Millia Institute of Technology
Rambagh, Purnea

Affiliated to Purnea University, Purnea

NAAC Accredited & ISO 9001:2015

SYLLABUS

Department of
Master of Computer Applications

1st SEMESTER

SEMESTER – I										
CC/ CE/ SE/ OE	**Paper Code**	**Paper Title**	**Hours Per Week**			**Credit**	**End-Term Theory Exam Marks**	**Continuous Evaluation Marks**	**End-Term Practical Exam Marks**	**Total Marks**
			L	**T**	**P**					
CC (Core Compulsory)	1MCACCC1	Database Management System	3	0	2	5	70	30	0	100
	1MCACCC2	Data Structures and Algorithms With 'C'	3	0	2	5	70	30	0	100
	1MCACCC3	Operating Systems	4	1	0	5	70	30	0	100
	1MCACCC4	Practical Examination	-	-	-	5	0	0	100	100
CE (Select Any 2)	1MCACCE(A)	Programming with VB.Net and ASP.Net	3	0	2	5	70	30	0	100
	1MCACCE(B)	Computer Organization and Architecture	4	1	0	5	70	30	0	100
	1MCACCE(C)	Discrete Mathematics	5	0	0	5	70	30	0	100
SE (Select Any 2)	1MCASEC(A)	Linux Server Administration	3	0	2	5	70	30	0	100
	1MCASEC(B)	Management Information Systems	4	1	0	5	70	30	0	100
	1MCASEC(C)	Internet of Things	3	0	2	5	70	30	0	100
	1MCASEC(D)	E–Commerce	4	1	0	5	70	30	0	100
OE	SWAYAM1	- - -	-	-	-	-	-	-	-	-
SEMESTER TOTAL						**40**				**800**

Definition of Credit	12 Hr. Lecture (L) = 1 credit	12 Hr. Practical (P) = 0.5 credit
	12 Hr. Tutorial (T) = 1 credit	12 Hrs. Practical (Lab) = 0.5 credit

SEMESTER – I

1MCACCC1 – DATABASE MANAGEMENT SYSTEM

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
CC	3	0	2	5	70	30	0	100

PRERUISITE:

Students are expected to know following topics before learning the syllabus. Theory classes may be organized if required. These topics are prerequisite not to be included for theory exam: - Significance of Databases. Database System Applications, Advantages and Disadvantages of different Database Management systems, Comparison between DBMS, RDBMS, Distributed and Centralized DB, Database design, ER Diagram, Relational Databases: Integrity Constraints, Functional Dependency, Multi-valued Dependency, Normalization.

COURSE OBJECTIVES

- To create and manipulate a database using SQL.
- To know database administration basics and practice commands.
- To Understand File Organization and Indexing in Database.
- To Acquire the Knowledge of Query Evaluation to Monitor the Performance of DBMS.
- To Impart Knowledge in Transaction Processing, Concurrency Control Techniques and Recovery Procedures.
- To Know Parallel, Distributed, Object Relational and XML database basics.

COURSE OUTCOMES

- Understand and describe the basic concepts and terminology of Database Management System.
- Apply query language commands using MySQL.
- Understand internal storage mechanism, File Organization and Indexing in Database.
- Understand Concurrency, Transaction and recovery management concepts.
- Know Basic Concepts in parallel, distributed, object relational and XML database.

UNIT – WISE SYLLABUS

UNIT-I

Introduction to Databases, Flat File Vs Database, Significance of Databases, DBMS Architecture. Database Users, Advantages and Disadvantages of different Database Management systems, Data Independence, Database Models - Hierarchical Data Model, Network Data Model, Relational Data Model, Entity Relationship Modeling (ERDs), Mapping Entities and Attributes, Convert a Logical Model to a Relational Model to the Physical Model, Codd's Rules, Primary, Secondary and Foreign Keys and their mapping, Comparison between DBMS, RDBMS, Relational Algebra, Relational Calculus, Integrity Constraints, Functional Dependency, Multi-valued Dependency, Normalization of databases, Generalization and Aggregation.

UNIT-II

Database creation, Query Language Introduction, DDL, DML and DCL Commands, Integrity Constrain, Query Structure, Basic Operations, SQL Data Types and Schemas, Set Operations, Null Values, Aggregate Functions, Sub queries, Modification of the Database, Join Expressions, Views, Transactions, Authorization, Trigger, Recursive Queries, Database Administration Basics, Running and Shutting Down, setting up Account, Users Role and privileges, Backup and Restore. (all above are implemented in lab- using MySQL)

UNIT-III

Overview of Physical Storage Media, RAID, Storage Access, File Organization, Organization of Records in Files, Data-Dictionary Storage, Indexing Basics, Ordered Indices, B+-Tree Index Files, B-Tree Index Files, Hashing, Multiple-Key Access, Query Optimization Basics.

UNIT-IV

Transaction Concept, Transaction State, Concurrent Executions, Serializability, Recoverability, Concurrency Management, Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Recovery, Failure Classification, Storage Structure, Recovery and Atomicity, Log-Based Recovery

UNIT-V

Database system Architecture, Centralized and Client-Server Systems, Server System Architectures Parallel Systems, Distributed Systems, Parallel Distribution, I/O Parallelism, Design of Parallel Systems, Distributed Databases, Heterogeneous and Homogeneous, Databases, Distributed Data, Storage Object Relational Database, XML database.

TEXT & REFERENCE BOOKS

- MySQL 8.0 Reference Manual Available online at https://dev.mysql.com/doc/refman/8.0/en/
- MySQL 8.0 Reference Manual in PDF format available online at https://downloads.mysql.com/docs/refman-8.0-en.pdf
- Learning MySQL by Hugh E. Williams, Seyed M.M. Tahaghoghi, O'Reilly, ISBN-978- 596008642
- Beginning MySQL by Geoff Moes, Robert Sheldon Wrox Publictions, ISBN –0764579509
- Creating your MySQL Database: Practical Design Tips and Techniques by Marc Delisle, PACKT Publications, ISBN-978-1904811305
- Mysql: The Complete Reference by Vaswani Vikram, Tata McGraw-Hill Education India, ISBN: 9780070586840, 9780070586840
- Murach'S Mysql by Murach Joel, PACKT Publishing, ISBN: 9789350237694, 9789350237694

SEMESTER – I

1MCACCC2 – DATA STRUCTURE AND ALGORITHMS WITH 'C'

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
CC	3	0	2	5	70	30	0	100

COURSE OBJECTIVES

- Learn Basic Data Structures such as, Linked Lists, Stacks and Queues, Tree and Graph.
- Learn Algorithm for Solving Problems Like Sorting, Searching, Insertion and Deletion of Data
- Understand the Complexity of Various Algorithms.
- Introduce Various Techniques for Representation of the Data in in Memory.

COURSE OUTCOMES

- Understand and Explain Basic Data Structures Such as, Linked Lists, Stacks and Queues, Tree and Graph.
- Select and Apply Appropriate Data Structures to define the particular Problem statement.
- Implement Operations Like Searching / Sorting, Insertion, and Deletion, Traversing on Various Data Structures.
- Determine and Analyze the Complexity of Given Algorithms

UNIT – WISE SYLLABUS

UNIT-I

Structure's, Union, File Input and Output, Pointer's, Dynamic Memory Allocation, and Function's call-by-reference in 'C' Language. Algorithm Analysis and Complexity, Data Structure - Definition, Types of Data Structures. Recursion: Definition, Linear and Binary Recursion, Searching Techniques, Linear Search, Binary Search.

UNIT-II

Linked Lists: Introduction, Single Linked List, Representation of a Linked List in Memory, Operations on a Single Linked List, Circular Linked List, Double Linked List, Advantages and Disadvantages of Linked List.

UNIT-III

Stacks and Queues: Stacks: Basic Stack Operations, Representation of a Stack Using Arrays, Stack Applications: Reversing List, Factorial Calculation, Infix to Postfix Transformation, Evaluating Arithmetic Expressions.

Queues: Basic Queue Operations, Representation of a Queue Using Array, Implementation of Queue Operations Using Stack. Circular Queues, Priority Queues. Applications of Queues - Round Robin Algorithm

UNIT-IV

Sorting Techniques: Basic Concepts, Sorting Algorithms: Insertion (Insertion Sort), Selection (Heap Sort), Exchange (Bubble Sort, Quick Sort), Distribution (Radix Sort) and Merging (Merge Sort) Algorithms.

UNIT-V

Trees: Terms Related to Tree, Binary Tree, Binary Tree Traversals, Creation of Binary Tree from In-order, Pre-order and Post-Order Traversals, Threaded Binary Trees, Binary Search Tree, BST Operations: Insertion, Deletion, B+ Tree, AVL Tree, Red-Black Tree.

Graphs: Basic Concepts, Representations of Graphs: Using Linked List and Adjacency Matrix, Graph Algorithms. Graph Traversals (BFS & DFS), Applications: Dijkstra's Shortest Path, Minimum Spanning Tree Using Prim's Algorithm, Kruskal's Algorithm and Warshall's Algorithm.

TEXT & REFERENCE BOOKS

- R. S. Salaria- Data Structures and Algorithm - Khanna Publishing
- G. A. V. Pai, Data Structures and Algorithms - TMH
- Debasis, Sarnanta - Classic Data Structures - PHI, 2009
- E. Horowitz, Sartaj Sahni and Susan Anderson, W. H. Freeman - Fundamentals of Data Structures in C
- Schaum's Series - Introduction of Data Structure - Prentice Hall of India

LIST OF PRACTICAL

1. Program to Maintain a Linked List.
2. Program to Add a New Node to the Ascending Order Linked List.
3. Program to Maintain a Doubly Linked List.
4. Program to Implement Stack as an Array.
5. Program to Implement Stack as a Linked List.
6. Program to convert an expression from Infix Form to Postfix Form.

7. Program to Evaluate an Expression Entered in Postfix Form.
8. Program to Implement Non-Recursive Function for Factorial of a Number.
9. Program to Implement Recursive Function for Factorial of a Number.
10. Program to Implement a Queue as an Array.
11. Program to Implement a Queue as a Linked List.
12. Program to Implement a Circular Queue as an Array.
13. Program to Implement a Circular Queue as a Linked List.
14. Program to Implement a Dequeue Using an Array.
15. Program to Implement Linear Search in an Unsorted Array.
16. Program to Implement Binary Search in a Sorted Array.
17. Program to Implement Selection Sort.
18. Program to Implement Insertion Sort
19. Program to Implement Bubble Sort.
20. Program to Implement Quick Sort.

SEMESTER – I

1MCACCC3 – OPERATING SYSTEMS

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
CC	4	1	0	5	70	30	0	100

COURSE OBJECTIVES

- To Understand the Services Provided by Operating System
- To Understand the Working and Organization of Process and its Scheduling and Synchronization.
- To Understand the Concept of Deadlock.
- To Understand Different Approaches to Memory Management Techniques.
- To Understand the Structure and Organization of the File System.

COURSE OUTCOMES

- Identify and describe the Services Provided by Operating Systems.
- Understand and Solve Problems Involving Process Control, Mutual Exclusion, Synchronization and Deadlock.
- Implement Processor Scheduling, Synchronization and Disk Allocation Algorithms for a Given Scenario
- Apply Various Approaches of Memory Management Techniques
- Analysis Various Operating System Approaches in Linux and Windows

UNIT – WISE SYLLABUS

UNIT-I

Definitions, Components and Types of Operating System, Operating System Services, System Calls, System Programs, Process Concepts, Process State & Process Control Block, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Threads Introduction

UNIT-II

The Critical Sections Problem, Semaphores, Classical Problem of Synchronization, Deadlock Characterizations, Method for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined Approach to Deadlock

UNIT-III

Storage Management Logical Versus Physical Address Space, Swapping, Contiguous Allocating, Paging, Segmentation, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithms, Thrashing, Demand Segmentation

UNIT-IV

Disk Structure, Disk Scheduling, Disk Management, Swap Space Management, Disk Reliability, Stable Storage Implementation, File Concepts, Directory Structure, Protecting, I/O Subsystem Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem

UNIT-V

Case Studies: Linux System: History, Components, Kernel Modules, Process Management – Model, Identity, Context, Scheduling – Kernel Synchronization, Process Scheduling, Memory Management of Physical Memory

Windows System: History, Design Principal, Components

TEXT & REFERENCE BOOKS

- Silberschatz, Galvin, Gagne- Operating System Concepts -Wiley Student Edition
- Milan Milenkovic-Operating System Concepts & Design- TMH Publication
- Andrew S. Tanenbaum-Modern Operating System- -PHI

SEMESTER – I
1MCACCC4 – PRACTICAL EXAMINATION

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
CC	-	-	-	5	0	0	100	100

Practical evaluation will be conducted from below listed papers *(whichever is / are opted by candidates)*:

1. Paper 1MCACCC1
2. Paper 1MCACCC2
3. Paper 1MCACCE(A)
4. Paper 1MCASEC(A)
5. Paper 1MCASEC(C)

SEMESTER – I

1MCACCE(A) – PROGRAMMING WITH VB.NET & ASP.NET

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
CE	3	0	2	5	70	30	0	100

COURSE OBJECTIVES

- Identify the basics of.NET framework, architecture and user programs.
- Do GUI programming using VB.NET
- Examine the challenges involved in.NET framework programming
- Do event driven programming projects
- Learn the ADO..NET Database Usages in Website Creation
- Develop Websites with use of ASP.NET.

COURSE OUTCOMES

- Understand and explore various features of VB.NET framework
- Analyse, design and develop the GUI based applications software using VB.NET.
- Design, develop and implement complete software projects using VB.NET with consideration of environment in team spirit.
- Analyse the requirement, design and develop dynamic and static websites and web applications using .NET technology.
- Integrate and apply different components including database, with proper choice of languages mapping

UNIT – WISE SYLLABUS

UNIT-I

Object-Oriented Programming: Classes and Objects, Fields, Properties, Methods, and Events, Abstraction, Encapsulation, Inheritance, and Polymorphism, Overloading, Overriding, Shadowing, Constructors and Destructors, .Net Framework: Features & Architecture, Common Language Runtime, Common Type System, MSIL, Class Libraries. Event Driven Programming, Methods and Events. Programming into Visual Studio, IDE of VB.NET – Menu Bar, Toolbar, Project Explorer, Toolbox, Properties Window, Form Designer, Form Layout, Immediate Window, ASP & HTML Forms, Building VB.NET and C# Applications.

UNIT-II

Visual Basic Language: Operators, Conditionals, Loops, Statements, Variables, Data Types, Arrays and Dynamic Arrays, Operators. Procedures, Scope, and Exception Handling, Creating Functions, Exception Handling, Using Resume Next and Resume Line, Using On Error GoTo, Windows Forms: Loading, Showing and Hiding Forms, Working with Multiple Forms, Creating Windows Applications, Adding Controls to Forms, Handling Events, MsgBox Function, InputBox Function, Startup Form, Multiple Document Interface (MDI) Applications, Dialog Boxes, Controls at Run Time, Mouse Events, Keyboard Events, Beeping, Deploying Applications.

UNIT-III

.NET Tools: Control Class, Text Boxes, Rich Text Boxes, Labels, Link Labels, Buttons, Checkboxes, Radio Buttons, Panels, and Group Boxes, List Boxes, Checked List Boxes, Combo Boxes, and Picture Boxes, Scroll Bars, Splitters, Track Bars, Pickers, Notify Icons, Tool Tip, and Timers, Menus, Built-in Dialog Boxes, and Printing, Image Lists, Tree and List Views, Toolbars, Status and Progress Bars, and Tab Controls

UNIT-IV

Web Forms with ASP.Net: Web Form Controls, HTML, Web Applications, Multiform Web Project, Client Events, Title Bar Text, Error Page, Search Engine Keywords, Embedding Visual Basic Code in Web Pages, Validation Controls Calendars. Introduction to Windows Services & Web Services

UNIT-V

Data Access with ADO.NET: Server Explorer Data Adaptors and Datasets, ADO.NET Objects, Data Connection, Dragging Tables, Dataset, Data Grid, Data Adapter Controls, Datasets Schema, MS Jet Database, Relational Databases. Binding Controls to Databases: Simple Binding, Complex Binding, Navigating in Datasets, Data Forms, Handling Databases in Code, Database Access in Web Applications.

TEXT & REFERENCE BOOKS

- Steven Holzner, VB.Net Programming - Black Book-Dreamtech Publications

- Evangelos Petroutsos Mastering VB.Net - BPB Publications
- Mathew Macdonald-The Complete Reference Asp.Net - TMH
- Professional ASP.Net- Wrox Publication - Techmedia
- Stephen Walther Active Server Pages 2.0 (Unleashed)
- Eric A. Smith ASP 3 Programming Bible: IDG Books

LIST OF PRACTICALS

1. Write a program to perform arithmetic operation in console application using switch case.
2. Write a program to perform reverse number.
3. Write a console application that obtains four integer values from the user and displays the product.
4. If you have two integers stored in variables var1 and var2, what Boolean test can you perform to see if one or the other (but not both) is greater than 10?
5. Write an application that includes the logic from Exercise 4, obtains two numbers from the user, and displays them, but rejects any input where both numbers are greater than 10 and asks for two new numbers.
6. Write a console application that places double quotation marks around each word in a
7. string.
8. Write an application that uses two command-line arguments to place values into a string and an integer variable, respectively. Then display these values.
9. Write an application that receives the following information from a set of students:
   - Student Id:
   - Student Name:
   - Course Name:
   - Date of Birth:

   The application should also display the information of all the students once the data is Entered. Create an application that allows the user to enter a number in the textbox named "getnum". Check whether the number in the textbox "getnum" is palindrome or not. Print the message accordingly in the label control named lbl display when the user clicks on the button "check".
10. Write a program to declare class "Distance" have data member's dist1, dist2, dist3. Initialize the two data members using constructor and store their addition in third data member using function and display addition.
11. Define a class "salary" which will contain member variable Basic, TA, DA, HRA. Write a program using Constructor with default values for DA and HRA and calculate the salary of employee.
12. Write a program to check whether the given number is Armstrong number or not.
13. Write a console application for bank account in C#.NET.
14. Write a console application to display student information using class and object.
15. Write a console application to display employee information using properties.
16. Write a console application for a class person having data members name & age. Accept the value for this using constructor. And display the output for one object.
17. Write a console application containing a method that will swap the value of two integer type variable.
18. Write a console application calculate the area and circumference of circle & rectangle using inheritance.
19. Write a program for calculates the area and circumference of circle & rectangle using abstract class.
20. Design a sign-Up form & validate user phone no with exactly 10 digit and email-id.
21. Design a sign-up form & validate username (minimum 8 characters & maximum 15 and only character), password and retype password (both should be same)
22. Design a web application form having loan amount, interest rate and duration fields. Calculate the simple interest and perform necessary validation i.e. Ensures data has been entered for each field. Checking for non-numeric value.
23. Create an application which will ask the user to input his name and a message, display the two items concatenated in a label, and change the format of the label using radio buttons and check boxes for selection, the user can make the label text bold, underlined or italic and change its color. include buttons to display the message in the label, clear the text boxes and label and exit.
24. List of employees is available in list box. Write an application to add selected or all records from listbox (assume multi-line property of textbox is true).
25. "How is the book ASP.NET with C# by Raj Sharma?" Give the user three choice: i) Good ii) Satisfactory iii) Bad. Provide a VOTE button. After user votes, present the result in percentage using labels next to the choices.
26. Create a project that calculates the total of fat carbohydrate and protein. Allow the user to enter into text boxes. The grams of fat, grams of carbohydrate and grams of protein. Each gram of fat is 9 calories and protein or carbohydrate is 4 calories. Display the total calories of the current food item in a label. Use to other labels to display and accumulated some of calories and the count of items entered. The form food have 3 text boxes for the user to enter the grams for each category include label next to each text box indicating what the user is enter.

27. Create a Global.asax file with Application variables count, color1 and gotohp. Create a Session variable called cont1. Initialize count as 0 and assign any color to color1. For the variable gotohp, give a hyperlink to any Website. Use the variables in a Web Form. Try these with the lock and unlock methods.
28. Write a program that gets user input such as the user name, mode of payment, appropriate credit card. After the user enters the appropriate values the Validation button validates the values entered.
29. Create the application that accepts name, password, age, email id, and user id. All the information entry is compulsory. Password should be reconfirmed. Age should be within 21 to 30. Email id should be valid. User id should have at least a capital letter and digit as well as length should be between 7 and 20 characters.
30. Create a Web Application to display all the Empname and Deptid of the employee from the database using SQL source control and bind it to GridView. Database fields are (DeptId, DeptName, EmpName, Salary)
31. Create a Login Module which adds Username and Password in the database. Username in the database should be a primary key.
32. Write a program to get a user input such as the boiling point of water and test it to the appropriate value using Compare Validator.
33. Create a web application to insert 3 records inside the SQL database table having following fields (DeptId, DeptName, EmpName, Salary). Update the salary for any one employee and increment it to 15% of the present salary. Perform delete operation on 1 row of the database table.
34. Create a web page to display the cricket score from the table event (id, name, score). Refresh the website automatically after every 30 seconds.
35. Write a program to display three images in a line. When any one of the images is clicked, it must be displayed below. On clicking the displayed image it must be cleared.
36. Design a college website (minimum 4 pages)
37. Design a company website (minimum 4 pages)

SEMESTER – I

1MCACCE(B) – COMPUTER ORGANIZATION AND ARCHITECTURE

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
CE	4	1	0	5	70	30	0	100

COURSE OBJECTIVES

- To understand the basic blocks of digital logic.
- Understand basic operation of Combinational Circuits.
- Understand the Boolean algebra and map simplification.
- To examine the basics of assembly programming.
- To learn the memory addressing techniques and I/O organization.

COURSE OUTCOMES

- Able to Apply Boolean algebra and map simplification to digital circuit design
- Able to Apply the flip-flop operation to design the timing and control circuit
- By using memory addressing techniques solve memory address problem
- Able to write assembly code for some basic problem.
- Understand the various types of memory and their functions.

UNIT – WISE SYLLABUS

UNIT-I

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Product-of sums simplification, don't-care-conditions, Combinational Circuits, Half-Adder, Full–Adder, Sequential Circuits, Flip-Flops SR, & J K, Basis Computer Organization, Instruction codes, Stored program organization, Computer registers, Common Bus system, Computer Instructions, timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Complete Computer Description

UNIT-II

Basis Computer Organization and Design: Design of Basis Computer, Control Logic Gates, Control of Registers and Memory, Design of Accumulator Logic, Control of AC Register, Adder and Logic Circuit, Multiple Bus Organization of Computer, Memory Addressing

UNIT-III

Programming the Basis Computer: Programming the Basis Computer, Machine Languages, Assembly Language, The Assembler, Program Loops, Programming Arithmetic and Logic Operations, Subroutines, subroutine Parameters and Data Linkage, Input output Programming, Character Manipulation, Program Interrupt

UNIT-IV

Micro programmed Control: Control Memory, Address Sequencing, Conditional Branching, Mapping of Instruction, Subroutines, Micro program Example, Design of Control Unit, Microgram Sequencer

UNIT-V

Input-Output & Memory Organization: Peripheral Devices, Input-Output Interface, Modes of Transfer, Priority Interrupt, Daisy- Chaining Priority, Parallel Priority Interrupt, Priority Encoder, Interrupt Cycle, Direct Memory Access (DMA), Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

TEXT & REFERENCE BOOKS

- Computer System Architecture Third Edition, by Mano M. Morris, Pearson Education India, ISBN: 9788131700709, 9788131700709
- Digital Design by Mano M. Morris, Pearson Education India, ISBN: 9789353062019, 9789353062019
- Digital Logic & Computer Design by Mano M. Morris, Pearson Education India, ISBN: 9788177584097, 9788177584097
- Computer Organization and Architecture by Basu P N, Vikas Publishing Houuse Pvt Ltd, ISBN: 9788125939917
- Computer Organization & Architecture 10th Edition - Designing for Performance by Stallings William, Pearson, ISBN: 9789332570405, 9789332570405
- Computer Architecture and Organization by Hayes John, Tata McGraw-Hill Education India, ISBN: 9781259028564, 9781259028564
- Computer Organization by Hamacher V. Carl, McGraw-Hill Education - Europe, ISBN: 9781259005275, 9781259005275

SEMESTER – I

1MCACCE(C) – DISCRETE MATHEMATICS

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
CE	5	0	0	5	70	30	0	100

COURSE OBJECTIVES

- Understand Different Types of Discrete Structures
- Express a Logic Sentence in Terms of Predicates, Quantifiers, and Logical Connectives
- Solve Problems Using the Principle of Inclusion -Exclusion.
- Understand Recursive Definitions;

COURSE OUTCOMES

- Apply the Operations of Sets and use Venn Diagrams to Solve Applied Problems.
- Analyze Properties of Algebraic Structures Such as Groups, Rings and Fields.
- Use and Analyze Recursive Definitions
- Understand, Explain and Apply the Basic Principles of Sets and Operations in Sets to Solve the Problems
- Analyze Modern Problems in Computer Science and solve them Using Graphs and Trees.

UNIT – WISE SYLLABUS

UNIT-I

Set Theory: Introduction to Set Theory, Set Operations, Algebra of Sets, Duality, Finite and Infinite Sets, Cartesian Product Relations, Representation of Relations, Types of Relation, Equivalence Relations and Partitions, Partial Ordering Relations and Lattices, Function and its Types, Composition of Function and Relations

UNIT-II

Graphs and Trees: Introduction to Graphs, Directed and Undirected Graphs, Homomorphic and Isomorphic Graphs, Subgraphs, Cut Points and Bridges, Multigraph and Weighted Graph, Paths and Circuits, Shortest Path in Weighted Graphs, Eurelian Path and Circuits, Hamilton Paths and Circuits, Planar Graphs Euler's Formula, Graph Coloring, Trees, Spanning Trees, Binary Trees and its Traversals.

UNIT-III

Propositional Logic: Basic Operations: And (^), Or (V), Not (~), Truth Value of a Compound Statement, Propositions, Tautologies, Contradictions, Validity of Arguments, Boolean Algebra Group Theory: Definition and Examples of a Monoid, Semigroup, Groups and Rings, Homomorphism, Isomorphism and Automorphism, Subgroups and Normal Subgroups, Cyclic Groups, Cosets, Lagrange's Theorem.

UNIT-IV

Definitions and Properties; Equivalence Relations and Equivalence Classes. Representations of Relations by Binary Matrices and Digraphs; Operations on Relations. Closure of a Relations; Reflexive, Symmetric and Transitive Closures.

UNIT-V

Definitions and Properties of Recursion and Recurrence Relation: Linear Recurrence Relation with Constant Coefficients, Homogeneous Solutions, Particular Solutions, Total Solution of a Recurrence Relation Using Generating Functions.

TEXT & REFERENCE BOOKS

- C.L Liu- Elements of Discrete Mathematics - McGraw Hill
- K.H. Rosen, Discrete Mathematics and Applications, Fifth Edition 2003, Tata McGraw Hill
- W.K. Grassmann and J.P. Trembnlay, Logic and Discrete Mathematics, a Computer Science
- Ronald Graham, Donald Knuth and Oren Patashik - Concrete Mathematics: a Foundation for Computer Science Ronald Graham
- Donald Knuth and Oren Patashik - Concrete Mathematics: a Foundation for Computer Science-Addison-Wesley
- Judith L. Gersting -Mathematical Structures for Computer Science, -Computer Science Press.
- K. A. Ross, Ch. R. B. Wright, Discrete Mathematics, Prentice Hall Inc., 1992 (Or Pwn Warszawa 1996).

SEMESTER – I

1MCASEC(A) – LINUX SERVER ADMINISTRATION

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
SE	3	0	2	5	70	30	0	100

COURSE OBJECTIVES

- Understand the fundamental concepts of Linux Server Administration
- Install and configure basic Linux services.
- Manage Users, Permissions, Folders, and Native Applications in Linux server.
- Manage the resources and security of a computer running Linux at a basic level
- Configure and manage simple networking services in Linux server.
- Creating and Maintaining E-Mail, FTP, and Web Services.

COURSE OUTCOMES

- Explain the fundamental concepts of Linux Server Administration
- Install, configure and manage basic Linux services.
- Manage Users and their permissions, applications and services in Linux server.
- Manage the resources and security of a Linux server.
- Configure and manage basic networking services in Linux server.
- Install and configure E-Mail, FTP, and Web Servers.

UNIT – WISE SYLLABUS

UNIT-I

Introduction, Understanding Linux Distributions, Installing Linux.

Using Essential Tools - Logging in to Linux, Using the Seven Essential Linux Command Line Tools (ls, cp, mv, rm, mkdir, cd, pwd) Getting Help with man, Finding Which man Page to Use, Using pinfo, Using Other Systems for Getting Help

Working with the Bash Shell - Understanding the Shell and Other Core Linux Components, Using I/O Redirection and Piping, Working with history, Using Command Line Completion, Using Variables, Using Other Bash Features, Working with Bash Startup Files

Essential File Management Tools - Understanding the Linux File System Hierarchy, Listing Files with ls, Using Wildcards, Copying Files with cp, Working with Directories, Using Absolute and Relative Paths, Moving Files with mv, Removing Files with rm, Understanding Hard and Symbolic Links, Managing Hard and Symbolic Links, Finding Files with find, Using Advanced find Options, Archiving Files with tar, Managing File Compression

Working with Text Files - Understanding vi, Creating Text Files with vi, Browsing Text Files with more and less, Using head and tail to See File Start and End, Displaying File Contents with cat and tac, Working with grep, Understanding Regular Expressions, Using Regular Expressions with grep, Using Common Text Processing Utilities

Connecting to a Server - Understanding the Root User, Using su, Using sudo, Creating a Simple sudo Configuration, Working on Linux from Graphical Interface or Command Line, Using ssh to Connect to a Remote Server, Using ssh Keys

UNIT-II

User and Group Management - Understanding Users, Understanding File Ownership, Creating Users with useradd, Creating Groups with groupadd, Managing User and Group Properties, Configuring Defaults for New Users, Managing Password Properties, Understanding User and Group Configuration Files, Managing Current Sessions

Permissions Management - Understanding Basic Linux Permissions, Managing Basic Linux Permissions, Understanding Advanced Linux Permissions, Managing Advanced Linux Permissions, Managing umask

Managing Partitions - Understanding Disk Storage and Devices, Understanding MBR and GPT Partitions, Creating MBR Partitions, Creating MBR Extended and Logical Partitions, Managing GPT Partitions, Working with SSD, Adding a Swap Partition, Understanding Encrypted Partitions, Configuring Encrypted Partitions

Managing File Systems and Mounts - Understanding Linux File Systems, Creating File Systems, Mounting File Systems through / etc / fstab, Using File System Label and UUID, Managing Systemd Mounts, Managing Systemd Automounts

Managing the Boot Procedure - Understanding the Linux Boot Procedure, Shutting Down a System, Configuring the GRUB2 Boot Loader, Troubleshooting Boot Issues, Working with a Rescue Disk

UNIT-III

Managing Networking - Understanding IPv4 Basics, Understanding IPv6 Basics, Applying run - time Network Configuration, Understanding Network Device Naming, Managing Host Names, Managing Host Name Resolution, Using Common Network Tools

Managing Time - Understanding Linux Time, Managing Linux Time, Understanding the NTP Protocol, Configuring Time Synchronization

Working with Systemd - Understanding Systemd, Managing Systemd Services, Modifying Service Configuration, Understanding Targets, Managing Targets

Process Management - Understanding Linux Processes and Jobs, Managing Interactive Shell Jobs, Monitoring Processes with top, Changing top Display Properties, Monitoring Process Properties with ps, Changing Process Priority, Managing Processes with kill

Managing Software - Installing Software from Source Packages, Understanding Software Packages, Managing Libraries, Understanding Repositories, Managing Packages with yum, Managing Packages with apt, Using rpm

Scheduling Tasks - Understanding Linux Task Scheduling, Scheduling Tasks with cron, Using systemd Timers, Using at to Schedule Tasks

Reading Log Files - Understanding Linux Logging, Working with journalctl, Understanding Rsyslog

UNIT-IV

An Introduction to Bash Shell Scripting - Understanding Bash Shell Scripts, Essential Shell Script Components, Using Loops in Shell Scripts

Managing Local Security - Using ulimit to Configure Resource Limitations, Configuring PAM, Working with /etc/securetty, Managing Secure Mount Options

Configuring a Firewall - Understanding Linux Firewalling, Configuring a Firewall with firewalld, Configuring a Firewall with ufw, Understanding iptables Basics, Configuring a Firewall with iptables

Managing SELinux and AppArmor - Understanding the Need for Mandatory Access Control, SELinux versus AppArmor, Configuring AppArmor, Troubleshooting AppArmor, Configuring SELinux Mode, Working with SELinux Labels, Managing SELinux Booleans, Troubleshooting SELinux

Managing SSH Services - Configuring the SSH Service, Using SSH Public/Private Keys, Using scp to Copy Files, Managing File Synchronization with rsync, SSH Port Forwarding

Managing Web Services - Configuring a Web Service, Managing Web Service Log Files, Configuring Virtual Hosts, Restricting Access to a Web Page

Configuring FTP Services – Understanding FTP Solutions, Configuring a Basic FTP Server, Working with sftp

UNIT-V

Configuring a Basic DNS Server - Understanding DNS, Configuring BIND, Configuring a Caching DNS Server

Providing NFS and CIFS File Shares - Understanding Linux File Sharing Solutions, Configuring a Basic NFS Server, Persistently Mounting NFS Shares, Configuring a Basic Samba Server, Mounting Samba Shares

Configuring a Database Server - Understanding Linux Database Solutions, Installing MariaDB, Creating a Simple Database

Configuring Basic Email Handling - Understanding Email Handling, Configuring a Basic Postfix Server, Configuring Dovecot as an IMAP Server

Configuring a Web Proxy - Understanding Web Proxies, Configuring a Basic Squid Proxy, Restricting Access to the Squid Proxy

Working with Virtual Machines - Understanding Linux Virtualization Solutions, Creating a KVM Virtual Machines, Managing KVM Virtual Machines

TEXT & REFERENCE BOOKS

- Christopher Negus Fedora and Red Hat Enterprise Linux Bibile, Wiley India Ltd.
- Christopher Negus, Linux Bible, Wiley India Ltd
- Linux Administration, Kogent Learning Solutions Inc., ISBN 13 - 9789350044209, ISBN 10-935004420x, Wiley India
- Linux Administration A Beginner's Guide, Sixth Edition, Wale Soyinka, MC Graw Hill
- Linux: Powerful Server Administration by Jonathan Hobson, Oliver Pelz, and Uday R. Sawant, Packt Publishing
- Forouzan-Unix & Shell Programming, Cengage Publications

LINUX SERVER ADMIN PRACTICAL LAB

UNIT-I

Lab: Installing Linux
Lab: Using Essential Tools,
Lab: Working with the Bash Shell
Lab: Using Essential File Management Tools
Lab: Working with Text Files
Lab: Connecting to a Server

UNIT-II

Lab: Managing Users
Lab: Managing Permissions
Lab: Managing Partitions
Lab: Managing File Systems

Lab: Managing the Boot Procedure

UNIT-III

Lab: Managing Networking
Lab: Managing Time
Lab: Working with Systemd
Lab: Managing Processes
Lab: Managing Software
Lab: Scheduling Tasks
Lab: Working with Logging

UNIT-IV

Lab: Writing Shell Scripts
Lab: Managing Security
Lab: Configuring a Firewall
Lab: Managing Mandatory Access Control
Lab: Configuring SSH
Lab: Managing Web Services
Lab: Configuring FTP Services

UNIT-V

Lab: Configuring DNS
Lab: Managing Remote File Shares
Lab: Configuring a Database Server
Lab: Configuring Email
Lab: Configuring a Proxy
Lab: Managing KVM Virtual Machines

SEMESTER – I

1MCASEC(B) – MANAGEMENT INFORMATION SYSTEMS

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
SE	4	1	0	5	70	30	0	100

COURSE OBJECTIVES

- To understand the process of Management roles, activities, planning and control
- To understand MIS feasibility study
- To explore approaches, techniques and methodologies to MIS development
- To understand Project management methodologies
- To understand the types of Files, Data Bases and Information Processing Control
- Understand the input / output form design

COURSE OUTCOMES

- Able to define Management activities, roles and levels
- Able to apply feasibility study to design any MIS software.
- Understand and define the relationships of MIS with other enterprise applications
- Explore Decision Making Process.
- Apply from design techniques in software user interface design
- Able to understand MIS projects and methodologies.

UNIT – WISE SYLLABUS

UNIT-I

Management activities, roles and levels, Management Planning and Control: how planning and control systems interrelate, Strategic Planning within an organization, activities, techniques and Results, The nature of decision-making: decision-making models and, classification of decision-making situations, The nature of information, classifications and characteristics. The nature of information and decision-making at different management levels, and the MIS subtypes typically implemented at each level of management to support these information / decision-making Requirements, Management as the direct user of an MIS vs. Intermediary use, Measurement of MIS performance and capabilities.

UNIT-II

Logical Data Concepts, Types of Files, Databases, Serial Access and Direct Access devices. Sequential, Hashed and indexed File Organization – Data Base Organization – single flat File – Hierarchical, Network, Relational DB Structures. Transaction Processing – Control and Retrieval. Word and Text Processing. Document Filing Computer Graphics, Composition and Reproduction, Document Distribution, Facsimile Transmission, Message Systems, Information Processing Control – Availability Controls. The relationships of MIS to other enterprise applications, such as Transaction Processing Systems (TPS) and Enterprise Resource Planning (ERP) systems Human Resources, Marketing & Sales, Production, Accounting & Finance, Customer Relationships Management (CRM), Product Supply Chain Management systems, The Internet and MIS provisions: Internet and the linkages to legacy MIS, security issues.

UNIT-III

MIS feasibility study, Assessment of economic, Cost-Benefit Analysis Overall approaches to MIS development: Techniques and methodologies for supporting MIS development: Data warehouse / BI systems development methodologies and techniques Fact finding techniques (e.g. SQIRO) Database design techniques, Decision Making Process – Problem Formulation, programmed vs Non-Programmed Decision, Criteria for Decision Making, Classical Economical Model, Administrative Model, Resolution of Conflict Uncertainty Avoidance, Problematic Search, Incremental Decision Making, Pay off Matrices, Decision Trees, Games Theory, Statistical Inference documenting and Communicating Decision rules, Support for Decision making phases.

UNIT-IV

Management Reporting Systems (MRS), Decision Support Systems (DSS), Group Decision Support Systems (GDSS), Knowledge Based Systems that support management such as Expert Systems (ES) and Neural Network (NN) systems, The application of On-Line Analytical Processing (OLAP) / Data, mining / Business Intelligence (BI) tools in supporting management, decision making. Data warehouses and data mining facilities: the relationship between data warehousing and other MIS facilities.

System Design: System design consideration, input / output design, forms design, file organization and database, data management, file design, program design, control and security.

UNIT-V

Managing MIS projects: Project management methodologies OO methodologies, Value Analysis, The use of CASE tools to aid MIS development, The suitability of packages vs. bespoke systems development, End-user development of MIS and its implications, Outsourcing vs. insourcing of MIS development and/or operational activities, Developments in hardware, software, Internet and communications capabilities and their implication for MIS, Trends in management and organisations, for example the possible movement towards flexible, virtual organisations and the role of MIS may have in this scenario MIS and mobile computing, MIS and social media.

TEXT & REFERENCE BOOKS

- Gordon B. Davis And Maggrethe H. Olson, Management Information Systems, McGraw Hill
- International Edition.
- Rober G. Mudrick, Joel E. Ross And James R. ClAGGET, Information Systems For Modern Management, Prentice Hall Of India (P) Ltd., Eastern Economy Edition.
- Jerome Kanter Management Information Systems, Prentice Hall of India Ltd.
- Kenneth C. Laudon& Jane P. Laudon, Essentials of Management Information Systems, Tenth Edition, Pearson Prentice
- Terry Lucey, Management Information Systems, Ninth Edition, Thompson
- McNurlin, Sprague & Bui, Information Systems Management in Practice, Prentice Hall
- Efraim Turban, Jay Aronson & Tin-Peng Liang, Decision Support Systems and Intelligent Systems, Ninth International Edition, Pearson Prentice- Hall.

SEMESTER – I

1MCASCE(C) – INTERNET OF THINGS (IoT)

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
SE	3	0	2	5	70	30	0	100

COURSE OBJECTIVES

- To impart necessary and practical knowledge of components of Internet of Things
- To introduce the latest microcontrollers with application development, product design and prototyping.
- Learn and Understand Various Protocols used in Wireless Sensor Network
- Develop skills required to build real-life IoT based projects

COURSE OUTCOMES

- Understand the Concepts of Internet of Things and the Application Areas of IoT
- Understand IOT's hardware and software components
- Interface I/O devices, sensors & communication modules
- Remotely monitor data and control devices
- Develop real life IoT based projects

UNIT – WISE SYLLABUS

UNIT-I

Introduction to IoT, Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service (XaaS), Role of Cloud in IoT, Security aspects in IoT.

UNIT-II

Elements of IoT, Hardware Components-Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces.

Software Components- Programming API's (using Python / Node, js / Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

UNIT-III

IoT Application Development: Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud / local server, Authentication, authorization of devices.

UNIT-IV

IoT case studies and mini projects based on Home Automation, Industrial automation, Transportation etc.

UNIT-V

IoT case studies and mini projects based on Agriculture, Healthcare, logistics etc.

TEXT & REFERENCE BOOKS

- Vijay Madisetti, Arshdeep Bahga, Ïnternet of Things, "A Hands on Approach", University Press
- Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs
- Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
- Jeeva Jose, "Internet of Things", Khanna Publishing House, Delhi
- Adrian McEwen, "Designing the Internet of Things", Wiley
- Raj Kamal, "Internet of Things: Architecture and Design", McGraw Hill
- Cuno Pfister, "Getting Started with the Internet of Things", O Reilly Media

LIST OF PRACTICALS

1. Familiarization with Arduino / Raspberry Pi and perform necessary software installation
2. To interface LED / Buzzer with Arduino / Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds
3. To interface Push button / Digital sensor (IR / LDR) with Arduino / Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection

4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to Print temperature and humidity readings
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed
6. To interface OLED with Arduino / Raspberry Pi and write a program to print temperature And humidity readings on it.
7. To interface Bluetooth with Arduino / Raspberry Pi and write a program to send sensor Data to smartphone using Bluetooth
8. To interface Bluetooth with Arduino / Raspberry Pi and write a program to turn LED ON / OFF when '1' / '0' is received from smartphone using Bluetooth
9. Write a program on Arduino / Raspberry Pi to upload temperature and humidity data to thing speak cloud.
10. Write a program on Arduino / Raspberry Pi to retrieve temperature and humidity data from thing speak cloud.
11. To install MySQL database on Raspberry Pi and perform basic SQL queries
12. Write a program on Arduino / Raspberry Pi to publish temperature data to MQTT broker
13. Write a program on Arduino / Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
14. Write a program to create TCP server on Arduino / Raspberry Pi and respond with humidity data to TCP client when requested
15. Write a program to create UDP server on Arduino / Raspberry Pi and respond with humidity data to UDP client when requested.

SEMESTER – I
1MCASEC(D) – E–COMMERCE

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
SE	4	1	0	5	70	30	0	100

COURSE OBJECTIVES

- Provides an introduction to information systems for business and management.
- Designed to familiarize students with organizational and managerial foundations of systems,
- Technical foundation for understanding information systems

COURSE OUTCOMES

- Analyze the impact of E-commerce on business models and strategy.
- Describe the major types of E-commerce.
- Explain the process that should be followed in building an E-commerce presence.
- Identify the key security threats in the E-commerce environment.
- Describe how procurement and supply chains relate to B2B E-commerce.
- Be aware of the ethical, social, and security issues of information systems

UNIT – WISE SYLLABUS

UNIT-I

Introduction: Definition, objectives, Advantages and E-commerce, disadvantages. Forces driving Traditional Commerce vs. E-commerce, E-commerce opportunities for industries, Growth of E-Commerce. Electronic Market, Electronic Data Interchange, Internet Commerce, Produce a generic framework for E-Commerce, Architectural framework of Electronic Commerce, Web based E Commerce Architecture.

UNIT-II

E-Commerce Models: Business to consumer, Business to Business, Consumer to Consumer, other models - Community Model and Value Chain Model.

UNIT-III

Electronic Payment Systems: Special features required in payment systems, Types of E-payment systems. E-Cash, E-cheque, Credit Card, Smart Card, Electronic purses.

UNIT-IV

E-Marketing: E-Customer Relationship Management, E-supply Chain Management.

UNIT-V

Security Issues in E-Commerce: Security risk of E-commerce, Security Tools, Types of threats, Security tools and risk management approach, Cyber laws, Business Ethics, IT Acts.

TEXT & REFERENCE BOOKS

- Bhaskar, Electronic Commerce - Frameroork Technologies and Applications. TMH.
- Kalakota & Whinston, Frontiers of Electronic Commerce, PE
- Kamlesh, and Deeksha. Business on the Net Introduction to the E-Com., Macmillan
- Joseph, E-Commerce: A Managerial Perspective, PHI.
- Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd.