estimation - Effort Measures - COCOMO: A Regression Model – COCOMO I-SLIM: A Mathematical Model Organizational Planning - Project Roles and Skills Needed.	12
IV	Project Management Resource Activities - Organizational -Form and Structure - Software Development Dependencies Brainstorming - Scheduling Fundamentals - PERT and CPM- Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling	12
V	Quality: Requirements – The SEI CMM - Guidelines - Challenges - Quality Function Deployment - Building the Software Quality Assurance - Plan - Software Configuration Management: Principles - Requirements - Planning and Organizing - Tools - Benefits - Legal Issues in Software - Case Study	12

Text Book(s):

1. Robert T. Futrell, Donald F. Shafer, Linda I. Safer, "Quality Software Project Management", Pearson Education Asia 2002
2. Dr.P.Rizwan Ahmed, Software Project Management, Margham Publications, Chennai, 2017

Reference Book(s):

1. Pankaj Jalote, "Software Project Management in Practice", Addison Wesley 2002.
2. Hughes, "Software Project Management", Tata McGraw Hill 2004, 3rd Edition.

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Understanding of project management fundamentals such as project planning, risk management and quality assurance	K1,K2,K3
CO 2	Choose the appropriate scheduling and testing techniques to build a quality product	K1,K2,K3
CO 3	Apply different cost estimation techniques and quality measures for software Development	,K2,K3,K4
CO 4	Differentiate various software development models and methodologies, planning activities and scheduling methods	K2,K3,K4,K5
CO 5	Asses the importance of software project documentation and identify the methods to create project documentation, including requirements documents, design documents, and project plans	K2,K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	2	3	2	2	3	2	2	2	2	2.33
CO2	2	3	3	3	3	3	3	3	3	2	2	2	2.67
CO3	3	3	3	3	2	2	3	2	3	3	2	2	2.58
CO4	3	2	3	3	3	3	3	3	3	2	2	3	2.75
CO5	3	2	3	3	3	3	3	3	3	3	2	3	2.83
											Mean Overall Score		2.63
											Correlation		High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25MSIT24	Skill Enhancement Course – (SEC-I)	3	2	25	75	100

Course Title	MOBILE APPLICATION DEVELOPMENT

Learning Objectives	
LO 1	**Set up and configure the Android development environment** using Eclipse and Android Emulator, and understand the basic components of an Android screen and user interface.
LO 2	**Design user interfaces using Android Views**, including basic views, picker views, list views, and image display elements to create interactive and user-friendly layouts.
LO 3	**Implement core Android components** such as Activities, Fragments, and Intents, while applying styles, themes, and dialogs to enhance the user experience.
LO 4	**Utilize menus and action bars effectively**, including option and context menus, customizing action items, handling media content, and integrating audio and video functionality.
LO 5	**Develop and deploy Android applications** with features like SMS messaging, email, data persistence using databases, background services, and app publishing processes.

SYLLABUS		
Unit	Contents	Hours
I	Getting Started with Android Programming – Using Eclipse for Android Development – Using Android Emulator - **Getting to know the Android User Interface:** Understanding the Components of a Screen	9
II	**Designing your User Interface with views:** Basic Views – Picker Views – List Views - Displaying Pictures	9
III	**Activities, Fragments and Intents:** Understanding Activities –Applying Styles and Themes to an Activity – Displaying a Dialog Window – Displaying a Progress Dialog – Linking Activities Using Intents – Fragments.	9
IV	**Menus with Views:** Option Menu – Context Menu. **Utilizing the Action Bar:** Adding Action Items to the Action Bar – Customizing the Action Items and Application Icon - Working with Audio and Video	9
V	**Messaging:** SMS Messaging – Sending E- Mail- Data Persistence: Creating and Using Databases – Developing Android Services – Publishing Android Applications	9

Text Book(s):
1. Wei – Meng Lee, (2012), Beginning Android 4 Application Development, Wiley India Edition
2. Dr.P.Rizwan Ahmed(2020), Mobile Application Development, Margham Publications,Chennai.
Reference Book(s):
1. Onur Cinar, (2012), Android Apps with Eclipse, Apress,   Springer (India) Private Limited.
2. Reto Meier,   (2010), Professional Android 2 Application Development, Wiley India Edition
Web Resource(s):

1. http://devcloper.android.com/training/basics/firstapp/index.html
2. www.vogella.com/articles/Android/article.html
3. www.coreservlets.com/android-tutorial/
4. www.edumobile.org/android/category/android-beginner-tutorial
5. http://www.androidhive.info/2011/11/android-sqlite- database-tutorial/ (Unit V: Ex. No.3 (SQLite Database)

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	Demonstrate the setup and configuration of Android Development Environment.	K1,K2,K3
CO 2	Apply the necessary UI components with different styles, themes, views, and layouts.	K1,K2,K3
CO 3	Examine and implement the required services such as messaging, mailing, multimedia concepts for the given problem	K1,K2,K3,K4
CO 4	Test and debug the Android applications with different inputs.	K2,K3,K4,K5
CO 5	Create mobile applications that make use of various android features, functions and database tasks	K2,K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	3	2	2	2	2	3	2	2	2	2.33
CO2	3	3	3	3	3	3	3	3	3	2	3	2	2.83
CO3	3	2	3	3	3	2	3	3	3	3	3	2	2.75
CO4	3	3	3	3	3	3	2	3	2	3	3	2	2.75
CO5	3	3	3	2	3	2	3	3	3	2	2	3	2.66
											Mean Overall Score		2.66
											Correlation		High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High

Semester	Course Code	Course Category	Hours / Week	Credits	Marks for Evaluation		
					CIA	ESE	Total
II	25MHR20	-	2	2	25	75	100

Course Title	HUMAN RIGHTS

Learning Objectives	
LO 1	**Understand the fundamental concepts and nature of human rights**, including their origin, development, theories, and the principles laid out in key historical documents like the Magna Carta.
LO 2	**Analyze international human rights frameworks**, such as the Universal Declaration of Human Rights, ICCPR, ICESCR, and specialized conventions addressing discrimination, torture, children's rights, and migrant workers.
LO 3	**Examine regional human rights systems**, including the European and African models, and understand the enforceability of international human rights laws within domestic legal systems.
LO 4	**Explore the human rights provisions within the Indian Constitution**, focusing on Fundamental Rights, Directive Principles, Fundamental Duties, and the measures available for human rights protection in India.
LO 5	**Evaluate human rights violations and the mechanisms for redressal**, including remedies against state and individual infringements, Public Interest Litigation, and the roles of the National and State Human Rights Commissions and Human Rights Courts.

SYLLABUS		
Unit	Contents	Hours
I	Human rights- Concepts & Nature Human Rights: Meaning, Definition, Nature, Content- Legitimacy of Human Rights- Origin and Development of Human Rights- Theories – Principles of Magna Carta – Modern Movements of Human Rights – The Future of Human Rights.	6
II	Human Rights – The International Perspective International human rights – Universal Declaration of Human Rights (UDHR) – International Covenant on Civil and Political Rights (ICCPR) – International Covenant on Economic, Social and Cultural Rights (ICESCR)- Human Right Declarations – Role of United Nation Commissions – Convention on the Elimination of All forms of Discrimination against women (CEDAW) – United Nations Convention against Torture (UNCAT) - United Nations Convention on the Rights of the Child (CRC or UNCRC)	6
III	International Human Regional Human Rights: European Human Rights System- African Human Rights System	6
IV	Human Rights in India: The Constitution of India – Fundamental Rights – Right to Life and Liberty – Directive Principles of State Policy – Fundamental Duties– Measures for Protection of Human Rights in India	6
V	Human Right Violations and Redressal Mechanism: Infringement of Human Right by State Machinery and by Individual– Constitutional remedies – Public Interest Litigation (PIL) - Protection of Human Rights Act, 1993 – National Human Rights Commission – State Human Rights Commissions	6

Text Book(s):
1. Human Rights Lalit Parmar, Anmol Publications Pvt. Limited, 1998
2. Human Rights In International Relations, David P. Forsythe, Cambridge University Press

Reference Book(s):
1. Alston, Philip, And Frederic Megret, Eds. The United Nations And Human Rights: A Critical 2. Appraisal. Second Edition. Oxford University Press, 2014. Bassiouni, M. Cherif, And William A. Schabas, Eds. New Challenges For The UN Human 3. Rights Machinery: What Future For The UN Treaty Body System And The Human Rights Council Procedures? Intersentia, 2011. 4. Kruckenberg, Lena J. The Unreal World Of Human Rights: An Ethnography Of The UN Committee On The Elimination Of Racial Discrimination. Nomos Publishers, 2012.
Web Resource(s):

Course Outcomes		
Upon successful completion of this course, the student will be able to:		
CO No.	CO Statement	Cognitive Level (K-Level)
CO 1	After studying unit-1, the student will be able to know the nature of human rights its origin, the theories, the movements in the march of human rights and the facets of future of human rights.	K1,K2,K3
CO 2	After studying unit-2, the student will be able to know the international dimension of human rights, the role of UN and the global effort in formulating conventions and declarations	K1,K2,K3
CO 3	After studying unit-3, the student will be able to Perceive the regional developments of human rights in Europe, Africa and Asia and the enforceable value of human rights in international arena.	K1,K2,K3,K4
CO 4	After studying unit-4, the student will be able to have knowledge on the human rights perspectives in India, more developed by its constitution and special legislations	K3,K4,K5
CO 5	After studying unit-5, the student will be able to know the redressal mechanism made available in case of human rights violation confined to India.	,K3,K4,K5

Relationship Matrix:

Course Outcomes (COs)	Program Outcomes (POs)							Program Specific Outcomes(PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	2	3	3	3	3	2	2	2	3	2	2	2.5
CO2	3	3	2	3	3	3	2	3	2	2	3	2	2.58
CO3	3	3	3	2	2	3	2	3	2	3	2	2	2.5
CO4	3	2	2	3	3	3	3	3	3	2	3	2	2.66
CO5	3	3	3	3	3	3	2	2	3	3	3	2	2.75
											Mean Overall Score		2.6
											Correlation		High

3 – Strong, 2- Medium, 1- Low

Mean Overall Score	Correlation
<=1	Low
>1 & <=2	Medium
>2 & <=3	High