OMKARA COLLEGE OF PROFESSIONAL EDUCATION, PATNA

MCA
SYLLABUS

REVISED
DETAILED SYLLABUS

FOR

TWO YEARS *(FOUR SEMESTERS)*
FULL TIME
MASTER OF COMPUTER APPLICATIONS
(MCA)

(EFFECTIVE FROM BATCH 2020 – 22)

[UNDER CBCS SYSTEM]

PATLIPUTRA UNIVERSITY, PATNA

Old Bypass Road, Near Rajandra Nagar Railway Station, Kankarbagh, Patna, Bihar – 800 020
Website : www.ppup.ac.in   e-mail : info@ppup.ac.in

ABOUT UNIVERSITY

Patliputra University, Patna was established on **18th of March, 2018**, by the order of the Government of Bihar, vide Letter / Memo No. 15 / M1 – 71 / 2016 – 700, dated 09/04/2018. All the Colleges of Patna and Nalanda Districts, Bihar (India), fall under the jurisdiction of the Patliputra University except those attached to the Patna University. The University has control over 25 Constituent Colleges, two Government Girls Colleges, three Minority Colleges and a number of Affiliated Colleges. Many of these colleges are running University – Approved Post – Graduate Centres in various subjects besides Skill – Oriented Courses in Vocational and Technical / Professional areas. These affiliated units are governed by their governing local bodies and duly constituted management board approved by the university.

The university has set avant-garde International Standards in Teaching-Learning and Research with the aid of uniquely conceived innovative approaches that are aimed to propel the quality of higher education to a new height in the country. The ambience of the university is being developed with radical ideas having global perspective in the domain of Education. The students in our colleges are from different corners of the state / region. In order to achieve academic excellence, we are striving to create a student-centric atmosphere that would be sensibly conducive to all stakeholders-viz-students, researchers, academicians, teachers, parents, society, institutions, research organisations, industries, govt. agencies and all kinds of employers. The university aspires to collaborate with several national and international academic bodies, research organisations, universities, industries, govt. agencies and non-government organisations.

The vision of the University is to create human resource with high calibre by inculcating human values, self-esteem and true nationalist pride to serve the society by setting-up high benchmarks befitting with the global needs to elevate overall moral and social standard for the service of mankind.

The mission is to develop an ingenious system including modern teaching-learning applications, furtherance of high-end research in all engineering, sciences, social sciences, humanities and health sciences with commitment to the social and environmental sustainability, using effective network of various stakeholders and develop brotherhood, patriotism truthfulness, meritocracy and public awareness.

MASTERS OF COMPUTER APPLICATION (MCA)

Level –   Post Graduate (PG)

Duration –   2 Years *(4 Semesters)*

Eligibility Criteria

Passed BCA / B.Sc. (IT) / Bachelor Degree in Computer Science / Engineering or Equivalent Degree.

OR

Passed B.Sc. / B.Com. / B.A. with Mathematics at 10+2 Level or at Graduation Level *(with additional bridge Courses as per the norms of the University)*.

Candidate must Obtained at least 50% marks *(45% marks in case of candidate belonging to reserved category)* in the qualifying Examination.

ABOUT THE PROGRAMME

Master of Computer Applications (MCA) is a two years post graduate programme. The curriculum of MCA is designed to meet the growing demand of qualified professionals in the field of ICT. It comprises of the core subjects like database, networking, data structure, core programming languages like C, C++, .NET and Java. Students also get exposure to advanced topics like Cyber Security, Mobile Software, IoT, Data Science etc. Elective papers help students to have an exposure in Cloud Computing, Big Data and Information Security related subjects.

COURSE OBJECTIVE

- To empower students with basic skills of various technologies.
- To develop the ability to identify, analyse, formulate and develop computer applications.
- To enable the students to select modern computing tools and techniques and use them with dexterity.

If you are looking for challenging roles in the IT industry, computer science web and mobile development, data analysis, information security etc., this programme is for you.

CAREER PATH YOU CAN CHOOSE AFTER THE COURSE

- Software Developer.
- Programmer.
- Systems Analyst.
- Computer Support.
- Engineer.
- Database Administrator.
- Systems Administrator.
- Web Designer & Developer.
- Network Administrator.

MASTER OF COMPUTER APPLICATION (MCA) 2 YEARS (4 SEMESTERS) PROGRAMME SCHEME				
Semester	**Core Courses Compulsory (CCC)**	**Core Courses Elective (CCE)**	**Skill Enhancement Courses (SEC)**	**Open Electives (OE)**
	4 Professional Core Courses of 5 Credits **4 * 5 = 20 Credits**	Professional Elective Courses of 5 Credits (Choose 2 Courses) **2 * 5 = 10 Credits**	Professional Skill Oriented Courses of 5 Credits (Choose 2 Courses) **2 * 5 = 10 Credits**	*Optional Certification Courses May Be Adopted By Candidate*
I	• Database Management System • Data Structures and Algorithms With 'C' • Operating Systems • Practical Examination	• Programming with VB.Net and ASP.Net • Computer Organization and Architecture • Discrete Mathematics	• Linux Server Administration • Management Information Systems • Internet of Things • E–Commerce	SWAYAM Certification – 1 *(CEC/NPTEL/AICTE)*
II	• Programming with C++ • Web Technologies • Data Communication and Computer Networks • Practical Examination	• Programming in Python • Computer Graphics • Statistical Methods	• Data Mining and Business Intelligence • NOSQL Databases • Angular Java Script • Information Security	SWAYAM Certification – 2 *(CEC /NPTEL/AICTE)*
III	• Software Engineering • Java Programming • Design and Analysis of Algorithm • Practical Examination	• Big Data Analytics • Theory of Computation • Mobile Application Development	• Programming with R • Management Theory and Practices • Development and Operational Tools (DevOps) • Enterprise Resource Planning (ERP) and CRM	SWAYAM Certification – 3 *(CEC/NPTEL/AICTE)*
IV	• Practical Examination • Project Work (15 Credits)	• Cloud Computing • Artificial Intelligence and Machine learning • Cyber Security	• Programming with Go • Blockchain Technology • Digital Marketing • Data Visualization	X

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					
SEMESTER – I										
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

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					
SEMESTER – II										
CC (Core Compulsory)	2MCACCC1	Programming with C++	3	0	2	5	70	30	0	100
	2MCACCC2	Web Technologies	3	0	2	5	70	30	0	100
	2MCACCC3	Data Communication and Computer Networks	4	1	0	5	70	30	0	100
	2MCACCC4	Practical Examination	-	-	-	5	0	0	100	100
CE (Select Any 2)	2MCACCE(A)	Programming in Python	3	0	2	5	70	30	0	100
	2MCACCE(B)	Computer Graphics	4	1	0	5	70	30	0	100
	2MCACCE(C)	Statistical Methods	4	1	0	5	70	30	0	100
SE (Select Any 2)	2MCASEC(A)	Data Mining and Business Intelligence	4	1	0	5	70	30	0	100
	2MCASEC(B)	NOSQL Databases	3	0	2	5	70	30	0	100
	2MCASEC(C)	Angular Java Script	3	0	2	5	70	30	0	100
	2MCASEC(D)	Information Security	4	1	0	5	70	30	0	100
OE	SWAYAM2	- - -	-	-	-	-	-	-	-	-
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

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					
		SEMESTER – III								
CC (Core Compulsory)	3MCACCC1	Software Engineering	4	1	0	5	70	30	0	100
	3MCACCC2	Java Programming	3	0	2	5	70	30	0	100
	3MCACCC3	Design and Analysis of Algorithm	4	1	0	5	70	30	0	100
	3MCACCC4	Practical Examination	-	-	-	5	0	0	100	100
CE (Select Any 2)	3MCACCE(A)	Big Data Analytics	4	0	1	5	70	30	0	100
	3MCACCE(B)	Theory of Computation	4	1	0	5	70	30	0	100
	3MCACCE(C)	Mobile Application Development	3	0	2	5	70	30	0	100
SE (Select Any 2)	3MCASEC(A)	Programming with R	3	0	2	5	70	30	0	100
	3MCASEC(B)	Management Theory and Practices	4	1	0	5	70	30	0	100
	3MCASEC(C)	Development and Operational Tools (DevOps)	3	0	2	5	70	30	0	100
	3MCASEC(D)	Enterprise Resource Planning (ERP) and CRM	4	1	0	5	70	30	0	100
OE	SWAYAM3	- - -	-	-	-	-	-	-	-	-
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

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					
SEMESTER – IV										
CC	4MCACCC1	Practical Examination	-	-	-	5	0	0	100	100
	4MCACCC2	Project Work	-	4	1	15	0	100	200	300
CE (Select Any 2)	4MCACCE(A)	Cloud Computing	4	1	0	5	70	30	0	100
	4MCACCE(B)	Artificial Intelligence and Machine learning	3	0	2	5	70	30	0	100
	4MCACCE(C)	Cyber Security	4	1	0	5	70	30	0	100
SE (Select Any 2)	4MCASEC(A)	Programming with Go	3	0	2	5	70	30	0	100
	4MCASEC(B)	Blockchain Technology	3	0	2	5	70	30	0	100
	4MCASEC(C)	Digital Marketing	3	0	2	5	70	30	0	100
	4MCASEC(D)	Data Visualization	4	1	0	5	70	30	0	100
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

BRIDGE COURSE
DETAILED SYLLABUS

- **For Those Students Who Have Passed Their Graduation Exam Without Computer Subjects Specialization.**

- **This Course Of 100 Marks *(70 Theory + 30 Internal)* Must Be Passed With MCA Examination.**

UNIT – WISE SYLLABUS

UNIT-I
- Brief history of development of computers
- Computer system concepts
- Computer system characteristics
- Capabilities and limitations
- Types of computers Generations of computers
- Basic components of a computer system - Control unit, ALU, Input / Output functions and characteristics
- Memory - RAM, ROM, EPROM, PROM and other types of memory
- Personal Computer (PCs) – evolution of PCs
- Configurations of PCs- Pentium and Newer, PCs specifications and main characteristics.
- Various Input / Output & Storage Units
- Storage fundamentals - Primary V/s Secondary Data Storage
- Data Retrieval methods - Sequential, Direct and Index

UNIT-II
- Software and its Need
- Types of Software - System software, Application software, System Software – Operating System, Utility Program,
- Programming languages - Machine, Assembly, High Level, 4GL, their merits and demerits
- Assemblers, Compilers and Interpreter, Single Pass & Multiple Pass Compiler
- Introduction to Operating System for PCs - DOS Windows, Linux, Macintosh
- Operating systems for mobile Devices - Symbian, Android, iMac etc.
- Application Software and its types - Word-processing, Spreadsheet, Presentation Graphics, Database Management Software

UNIT-III
- Algorithms Need, & Development Process, Flow Chart, Types of Flow Chart.
- Programming Methodologies - Procedural Programming, Object-Oriented Programming, Functional Programming, Logical programming
- Top-down & Bottom-up approaches of software development

UNIT-IV
- Programming With 'C' Language
  - Keywords, Constant & Variables
  - Data Types - Integer, Float, Single, Double etc., Type Conversion
  - Scope of variables - Local & Global,
  - Expression
  - Operators - Arithmetic, Logical, Relational, Conditional and Bit Wise Operators, Precedence and Associativity of Operators.
  - Types of Statements – Conditional, Branching, Iteration / Looping. Examples & Uses,
  - Array - Single & Multi-dimension,
  - Functions - Library & User defined

UNIT-V

- Data and Information – Types of information, requirements of information at different levels of management, qualities of information.
- Software Development Life Cycle (SDLC) - Defining the Problem, Designing, Coding, Testing and Debugging, Documenting, Deploying and Maintaining.
- Requirements determination - requirements specifications – feasibility analysis – final specifications – hardware and software study - system design – system implementation - system evaluation – system modification. Role of systems analyst - attributes of a systems analyst – tools used in system analysis.
- Information gathering – strategies - methods – case study – documenting study – system requirements specification.
- Tools for prototype creation, data flow diagrams - leveling of DFDs – leveling rules – logical and physical DFDs – software tools to create DFDs.
- Data input methods – coding techniques - requirements of coding schemes – error detection of codes – validating input data - input data controls interactive data input.
- Designing outputs – output devices - designing output reports – screen design – graphical user interfaces – interactive I/O on terminals.

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.

SEMESTER – II
2MCACCC1 – PROGRAMMING 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
- To Implement Object Oriented Programming.
- To Learn the Syntax and Semantics of the C++ Programming Language.
- To Learn how to Implement Copy Constructors and Class Member Functions.
- To Learn how to Overload Functions and Operators in C++.
- To Learn how Containment and Inheritance Promote Code Reuse in C++.
- To Learn how to Use Exception Handling in C++ Programs.

COURSE OUTCOMES
- Explain Concepts and Advantages of Object-Oriented Programming.
- Apply and implement the concepts of the Object-Oriented paradigms to analyze, design and develop the solutions of real-world problems using the Principles of information Hiding Localization and Modularity.
- Design, Development and maintain the small applications, system utility for societal and academic problems using reusability concepts in team spirit.
- Demonstrate the Advanced Features of C++ Specifically Stream I/O, Templates and Operator Overloading and overriding.

UNIT – WISE SYLLABUS

UNIT-I
Overview of C++: Object Oriented Programming, Concepts, Advantages, Usage, Program Development Environment, C++ Language Standards, Introduction to Various C++ Compilers, C++ Standard Libraries, Main Function in C++, Meaning of Empty Argument List, Function Prototyping, Default Arguments and Argument Matching, User Defined Data Types, Classes & Objects: Structure, Union & Classes, Inline Function, Scope Resolution Operator, Static Class Members: Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment, Friend Function, Friend Classes.

UNIT-II
Array, Pointers References & the Dynamic Allocation Operators: Array of Objects, Pointers to Object, Type Checking C++ Pointers, This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter, Call by Reference and Return by Reference Passing References to Objects, Returning Reference, Independent Reference, C++ Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects.
Constructor & Destructor: Introduction, Constructor, Access Specifiers for Constructors, and Instantiation, Parameterized Constructor, Multiple Constructor in a Class, Constructor with Default Argument, Copy Constructor, Destructor.

UNIT-III
Overloading as Polymorphism, Function & Operator Overloading, Function Overloading, Overloading Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating a Member Operator Function, Creating Prefix & Postfix Forms of the Increment & Decrement Operation, Overloading the Shorthand Operation (i.e. +=, -= etc.), Operator Overloading Restrictions Operator Overloading Using Friend Function, Overloading New & Delete, Overloading Some Special Operators, Overloading [ ], ( ), -, Comma Operator, Overloading << and >>, Namespaces: Global Namespace and Namespace Standard, Nested Namespaces.

UNIT-IV
Inheritance: Base Class Access Control, Protected Base Class Inheritance, Single, Multiple & Multilevel Inheritance, Inheriting Multiple Base Classes, Constructors, Destructors & Inheritance, When Constructor & Destructor Function are Executed, Passing Parameters to Base Class Constructors, Granting Access, Virtual Base Classes, Virtual Functions & Polymorphism: Virtual Function, Pure Virtual Functions, Early Vs. Late Binding. Exception Handling: try, throw, catch Sequence, Multiple Catch Blocks, Uncaught Exceptions, Catch-All Exception Handler, Catching Multiple Exceptions, Controlling uncaught Exceptions.
File Handling in C++: C++ I/O System Basics: C++ Streams, the Basic Stream Classes C++ Predefined Streams, File operations in C++, Sequential & Random- Access file operations in C++

UNIT-V
Formatted I/O: Formatting Using the IOS Members, Setting the Formal Flags, Clearing Format Flags, an Overloaded Form of Setf(), Using Width() Precision() and Fill(), Using Manipulators to Format I/O, Creating Your Own Manipulators.

Class templates: Implementing a Class Template, Implementing Class Template Member functions, Using a Class Template, Function Templates, Implementing Function Templates, Using Template Functions, Template Instantiation, Class Template Specialization, Template Class Partial Specialization, Template Function Specialization, Template Parameters, Static Members and Variables, Templates and Friends, Templates and Multiple-file Projects, Overview of Standard Template Library (STL)

TEXT & REFERENCE BOOKS
- Herbertz Shield, "C++ The Complete Reference "TMH Publication ISBN 0-07-463880-7
- Ashok Kamthane, Object-Oriented Programming with ANSI and Turbo C++, Pearson India, ISBN: 788131791448 / 9788131703830, 8131703835
- R. Subburaj, 'Object Oriented Programming With C++ Vikas Publishing House, New Delhi.ISBN 81-259-1450-1
- E. Balgurusamy, "C++ '' TMH Publication ISBN 0-07-462038-X
- M. Kumar 'Programming In C++'' TMH Publications
- R. Lafore, 'Object Oriented Programming C++"
- Ashok. N. Kamthane, "Object Oriented Programming With ANSI & Turbo C++", Pearson Education Publication, ISBN 8j-7808-772-3

LIST OF PRACTICALS
1. Basic Programming
   o Write a Program That Just Outputs `Hello, World
   o Write a Program to Find Maximum and Minimum of Given 3 Numbers.
   o Write a Program That Output Value as Number and as Character.
   o Implementation of the Function That Calculates the Cross Sum of an Integer. (123 as 1+2+3).
   o Determine Number of Characters in a String.
2. Function and Array
   o Raising a Number N to a Power P is the Same as Multiplying N by Itself P Times. Write a Function Called Power ( ) That Takes a Double Value for N and an INT Value for P, and Returns the Result as Double Value. use a Default Argument of 2 for P, So That If This Argument is Omitted, the Number Will Be Squared. Write a Main ( ) Function That Gets Values from the User to Test This Functions.
   o Write a C++ Program to Sort an Array of Integer in Ascending Order Using a Function Called Exchange( ) Which Accepts Two Integer Arguments by Reference.
3. Write a C++ Program to Implement Function Overloading in Order to Compute.
4. Write a C++ Program to Implement Power (M, N) Where
   a) M is Double and N is Int
   b) M and N are Int.
5. Write a Program That Uses a Structure Called Point to Model a Point. Define Three Points, and Have the User Input Values to Two of Them. Then Set the Third Point Equal to the Sum of the Other Two, and Display the Value of the New Point. Interaction with the Program Might Look Like This:
       Enter Coordinates for P1: 3 4
       Enter Coordinates for P2: 5 7
       Coordinates of P1 + P2 are: 8, 11
6. Create the Equivalent of a Four Function Calculator. Program Should Request the User to Enter a Number, an Operator, and Another Number. It Should Then Carry Out the Specified Arithmetical Operation: Adding, Subtracting, Multiplying, Or Dividing the Two Numbers. (It Should use a Switch Statement to Select the Operation). Finally It Should Display the Result. When It Finishes the Calculation, the Program Should Ask If the User Wants to Do Another Calculation. Response Can Be Y Or N. Some Sample Interaction with the Program Might Look Like This.
       Enter First Number, Operator, Second Number: 10/ 3
       Answer = 3.333333
       Do Another (Y/ N)? Y
       Enter First Number, Operator, Second Number 12 + 100
       Answer = 112
       Do Another (Y/ N) ? N
7. Create a 'Distance' Class with:
   o Feet and Inches as Data Members
   o Member Function to Input Distance
   o Member Function to Output Distance
   o Member Function to Add Two Distance Objects
   o Write a Main Function to Create Objects of Distance Class. Input Two Distances and Output the Sum.
   o 9. Create a Class Called 'Time' That Has
   o Three Integer Data Members for Hours, Minutes and Seconds

- o Constructor to Initialize the Object to Zero
- o Constructor to Initialize the Object to Some Constant Value
- o Member Function to Add Two Time Objects
- o Member Function to Display Time in Hh:Mm:Ss Format
- o Write a Main Function to Create Two Time Objects, Add Them and Display the Result in Hh:Mm:Ss Format.
8. Create a Class Called 'Employee' That Has
   - o Empcode and Empname as Data Members
   - o Member Function Getdata( ) to Input Data
   - o Member Function Display( ) to Output Data
   - o Write a Main Function to Create Emp, an Array of Employee Objects. Accept and
   - o Display the Details of At Least 6 Employees.
9. Create a Class Rational Which Represents a Numerical Value by Two Double Values Numerator& Denominator. Include the Following Public Member Functions: Constructor with No Arguments (Default). Constructor with Two Arguments.
   - o Void Reduce( ) That Reduces the Rational Number by Eliminating the Highest Common Factor Between the Numerator and Denominator.
   - o Overload + Operator to Add Two Rational Number.
   - o Overload >> Operator to Enable Input Through Cin.
   - o Overload << Operator to Enable Output Through Cout.
   - o Write a Main ( ) to Test All the Functions in the Class.
10. Create a Class 'Complex' to Hold a Complex Number. Write a Friend Function To add Two Complex Numbers. Write a Main Function to Add Two Complex Objects.
11. Create a 'Matrix' Class of Size M X N. Overload the '+' Operator to Add Two matrix Objects. Write a Main Function to Implement It.
12. Create a 'String' Class Which Overloads ' = = ' Operator to Compare Two String objects.
13. Create a Base Class Called 'Shape' Having
    - o Two Data Members of Type Double.
    - o Member Function Get-Data( ) to Initialize Base Class Data Members.
    - o Pure Virtual Member Function Display-Area( ) to Compute and Display the Area Of the Geometrical Object.
    - o Derive Two Specific Classes 'Triangle' and 'Rectangle' from the Base Class.
    - o Using These Three Classes Design a Program That Will Accept Dimension of a Triangle / Rectangle Interactively and Display the Area.
14. Consider the Following Class Definition
    Class Father {
    Protected: Int Age;
    Public:
    Father (Int X) {Age = X;}
    Virtual Void Iam( )
    { Cout<< I Am the Father, My Age is : << Age<< End1:}
    };
    - o Derive the Two Classes Son and Daughter from the Above Class and for Each, Define Iam( ) to Write Our Similar But Appropriate Messages. You Should Also Define Suitable Constructors for These Classes.
    - o Now, Write a Main ( ) That Creates Objects of the Three Classes and Then Calls Iam ( ) for Them. Declare Pointer to Father. Successively, Assign Addresses of Objects of the Two Derived Classes to This Pointer and in Each Case, Call Iam( ) Through the Pointer to Demonstrate Polymorphism in Action.
15. Write a C++ Program That Displays the Size (in Bytes) of a Given File. The Name of the File is Specified as Command Line Argument.
16. Design Your own Manipulator to Provide the Following Output Specification For printing Money Value:
    - o 10 Columns Width
    - o The Character '$' At the Beginning
    - o Two Digits Precision
    - o Filling of Unused Spaces with ' * '
    - o Trailing Zeros Shown
17. Write a program in C++ to Create a Function Template
18. Write a program in C++ to Create a Class Template

SEMESTER – II
2MCACCC2 – WEB TECHNOLOGIES

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 to Design and Develop a Web Page
- Design and Develop a Web Site Using Text, Images, Links, Lists, and Tables for Navigation and Layout.
- Style Your Page Using CSS, Internal Style Sheets, and External Style Sheets.
- Learn to use JavaScript & XML in Web Design.
- Learn How to use Database in Web Design.

COURSE OUTCOMES
- Describe the Concepts of WWW Including Browser and HTTP Protocol.
- List the Various HTML Tags and use them to develop the user-friendly web Pages.
- Define the CSS with its Types and use them to provide the Styles to the web pages at Various Levels.
- Develop the Modern Web Pages Using the HTML and CSS Features with Different Layouts as per Need of Applications.
- Use the JavaScript to Develop the Dynamic Web Pages
- Use Server-Side Scripting with PHP to Generate the Web Pages Dynamically Using the Database Connectivity.
- Develop the Modern Web Applications Using the Client and Server-Side Technologies and the Web Design Fundamentals.

UNIT – WISE SYLLABUS

UNIT-I
Introduction to Web, Web Designing and Website Planning: Concept of WWW, Internet and WWW. HTTP Protocol: Request and Response, Web Browser and Web Servers, Website Hosting Free vs. Paid, Linux Vs. Windows Hosting. Concepts &use of Database & Mail Servers Associated with Web Sites, Features of Web 2.0 Concepts of Effective Web Design, Web Design Issues Including Browser, Bandwidth and Cache, Display Resolution, Look and Feel of the Website, Page Layout and Linking, User Centric Design, Sitemap, Planning and Publishing Website, Designing Effective Navigation, Website Hosting Issues, FTP.

UNIT-II
Web Development with HTML: Basics of HTML, Formatting and Fonts, Commenting Code, Color, Hyperlink, Lists, Tables, Images, Forms, Meta Tags, Character Entities, Frames and Frame Sets, Browser Architecture and Web Site Structure, use of HTML Code Editor & WYSIWYG Editor.
Cascading Style Sheets (CSS): Style Sheets: Need, Introduction, Basic Syntax and Structure, Using CSS- Background Images, Colors and Properties, Manipulating Texts, Using Fonts, Borders and Boxes, Margins, Padding Lists, Positioning Using CSS, CSS2, Overview and Features of CSS3

UNIT-III
Technologies for Web Applications JavaScript & XML JavaScript: Client-Side Scripting with JavaScript, Variables, Functions, Conditions, Loops and Repetition, Pop Up Boxes, JavaScript Objects, the Dom and Web Browser Environments, Manipulation Using Dom, Forms and Validations, DHTML: Combining HTML, CSS and JavaScript, Events and Buttons.
XML: Introduction of XMI, Validation of XML Documents, Ways to use XML, XML for Data Files, HTML vs. XML, Embedding XML into HTML Documents, Converting XML. to HTML. for Display, Displaying XML Using CSS and XSL, Rewriting HTML as XML, Relationship Between HTML, SGML and XML, Web Personalization, Semantic Web, Semantic Web Services. Transforming XML Using XSL and XSLT

UNIT-IV
Web Design with PHP Introduction and Basic Syntax of PHP, Decision and Looping with Examples, PHP and HTML, Arrays, Punctions, Browser Control and Detection, String. Form Processing Files, Cookies and Sessions, Object Oriented Programming with PHP, Introduction to PHP CMS and Framework.

UNIT-V
Introduction to Database Driven Websites with PHP, PHP and MYSQL, Commands with PHP Examples, Connection to Server, Creating Database. Selecting a Database, Listing Database, Listing Table Names, Creating a Table, Inserting Data, Altering Tables, Queries, Deleting Database, Deleting Data and Tables

TEXT & REFERENCE BOOKS

- Roger S. Pressman, David Lowe, "Web Engineering", Tata McGraw Hill Publication, 2007
- Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill
- Gopalan N P, Akilandeswari "Web Technology: a Developer S Perspective", PHI
- Chris Bates Web Programming: Building Internet Applications Wiley
- Refter, Fawset- Beginning XML, Wiley India
- H.M. Deitel, P.J. Deitel, A.B. Goldberg - Internet & World Wide Web How to Program, Pearson Education, 3rd Edition
- C. Xavier, "Web Technology & Design", Tata McGraw Hill.
- Ivan Bay Ross, "HTML, DHTML, JavaScript, Perl CGI", BPB.
- Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India
- Web Technologies, Black Book, Dreamtech Press
- HTML 5, Black Book, Dreamtech Press,
- Joel Sklar-Web Design, Cengage Learning
- Harwani-Developing Web Applications in PHP and Ajax, Mcgrawhill

LIST OF OPEN SOURCE SOFTWARE / LEARNING WEBSITE

- Browsers Like IE, Mozilla, Firefox Etc.
- Server Software Xampp / Wamp / Lamp
- www.apachefriends.org
- www.w3.org
- www.w3schools.com
- www.php.net
- www.mysql.com

LIST OF PRACTICAL

1. Write an HTML page with Javascript that takes a number from one text field in the range 0 – 999 and display it in other text field in words. If the number is out of range, it should show "out of range" and if it is not a number it should show "not a number" message in the result box.
2. Develop static pages (using only HTML) of an online Book store.
   The pages should resemble: www.amazon.com. The website should consist the following pages.
   - Home page
   - Registration and user Login
   - User profile page
   - Books catalog
   - Shopping cart
   - Payment by credit card Order
3. Write an HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, lines and words in the text entered using an alert message. Words are separated with white space and lines are separated with new line character.
4. Write an HTML page that contains a selection box with a list of 5 countries. In this page when the user selects a country, its capital should be printed next to the list, and add CSS to customize the properties of the font of the capital.
5. Create an XML document that contains 10 users information. Write a script which takes user id as input and returns the user details by taking the user information from XML document.
6. Implement a user validation web application, where user submits the login name and password to server. These are checked against the data already available in database and if the data matches a successful login page is returned otherwise a failure message is shown to the user.
7. A simple calculator web application that takes 2 numbers and an operator (+, -, *, /, %) from an HTML page and returns the result page with the operation performed on the operands.
8. A web application shows a start time at the right top corner of the page and takes a name as input and provides the logout button at bottom. On clicking logout button it should show a logout page with thank you message with the duration of Usage.
9. A web application that takes name and age from an HTML page. If the age is less than 18, it should send a page with "hello, and You are not authorized to visit this site" otherwise it should send "You are welcome to this site" message.
10. Write a web application in which the user is first served a login page which takes users name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions if name and password matches, serves a welcome page with user's full name. If name matches and password doesn't match then serves password mismatch page. If name not found in database, serves a registration page where users full name is asked and on submitting the full name, it stores the login name, password and full name in the database.
11. A web application that lists all cookies stored in the browser on clicking "list cookies" button, add cookies if necessary.

SEMESTER – II
2MCACCC3 – DATA COMMUNICATION AND COMPUTER NETWORKS

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
- Build an understanding of the Fundamental Concepts of Computer Networking.
- Familiarize with the Taxonomy and Terminology of the Computer Networking Area.
- Introduce about various Networking Devices.
- Introduce about concept of Routing in networking.
- Preparing the Student for Entry Advanced Courses in Computer Networking.

COURSE OUTCOMES
- Demonstrate the Basic Concepts of Networking, Networking Principles, Routing Algorithms, IP Addressing, and Working of Networking Devices.
- Demonstrate the Significance, Purpose, and application of Networking Protocols and Standards.
- Describe, compare, and contrast LAN, WAN, MAN, Intranet, Internet, AM, FM, PM, and Various Switching Techniques.
- Explain the working of Layers and apply the various protocols of the OSI & TCP/IP model.
- Analyze the Requirements for a Given Organizational Structure and Select the Most Appropriate Networking Architecture and Technologies.
- Design the Network Diagram and Solve the Networking Problems of the Organizations with Consideration of Human and Environment.
- Install and Configure Networking Devices.

UNIT – WISE SYLLABUS

UNIT-I
Introduction to Computer Networks, Types of Network - LAN, WAN, MAN, Internet, Network Topologies, Transmission Media, Communication Mode: Simplex, Half Duplex, Full Duplex. Analog & Digital Signals, Base Band, Broad Band, Error Detection and Correction, OSI Model: Functions of Each Layer, Services and Protocols, Inter-Networking Devices, Hub, Repeater, Bridge, Switch, Modem, Routers Gateways.

UNIT-II
Multiplexing Multiplexer FDM, TDM Statistical Multiplexing, Modulation AM, FM, PM, Switching Technique, Message Switching, Circuit Switching, Packet Switching, Virtual Circuit, Framing, Error Control, Sliding Window Protocols, DLL Protocol – HDLC, PPP, Medium Access Sub-Layer – Channel Allocation, MAC, ALOHA, CSMA, Collision Free Protocols, IEEE Standards, 802.3, 802.4, 802.5. Fast Ethernet, FDDI Token Ring.

UNIT-III
Routing Algorithm: Shortest Path Routing, Distance Vector Routing, Unicast Routing, Multicast Routing, Link State Routing, Broadcast Routing, Congestion Control, Traffic Shaping. TCP/IP: Introduction, History of TCP/IP, Architecture, Layers of TCP/IP, Comparison Between OSI and TCP/IP Models, Transmission Control Protocol, User Datagram Protocol, Internet Protocol IP Addressing, IP Addressing Classes, Internet Protocols – IP Packet, ARP, RARP, ICMP.

UNIT-IV
Various Protocol, HTTP, Telnet, FTP, SMTP, Mine, UDP, URL (Uniform Resource Locater), ISDN Channel, ISDN Services, Base Band ISDN, Broadband ISDN, Network Security, Network Security Issues, Firewalls – Need and Features of Firewalls, Types of Firewall Technology - Network Level and Application Level, IP Packets Filter Screening Routers, Limitations of Firewalls.

UNIT-V
Introduction to Wireless Network, Fundamentals of Cellular Systems, Mobile, Ad-Hoc and Sensor Networks, Wireless PAN / LAN / MAN, Multi-Path Propagation, Path Loss, Slow Fading, Fast Fading, Frequency Reuse, Cell Splitting, Cell Sectoring.

TEXT & REFERENCE BOOKS
- Andrew S. Tanenbaum -Computer Networks, Pearson Publishers
- Behrouza Forouzan- Data Communications and Networking - Global
- William a Shay - Understanding Data Communications and Networks – Course Technology Inc
- Prakash C. Gupta -Data Communications and Computer Networks, PHI
- William Stallings- Data and Computer Communications, Pearson Education India
- Larry L. Peterson and Bruce S. Davie – Computer Network – A Systems Approach, Morgan Kaufmann Publishers

SEMESTER – II
2MCACCC4 – 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 2MCACCC1
2. Paper 2MCACCC2
3. Paper 2MCACCE(A)
4. Paper 2MCASEC(B)
5. Paper 2MCASEC(C)

SEMESTER – II
2MCACCE(A) – PROGRAMMING WITH PYTHON

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
- To Introduce Python Programming Language and its Features and Applications.
- To Learn Installing Python.
- To Practice Basic Language Features of Python.
- To Implement Oops Concepts Using Python.
- To Work with Files in Python

COURSE OUTCOMES
- Install and use Python on Various Platform.
- Understand and Explain the features of Python language
- Build package and modules in Python with object-oriented concept.
- Design and Develop Python applications for data analysis
- Write programs for Reading and Writing files in Python.

UNIT – WISE SYLLABUS

UNIT-I
Environment Setup of Python Application Area, Interactive Mode and Script Mode Data Types, Mutable and Immutable Variables, Expressions and Statements, Variables and Keywords, Operators and Operands, Expressions and Statements, Taking Input and Displaying Output. Functions: Importing Modules, Invoking Built in Functions, Defining Functions, Invoking Functions, Scope, Passing Parameters, Scope of Variables, Returning Values, Recursion, Conditional and Looping Construct

UNIT-II
Strings: String Operators, Comparing Strings Using Relational Operators; String Functions & Methods, Regular Expressions and Pattern Matching Lists: Concept of Mutable Lists, Creating, Initializing and Accessing the Elements, Traversing, Appending, Updating and Deleting Elements, Composition, Lists as Arguments, List Operations, List Functions and Methods, Dictionaries: Concept of Key-Value Pair, Creating, Initializing and Accessing, Traversing, Appending, Updating and Deleting Elements, Dictionary Functions and Methods, Tuples: Immutable Concept, Creating, Initializing and Accessing Elements, Tuple Assignment, Slices, Indexing, Functions.

UNIT-III
Concept of Object-Oriented Programming: Data Hiding, Data Encapsulation, Class and Object, Polymorphism, Inheritance, Advantages of Object-Oriented Programming over earlier Programming Methodologies. Classes: Defining Classes, Creating Instance Objects, Accessing Attributes and Methods, Constructor Methods in a Class, Private Attributes (Limited Support), Importance of "Self" (Acts as a Pointer to Current Calling Object) Operator Overloading with Methods.

UNIT-IV
Inheritance: Concept of Base Class and Derived Class: Single, Multi-level and multiple Inheritance-Overriding Methods, Using Super() in Derived Class to Invoke Init() Or Overridden Methods of Parent Class Data, File: Need for Non-Bold for Data File, Types of Data File-Text and Binary, Opening and Closing Files - Open(), Close(), Access Modes (Output, Input, Default), File Object, Access Modes, Reading and Writing a File - Read(), Readline(), Readlines(), Write(), Writeliness, File Positions (Seek(), Tell()), Renaming and Deleting a File, Flush()

UNIT-V
Implementation of Basic File Operations on Text and Binary File in Python: Creating / Writing Data into File, Reading and Displaying Data from File, Searching for Particular Data from a File, Insertion and Deletion of Data from an Already Existing File, Modification of Data in FileError and Exceptions: Nameerror, Indexerror, Typeerror, I/O Error, Importerror, Valueerror, Eoferror, Generator Function Using Yield

TEXT & REFERENCE BOOKS
- Mark Lutz Learning Python, 5th Edition O'reilly Publication
- Fabrizio Romano Learning Python - Download Link – Https://Www.Packtpub.Com/Packt/Free-Ebook/Learning-Python

- Mark Lutz Learning Python (Fourth Edition) - Download Link - Http://Freebook.Qiniudn.Com/Learning%20python, %204th%20edition.Pdf
- Https://Docs.Python.Org/3/Tutorial/Index.Html

LIST OF PRACTICAL

1. Program to demonstrate basic data type in python
2. A cashier has currency notes of denominations 10, 50, and 100.If the amount to be withdrawn is input through the keyboard using input() function in hundreds, find the total number of currency notes of each denomination the cashier will have to give to the withdrawer
3. Program to demonstrate list and tuple in python
4. Write a program in Python, A library charges a fine for every book returned late. For first 5 days the fine is 50 paisa, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a program to accept the number of days the member is late to return the book and display the fine or the appropriate message
5. Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs.12.00 per hour for every hour worked above 40 hours. Assume that employee do not work for fractional part of an hour.
6. Two numbers are entered through the keyboard, write a program to find the value of one number raised to the power of another
7. Write a function that receives marks received by a student in 3 subjects and returns the Average and percentage of these marks. Call this function from main() and print the result in main
8. Write a program to read a file and display its contents
9. Write a program to demonstrate database connectivity in python

SEMESTER – II
2MCACCE(B) – COMPUTER GRAPHICS

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
- Introduce Computer Graphics - Software, Hardware, Applications
- Understand the various object Drawing Algorithms
- Learn the Basic Principles of 2 Dimensional, 3-Dimensional Transformations
- Understand the Concepts of Curves and Surfaces
- Understand the Concepts of Viewing and Projection
- Learn and Understand the basic tools used in creation in Multimedia.

COURSE OUTCOMES
- Able to describe the Basic Concepts and terminologies used in Computer Graphics
- Apply and Analyze different Approaches/ Algorithms for Drawing various graphics objects
- Identify and Apply Various Geometrical Transformations Approaches
- Implement Various Algorithms to Polygon Fill.
- Describe the Importance of Viewing and Projections.
- Identify Various Software Systems Used in design, the Creation and Implementation of Multi-Media.

UNIT – WISE SYLLABUS

UNIT-I
Graphics Introduction, Application of Graphics, Elements of Graphics Workstation, Pixel, Frame, Buffer, Resolution, Graphics Display Devices - Raster Scan System, Random Scan System, Refresh CRT, Color CRT, LCD Led Monitor and Plasma Panel, Hard Copy Devices: Printers & Plotters, Input Devices: Mouse, Trackball, Light Pen, Scanner, Digital Camera

UNIT-II
Drawing Geometry: Point–Plotting, Coordinate System, Point Plotting, Line Drawing – Line Segments, Line Drawing Algorithm: DDA Algorithm, Bresenham's Line Algorithm, Circle Drawing, Ellipse Drawing, Polygon Representation Rectangle, Filling– Filled Area Primitives, Scan Line Polygon Fill Algorithm, Flood Fill Algorithm, Boundary Fill Algorithm.

UNIT-III
2D Geometric Transformation: Translation, Rotation, Scaling, Geometric Transformation, Coordinate Transform and Composite Transformation, 2D Viewing Transformation & Clipping: World Coordinate System (WCS), Normalized Device Coordinate System, Point Clipping, Line Segment Clipping, Cohen–Sutherl and Line Clipping.

UNIT-IV
3D Geometric Transformation 3D Geometric Transformation: Translation, Rotation, Scaling, Composite Transformation, 3D Display Methods - Parallel Projection, Perspective Projection, Curve Representation, Bezier and B- Spline Methods.

UNIT-V
Multimedia Basics, Multimedia Applications, Multimedia: Text – Font, Faces, Animating Text, Hyper Text. Sound: Midi, Digital Audio Basics, File Formats Image – Bitmap, Vector Drawing, Color Palate, Image File Formats (BMP, JPG), Video – Broadcast Video Standards (NTSC, PAL), Integrating Computer and Television, Compression and Decompression (JPEG, MPEG). Animation: Principle of Animation, Cell Animation, Kinematics, Morphing

TEXT & REFERENCE BOOKS
- D. Hearn & M. Baker, "Computer Graphics", Prentice Hall
- D. F. Rogers, J. A. Adams, "Mathematical Elements for Computer Graphics", TMH
- Multimedia Systems, J.F.K, Buford, ACM Press, (ISBN 0-201-53258-1).
- Tay Vaughan, Multimedia: Making It Work, McGraw Hill Education
- Ranjan Parekh, Principles of Multimedia, McGraw Hill Education

SEMESTER – II
2MCACCE(C) – STATISTICAL METHODS

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 develop the student's ability to deal with quantitative & statical data
- To enable the use of statistical methods & techniques wherever relevant.
- To have a proper understanding of various Statistical techniques for solving problems

COURSE OUTCOMES
- Describe and discuss the key terminology, concepts tools and techniques used in Statistical analysis
- Critically evaluate the underlying assumptions of analysis tools
- Understand and critically discuss the issues surrounding sampling, estimation and regression
- Discuss critically the uses and limitations of statistical methods
- Solve a range of problems using the techniques covered

UNIT – WISE SYLLABUS

UNIT-I
Statistics and Data Analysis: Statistical Inference, Samples, Populations, and the Role of Probability, Sampling Procedures; Collection of Data, Measures of Location: The Sample Mean and Median, Measures of Variability, Discrete and Continuous Data, Statistical Modeling.
Probability: Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes" Rule.

UNIT-II
Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Joint Probability Distributions.
Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.

UNIT-III
Some Continuous Probability Distributions: Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions, Chi-Squared Distribution, Beta Distribution, Lognormal Distribution.

UNIT-IV
Fundamental Sampling Distributions and Data Descriptions: Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Distribution of S^2, t –Distribution, F-Distribution.
One and Two-Sample Estimation Problems: Introduction, Statistical Inference, Classical Methods of Estimation, Single Sample: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Two Samples: Estimating the Difference between Two Means, Paired Observations, Single Sample: Estimating a Proportion, Two Samples: Estimating the Difference between Two Proportions, Single Sample: Estimating the Variance, Two Samples: Estimating the Ratio of Two Variance.

UNIT-V
Multiple Linear Regression and Certain Nonlinear Regression Models: Introduction, Estimating the Coefficients, Linear Regression Model Using Matrices, Properties of the Least Squares Estimators, Inferences in Multiple Linear Regression, Choice of a Fitted Model through Hypothesis Testing, Categorical or Indicator Variables, Sequential Methods for Model Selection, Cross Validation, Other Criteria for Model Selection, Special Nonlinear Models for Non ideal Conditions.

TEXT & REFERENCE BOOKS
- Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, Pearson Publisher's.
- S C Gupta and V K Kapoor, Fundamentals of Mathematical Statistics, Khanna Publications.
- T.T. Soong, Fundamentals of Probability and Statistics For Engineers, John Wiley & Sons Ltd.
- Sheldon M Ross, Probability and Statistics for Engineers and Scientists, Academic Press.
- S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi.

SEMESTER – II
2MCASEC(A) – DATA MINING AND BUSINESS INTELLIGENCE

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
- Introduce the Basic Concepts of Data Base, Data Warehouse and Data Mining
- Understand the Concept of Knowledge Discovery
- Understand the process of deriving Information from data with Different Perspectives
- Understand and apply Pre-processing Methods on Raw Data
- Discover Interesting and Useful Patterns and associations, Analyze Supervised and Unsupervised Models
- Understand Business Intelligence Life Cycle and Techniques Used in It

COURSE OUTCOMES
- Demonstrate an Understanding and knowledge of the Data Warehousing, Data Mining and Business Intelligence
- Explain the Data Analysis and Knowledge Delivery Stages.
- Organize and Prepare the Data Needed for Data Mining Using Pre Pre-processing Techniques
- Implement the Appropriate Data Mining Methods Like Association, Classification, Clustering
- Apply Data Mining Methods to Solve Practical Problems. (Analyze the Problem Domain, Data Collection, Pre-processing, Apply Suitable Data Mining Method, Interpret and Visualize the Results and Provide Decision Support.)

UNIT – WISE SYLLABUS

UNIT-I
Data Ware Housing Definition, Usage and Trends, DBMS Vs. Data Warehouse, Data Marts, Metadata, Data Mining Definition & Application, DBMS Vs. Data Mining, KDD Versus Data Mining, Data Mining Techniques, Business Intelligence Introduction, Cycle of a Business Intelligence Analysis Data Pre-processing: Need, Data Cleaning, Integration & Transformation

UNIT-II
Data Warehouse Process & Architecture, OLAP and OLTP Definitions, Difference Between OLAP and OLTP, Dimensional Analysis, Multidimensional Data Mode, Data Cubes, Drill-Down and Roll-Up – Slice and Dice or Rotation, Operations, Types of OLAP, ROLAP Vs. MOLAP, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations
Relation between BI and DW, the Business Intelligence User Types, Standard Reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, Dimensional Analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards

UNIT-III
Association Rule Mining, Single - Dimensional Boolean Association Rules Apoiri Algorithm, FT Growth, Multi-Level Association Rules from Transaction Databases

UNIT-IV
Classification and Prediction, Concepts of Decision Tree Induction and Bayesian Classification, Cluster Analysis, Categorization of Methods, Partitioning Methods, K-Means Algorithm, Outlier Analysis, Hierarchical Methods

UNIT-V
Emerging Technologies - Machine Learning, Big Data: Introduction, Importance, Four Vs Data Mining for Business Applications Like Fraud Detection, Market Segmentation, Retail Industry, Telecommunications Industry Banking & Finance and CRM etc., Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, Web Mining Concepts.

TEXT & REFERENCE BOOKS
- Jiawei Han, Michelinekamber, "Data Mining Concepts and Techniques", Morgan Kaufmann Publishers
- Arun K Pujari, "Data Mining Concepts and Techniques", University Press
- G.K.Gupta, "Data Mining with Case Studies", PHI Ltd

SEMESTER – II
2MCASEC(B) – NOSQL DATABASES

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 give knowledge about the four types of NoSQL Databases - Document-oriented, Key-Value Pairs, Column-oriented and Graph.
- To understand the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
- To describe architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.
- To acquire skills to define objects, load data, query data and performance tune Key-Value Pair NoSQL databases.
- To acquire skill to use MongoDB.

COURSE OUTCOMES
- Define, compare and use the four types of NoSQL Databases - Document-oriented, KeyValue Pairs, Column-oriented and Graph.
- Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
- Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.
- Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Key-Value Pair NoSQL databases.
- Explain the detailed architecture, define objects, load data, query data and performance tune Graph NoSQL databases.
- Perform hands-on NoSql database lab assignments with MongoDB.

UNIT – WISE SYLLABUS

UNIT-I
Review of the Relational Model, ACID Properties, Distributed Databases: Sharding and Replication, Consistency, The CAP Theorem, NoSQL Data Models. Introduction to NoSQL Database, Architecture, Characteristics and Significance, NoSQL database classification – Key value Stores, Column family Stores, Document store, XML Database, Graph Database, Introduction to MongoDB, Installation, Mongo DB Shell.

UNIT-II
Data Types, Data Modeling: Designing the Database, Drilling Down on Collections, Using Documents, Creating the _id Field, Building Indexes, Impacting Performance with Indexes, Working with data: Navigating Your Databases, Inserting Data into Collections, Querying for Data, Using the Dot Notation.

UNIT-III
Using Sort, Limit, and Skip Functions Working with Capped Collections, Retrieving a Single Document, Using the Aggregation Commands, Working with Conditional Operators, Leveraging Regular Expressions, Updating Data, Updating with update(), Updating Information Automatically, Specifying the Position of a Matched Array.

UNIT-IV
Atomic Operations, Modifying and Returning a Document Atomically, Renaming a Collection, Removing Data, Referencing Data, Implementing Index-Related Functions, Surveying Index - Related Commands, Forcing a Specified Index to Query Data, Constraining Query Matches.

UNIT-V
Working with GridFS, Getting Started with the Command-Line Tools, Using the _id Key, Working with Filenames, Determining a File's Length, Working with Chunk Sizes, Tracking the Upload Date, Hashing Your Files, Using the search Command, Deleting, Retrieving Files from MongoDB.

TEXT & REFERENCE BOOKS
- NoSQL For Dummiesby Adam Fowler A Wiely brand

- MongoDB Documentation online available at https://docs.mongodb.com/
- Mongo DB Basics by David Hows, Peter Membrey, Eelco Plugge.: Apress.
- https://www.amazon.com/NoSQL-Distilled-Emerging-Polyglot-Persistence/dp/0321826620 (Kindle edition)
- https://www.tutorialspoint.com/mongodb/mongodb_tutorial.pdf
- http://www.ccs.neu.edu/home/kathleen/classes/cs3200/20-NoSQLMongoDB.pdf
- MongoDB Quick start Guides by Doug Bierer, Packet Publisher, ISBN ISBN 978-1-78934-353-3

LIST OF PRACTICAL
1. Download and install MongoDB
2. Create a MongoDB database to store a collection of documents
3. Load a large amount of document-based data into the collection
4. Query the document collection to research a topic and answer questions

For Lab Assignment 3 and 4
Structure of 'restaurants' collection:
```
{
        "address": {
        "building": "1007",
        "coord": [ -73.856077, 40.848447 ],
        "street": "Morris Park Ave",
        "zipcode": "10462"
        },
        "borough": "Bronx",
        "cuisine": "Bakery",
        "grades": [
                { "date": { "$date": 1393804800000 }, "grade": "A", "score": 2 },
                { "date": { "$date": 1378857600000 }, "grade": "A", "score": 6 },
                { "date": { "$date": 1358985600000 }, "grade": "A", "score": 10 },
                { "date": { "$date": 1322006400000 }, "grade": "A", "score": 9 },
                { "date": { "$date": 1299715200000 }, "grade": "B", "score": 14 }
                ],
        "name": "Morris Park Bake Shop",
        "restaurant_id": "30075445"
}
```

You may download the compressed file (https://www.w3resource.com/mongodb-exercises/restaurants.zip) and uncompress it to find the collection used in our exercises. The collection comprises of 3772 documents.

1. Write a MongoDB query to display all the documents in the collection restaurants.
2. Write a MongoDB query to display the fields restaurant_id, name, borough and cuisine for all the documents in the collection restaurant.
3. Write a MongoDB query to display the fields restaurant_id, name, borough and cuisine, but exclude the field _id for all the documents in the collection restaurant.
4. Write a MongoDB query to display the fields restaurant_id, name, borough and zip code, but exclude the field _id for all the documents in the collection restaurant.
5. Write a MongoDB query to display all the restaurant which is in the borough Bronx.
6. Write a MongoDB query to display the first 5 restaurant which is in the borough Bronx.
7. Write a MongoDB query to display the next 5 restaurants after skipping first 5 which are in the borough Bronx.
8. Write a MongoDB query to find the restaurants who achieved a score more than 90.
9. Write a MongoDB query to find the restaurants that achieved a score, more than 80 but less than 100.
10. Write a MongoDB query to find the restaurants which locate in latitude value less than -95.754168.
11. Write a MongoDB query to find the restaurants that do not prepare any cuisine of 'American' and their grade score more than 70 and latitude less than -65.754168.
12. Write a MongoDB query to find the restaurants which do not prepare any cuisine of 'American' and achieved a score more than 70 and located in the longitude less than 65.754168. (Note : Do this query without using $and operator.)
13. Write a MongoDB query to find the restaurants which do not prepare any cuisine of 'American ' and achieved a grade point 'A' not belongs to the borough Brooklyn. The document must be displayed according to the cuisine in descending order.

14. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Wil' as first three letters for its name.
15. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'ces' as last three letters for its name.
16. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Reg' as three letters somewhere in its name.
17. Write a MongoDB query to find the restaurants which belong to the borough Bronx and prepared either American or Chinese dish.
18. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which belong to the borough Staten Island or Queens or Bronxor Brooklyn.
19. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which are not belonging to the borough Staten Island or Queens or Bronxor Brooklyn.
20. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which achieved a score which is not more than 10.
21. Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which prepared dish except 'American' and 'Chinees' or restaurant's name begins with letter 'Wil'.
22. Write a MongoDB query to find the restaurant Id, name, and grades for those restaurants which achieved a grade of "A" and scored 11 on an ISODate "2014-08-11T00:00:00Z" among many of survey dates.
23. Write a MongoDB query to find the restaurant Id, name and grades for those restaurants where the 2nd element of grades array contains a grade of "A" and score 9 on an ISODate "2014-08-11T00:00:00Z".
24. Write a MongoDB query to find the restaurant Id, name, address and geographical location for those restaurants where 2nd element of coord array contains a value which is more than 42 and upto 52.
25. Write a MongoDB query to arrange the name of the restaurants in ascending order along with all the columns.
26. Write a MongoDB query to arrange the name of the restaurants in descending along with all the columns.
27. Write a MongoDB query to arranged the name of the cuisine in ascending order and for that same cuisine borough should be in descending order.
28. Write a MongoDB query to know whether all the addresses contains the street or not.
29. Write a MongoDB query which will select all documents in the restaurants collection where the coord field value is Double.
30. Write a MongoDB query which will select the restaurant Id, name and grades for those restaurants which returns 0 as a remainder after dividing the score by 7.
31. Write a MongoDB query to find the restaurant name, borough, longitude and attitude and cuisine for those restaurants which contains 'mon' as three letters somewhere in its name.
32. Write a MongoDB query to find the restaurant name, borough, longitude and latitude and cuisine for those restaurants which contain 'Mad' as first three letters of its name.

SEMESTER – II
2MCASEC(C) – ANGULAR JAVA SCRIPT

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
- Implement single-page applications, Build Angular Forms
- Understand the use of Modules, Controllers and Directives
- Understand the concept and implementation of Dependency Injection
- Master AngularJS expressions, filters, and scopes

COURSE OUTCOMES
- Build real client apps with Angular on your own
- Troubleshoot common compile-time and run-time errors
- Write clean and maintainable code like a professional
- Apply best practices when building Angular apps

UNIT – WISE SYLLABUS

UNIT-I
JavaScript Introduction, The Basics of AngularJS - Why We Need Frameworks, What Is a Framework?, Downloading and Installing AngularJS, Browser Support, Your First AngularJS Application, Declarative vs. Procedural Programming, Directives and Expressions – What is a Directive?, What Are Expressions?
JavaScript Primer - Including Scripts on a Page, Statements, Functions, Parameters and Return Values, Types and Variables, Primitive Types - Booleans, Strings, Numbers, Undefined and Null, JavaScript Operators, Equality vs. Identity, Pre- vs. Post-Increment, Working with Objects - Creating Objects, Reading and Modifying an Objects Properties, Adding Methods to Objects, Enumerating Properties, Control Flow – Loops, Conditional Statements, Working with Arrays - Array Literals, Enumerating and Modifying Array Values, Callbacks, JSON

UNIT-II
Introduction to MVC - Design Patterns, Model View Controller - Model, View, Controller, A Separation of Concerns, Why MVC Matters, MVC the AngularJS Way, Filters and Modules - Introduction to Filters, Built-in Filters, The Number Filter, The Date Filter, The limit To Filter, AngularJS Modules - What Is a Module?, Bootstrapping AngularJS, Creating a Custom Filter

UNIT-III
Directives - The Basics of Directives, Using Directives, Built-in Directives - ngBind, ngCloak, ngInclude, ngShow and ngHide, ngRepeat, Event-Handling Directives, Using the API Documentation, Creating a Custom Directive-The restrict Option, The template Option, The link Option
Working with Forms - HTML Forms Overview, The form Element, The input Element – button, submit, text, checkbox, password, radio, The textarea Element, The select Element, The label Element, Model Binding, AngularJS Forms, Validating Forms

UNIT-IV
Services and Server Communication-Using Services, The $window Service, The $location Service, The $document Service, Why Use Services?, Creating Services – Promises, Server Communication, Handling Returned Data-Accessing Returned Data, Handling Errors
Organizing Views - Installing the ngRoute Module, Using URL Routes - Defining Routes, Route Parameters, Eager vs. Conservative Routes, Route Configuration Options, HTML5 Mode

UNIT-V
AngularJS Animation - Installing the ngAnimate Module, CSS Animation Overview - Transforms, Transitions, Applying Animations, Deployment Considerations - Configuration, Testing, Error Handling, Hide Unprocessed Templates, Minification and Bundling, Managing the Build Process, Deployment

TEXT & REFERENCE BOOKS
- AngularJS Essentials- Rodrigo Branas, Packet Publishing Ltd Open Source
- AngularJS: Novice To Ninja - Sandeep Panda, Site point Pty. Ltd, Download link http://www.longevity.co.uk/media/1008/angularjs-novice-to-ninja.pdf

SEMESTER – II
2MCASEC(D) – INFORMATION SECURITY

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
- Aware and Understand the Challenges and Scope of Information Security.
- Gain the Knowledge of Basic Security Concepts.
- Learn and Understand the Importance of Cryptographic Algorithms and Their Uses.
- Learn and Understand Access Control Mechanism Used for User Authentication and
- Authorization.
- Understand and Practice the Sockets Layer (SSL).
- Aware and Learn the Usages of Secure Internet Protocol (IP) and HTTPS

COURSE OUTCOMES
- Explain the Principles of Cryptography and Cryptanalysis Including Symmetric and Asymmetric Encryption Hashing and Digital Signatures.
- Explain the Fundamental Notions of Threat Vulnerability Attack and Countermeasure.
- Be Able to Identify the Security Goals of an Information System Point Out Contradictory Goals and Suggest Compromises.
- Identify and Classify Particular Examples of Attacks.
- Implement the Various Security Algorithms.
- Analyze the Root Causes of Attacks & Suggest Appropriate Solution for Different Types of Security Breach Scenario.

UNIT – WISE SYLLABUS

UNIT-I
Introduction: Security Concepts: Confidentiality Integrity and Availability Threats Risks Sources of Threats Attacks Classification Cryptography Confusion Vs. Diffusion Stream Ciphers Vs. Block Ciphers. Classical Cryptography, Objectives of Cryptography. Symmetric Key Cryptography, Asymmetric Key cryptography, Secret-Key and Public-Key Cryptography Cryptanalysis RC5 Blowfish.

UNIT-II
Block Ciphers Block Cipher Principles Feistel Networks S-Boxes and P Boxes Block Cipher Des Elementary Number Theory Prime Numbers Factoring Modular Arithmetic GCD Modular Square Roots.

Key Exchange: Diffie-Hellman Public-Key Encryption: RSA Entity Authentication: Passwords Challenge-Response Algorithms Digital Signature Digital Certificates X509 Certificates SSL HTTPS and IPSEC.

UNIT-III
Introduction to Hash Function: Message Digest: MD5 and SHA-1 Attacks on Hash Functions. MD Family SHA Family Trapdoor Functions Digital Signatures Overview of GPG Seahorse Frontends– Kleopatra Enigmail.

UNIT-IV
Network Issues Public-Key Infrastructure (PKI) Kerberos Encryption Using Non-Cryptographic Tools (VI Zip) Authentication Principles and Methods Passwords Two-Factor Authentication Steganography Penetration Testing and Ethical Hacking.

UNIT-V
Internet Security & Wireless Security: Firewall & IDS Firewall Techniques, Firewall Architecture, Types of IDS, IDS Tools. Email & Transaction Security Mechanisms, Privacy Enhanced Mail (PEM), Client-Server Security on web, Wi-Fi & IEEE 802.1 Security, Bluetooth Security.

TEXT & REFERENCE BOOKS
- William Stallings Cryptography and Network Security PHI.
- Bruce Schneier- the Mathematics of Encryption- American Mathematical Society
- Atulkahate "Cryptography and Network Security" TMH.

- Calabrese Info Security Intelligence-Cryptography Principles Appl- Cengage Learn.
- Krawetz- Intro to Network Security Cengage Learning.
- Bruce Schneier Applied Cryptography John Wiley and Sons Mark Stamp
- Mark Stamp Information Security: Principles and Practice John Wiley and Sons.
- Matt Bishop Computer Security Art and Science Pearson Education
- Merkow & Breithaupt, Information Security: Principles and Practices, PE.

SEMESTER – III
3MCACCC1 – SOFTWARE ENGINEERING

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

- Understand, Learn and Apply the Theoretical and Practical Knowledge of Software Development Such as Software Development Paradigms, Process, Models, Tools and Techniques.
- Understand and Learn the Process of Software Requirements Identification, Analysis, Review, and also Learn Recording Requirements in the IEEE Format of the SRS Document.
- Understand the Various Types and Levels of Software Testing and Basic Approaches of Test Case Designing.
- Gain the Knowledge of the Various Models of Software Quality, Estimation, Quality Assurance and Control.

COURSE OUTCOMES

- Identify, Analyze, Review and Validate the Requirement of Software Components and System, and Also Prepare Software Requirement Specification (SRS) Documentation Using Relevant Standards, Tools and Methodologies.
- Manage a Software Project by Applying Project Management Concepts Such as Planning, Scheduling and Risk Management for Developing Qualitative and Economic Software.
- Work Effectively in Various Profiles of Software Developing Team Such as Software Analyst Architecture, Programmer, Tester, Quality Assurance and Control officer, Project Manager and Leaders.
- Communicate and Coordinate Competently by Listening, Speaking, Reading and Writing Software Documents
- Apply Coding Standards & Guidelines, and Quality Norms in Coding of Software Systems to Satisfy the Requirements and Quality.
- Design Test Cases and Optimize the Test Suite for UNIT, Integration and System-Level Testing using various Techniques and Tools for Adequately Testing the Software Components and Systems.

UNIT – WISE SYLLABUS

UNIT-I

Software: Software Characteristics, Components, and Applications, Software Engineering Layered Technology, Software Development Life Cycle, Software Process Models- Linear Sequential Model, Prototype & RAD Model, Incremental and Evolutionary Process Models. Introduction of Agile Software Development, CBSD (Component Based Software Development) Aspect Oriented Paradigm (AOP) and Green Software Development, Process and Product Metrics.

UNIT-II

Analysis Concept and Principles: Requirement Analysis, Analysis Principles, Requirement Elicitation, Information Gathering Techniques, Requirements Specification, Requirements Verification and Validation, Requirements Management. Requirements Modeling: Scenarios, Information and Analysis Classes, Flow and Behavioral Modeling, Documenting Software Requirement Specification (SRS) Characteristics of SRS, Format of SRS, Software Project Planning: Objectives, Decomposition Techniques, and Empirical Estimation Models. Project Metrics: Software Measurement-Size Oriented, Function Oriented Metrics.

UNIT-III

Design Concepts and Principles: Design Process, Design Concepts, Design Principles, Effective Modular Design, Human Computer Interface Design, Interface Design Guidelines. System Design: Design Models for Architecture, Component, Data and User Interfaces; Problem Partitioning, Abstraction, Cohesiveness, Coupling, Top-Down and Bottom-Up Design Approaches; Functional Versus Object Oriented Approach, Design Specification. Coding: Top-Down and Bottom-Up Structure Programming, Information Hiding, Programming Style, and Internal Documentation, Verification.

UNIT-IV

Software Testing: White and Black Box Testing, Levels of Testing, Unit, Integration, System Testing, Functional Testing, Structural Testing, Test Plan, Software Testing Strategies, Verification & Validation, Incremental & Non- Incremental Testing, Top-Down and Bottom-Up Integration Testing, Alpha & Beta Testing, White Box and Black Box Test Case Design Techniques, Debugging Techniques. Software Quality, Quality Models, Quality Control and Quality Assurance, ISO, SEI Capability Maturity Model (CMM) and Comparison between ISO & SEI CMM.

UNIT-V

Agile Methodology: Introduction and background, Values of Agile, Stakeholders, Challenges, Agile Manifesto and Principles, Twelve Practices of XP, Overview of Scrum, Need of scrum, working of scrum, advanced Scrum Applications, Scrum and the Organization, scrum values, Framework of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Refactoring, Pair Programming, User Stories, Characteristics and contents of User stories, Backlog Management, Agile Risk Management, Scrum roles, Agile Tools, Agile Metrics and Measurements, Agile Design Practice, Refactoring Techniques, Agile Testing, Test-Driven Development (TDD), x Unit framework and tools for TDD, Agile Configuration Management, Continuous Integration / Continuous Delivery (CI / CD), and DevOps

TEXT & REFERENCE BOOKS

- Roger S. Pressman, Software Engineering-A Practitioner's Approach, McGraw Hill International Edition,
- K. K. Aggarwal, Yogesh Singh, Software Engineering,
- Ian Sommerville, Software Engineering, Addison-Wesley Publishing Company
- James F. Peter, Software Engineering - An Engineering Approach, John Wiley
- Fairley Richard Software Engineering Concepts, Tata McGraw Hill
- Scrum Ken Schawber, Mike Beedle - Agile Software Development with Publisher: Pearson
- Lisa Crispin, Janet Gregory Agile Testing: A Practical Guide for Testers and Agile Teams Publisher: Addison Wesley.
- Kenneth S. Rubin, Essential Scrum: A Practical guide to the most popular agile process
- Robert C. Martin, Agile Software Development, Principles, Patterns and Practices, Publisher: Prentice Hall

SEMESTER – III
3MCACCC2 – JAVA PROGRAMMING

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
- Introduce and Learn the Usage of the Java SDK Environment to Create, Debug and Run Java Programs.
- Understand Fundamentals of Java Programming Such as Character Set, Variables, Data Types, and Control Structures, Array, Class, and Methods.
- Understand the Concepts of (OOPs) and Learn Implementation in Java Defining Classes, Invoking Methods, Using Class Libraries.
- Introduce Strings, Vectors, Interfaces, Packages and Threads Handling in Java.
- Gain the Knowledge of Java Applets, AWT, Swings, Servlet.
- Understand the GUI Application, Web Applications, N-Tier Architecture.
- Develop the Understanding of the Basic Knowledge of File Handling, Database Connectivity, Java Servlets and Web Application.

COURSE OUTCOMES
- Explain and Apply the Object-Oriented Concepts for Solving Real Problem.
- Use the Java SDK Environment to Create, Debug and Run Simple Java Programs.
- Apply Java Technology to Develop the Small Applications, Utilities, and Web Applications.
- Apply Events Management and Layout Managers Using AWT, Swing, JDBC and Servlet for Developing the Software for Various Problems.

UNIT – WISE SYLLABUS

UNIT-I
Basics of Java: History and Basics of Java, Java Environment, JDK Tools, Java Virtual Machine, Java Program Structure, Java Language - Tokens, Keywords, Constants, Variables, and Data Types. Operators and Expressions, Statements - Decision Making, Branching and Looping, Labeled Loops Statement, Jump Statements: Break, Continue, and Return, Command Line Argument. Classes and Objects: Classes, Objects, Defining a Class, Adding Variables and Methods, Creating Objects, Accessing Class Members, Constructors, Static Members, Nesting of Methods

UNIT-II
Inheritance and Polymorphism: Basics Types, Extending a Class,Using Super, Method Overloading, Method Overriding, Final Variables and Methods, Final Classes, Finalize Method, Visibility Control. One and Two Dimension Arrays, String Array, String and String Buffer Classes, Vectors, Wrapper Classes. Abstract Classes and Methods. Interfaces: Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables, Packages: System Packages, Naming Conventions, Creating Packages, accessing a Package, Using Package, Adding a Class to a Package, Hiding Classes. Exception Handling: Introduction to Exception Handling, Try-Catch, Finally, Throws, Java Thread Model: Life Cycle of a Thread, Thread Class, Runnable Interface

UNIT-III
Applet Programming: Creating and Executing Java Applets, Inserting Applets in a Web Page, Applet Tag, Local and Remote Applets, Applets Vs. Applications, Applets Life Cycle. AWT Classes, Event Handling, AWT Programming: Workingwith Windows, Graphics and Text, Using AWT Controls, Layout Managers and Menus, Handling Image, Animation, Sound andVideo.
Java Swing: Swing Classes, JApplet, ImageIcon, JLabel, JTextField, JButton, JRadioButton, JCheckBox, JComboBox, JList, JTabbedPane, JScrollBar, JTable.

UNIT-IV
I/O Stream: Introduction of I/O Stream, Types of Streams, Stream Class Hierarchy, Using File Class, Byte Streams Vs Character Streams, Text file Vs Binary File, Standard I/O Streams, and Random-Access File, Serialization.
Database Programming Using JDBC: Introduction to JDBC, JDBC Drivers, Types of JDBC Drivers, Connecting with Database.

UNIT-V
J2EE: Introduction of J2EE, Web Application Basics, Architecture and Challenges of Web Application, Servlet: Servlet Life Cycle, Developing and Deploying Servlets, RMI, Java Networking.
Java Server Pages (JSP): JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects.

TEXT & REFERENCE BOOKS
- E. Balagurusamy, "Programming with Java, a Primer", TMH, ISBN-13: 978-0-07-061713-1, ISBN-10: 0-07-061713-9.
- Patrick Naughton and Herbert Schildt, "Java: The Complete Reference", TMH Publication, ISBN 0-07-463769-X.
- Yashavant Kanetkar, "Let us Java", BPB Publications.
- Ivan Bayross, "Web Enabled Commercial Application Development Using HTML, DHTML, JavaScript, Perl CGI", BPB Publications
- Cay Horstmann, "Big Java", Wiley Publication
- Peter Norton, "Java Programming", Techmedia Publications.
- Joseph Weber, "Using Java 1.2", PHI, ISBN -81-203-1558-8.

LIST OF PRACTICALS
1. Write a Program in Java to Calculate the Simple Interest.
2. Write a Program in Java to Calculate Sum of Two Numbers Input from Command Line Argument.
3. Write a Program in Java to Calculate Area of Circle Using Scanner Class.
4. Write a Program in Java to Calculate Square Root of a Number.
5. Write a Program in Java to Display Name, Age, Calendar and Salary of a Person Input from the Keyboard.
6. Write a Program in Java to Display Grading of Student When His Percentage is Input from Keyboard.
7. Write a Program in Java to Display Odd Number from 1 to 100.
8. Write a Program in Java to Display the Following Patterns using Functions.

(a)	(b)	(c)	(d)
1	1	1	1
1 2	2 2	2 1	2 3
1 2 3	3 3 3	3 2 1	4 5 6
1 2 3 4	4 4 4 4	4 3 2 1	7 8 9
1 2 3 4 5	5 5 5 5 5	5 4 3 2 1	10 11 12 13

9. Write a Program in Java to Calculate the Factorial of a Number.
10. Write a Program in Java to Determine Whether a Number Input from Keyboard is Prime Number Or Not.
11. Write a Program in Java to Display the Prime Numbers from 1 to 500 Using Function.
12. Write a Program in Java to Show Accessing Class Members and use a Dot(.).
13. Write a Program in Java to Show Multilevel Inheritance.
14. Write a Program in Java to Show Single Inheritance.
15. Write a Program in Java to Concatenate Two Strings Without Using Library Function.
16. Write a Program in Java to Make First Alphabet Capital of Each Word in a String.
17. Write a Program in Java to Get the Last Index of Any Given Character in a String.
18. Write a Program in Java to Reverse Words of a String.
19. Write a Program in Java to Find Occurrences of Each Character in a String.
20. Java Program to Get String and Count Number of Words in Provided String.
21. Write a Program in Java to Check Given String is Palindrome String Or Not in Java.
22. Write a Program in Java to Reverse Each Word of Given String.
23. Write a Program in Java to Get Sub String from a Given String.
24. Java Program to Convert String to Lowercase and Uppercase.
25. Create a Java Applet and Show the use of DrawString() Function.
26. Create a Java Applet to Show How to use Various Methods of Applet Class and Graphics Class in a Java Applet.
27. Write a Program in Java to Show the use of Interface.
28. Create a Java GUI Application Using Labels and Textfields.
29. Create a Java GUI Application Using Radio buttons.
30. Create a Java GUI Application Using Checkboxes.
31. Create a Java GUI Application Using Combo boxes.
32. Create a Java GUI Application Using Listboxes.
33. Create Two Html Pages with Links to Navigate from One Page to Other Page.
34. Write a Servlet to Display Current Date and Time of Server on Client: DateServlet
35. Write a Servlet to Display Natural Numbers from 1 to 100: NumberServlet
36. Create a JSP to Display Natural Numbers from 1 to 50: Number.Jsp and Write Down the Process of Running It Step by Step.
37. Create a JSP to Display Current Date and Time of Server onClient: Date.JSP and Write Down the Process of Running it Step by Step.

GROUP ASSIGNMENTS
1. Scientific Calculator Utility
2. Chat Application

3. Time Table System
4. Student Attendance System
5. Steganography & Data Encryption System Java
6. Student Information System
7. Survey Tool System
8. Text Editor Like Notepad / Wordpad
9. Game / Puzzle Like Luddo Game
10. Game / Puzzle Like Snake Game
11. Paint Application

SEMESTER – III
3MCACCC3 – DESIGN AND ANALYSIS OF ALGORITHM

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 develop proficiency in problem solving and programming.
- To be able to carry out the Analysis of various Algorithms for mainly Time and Space Complexity.
- To get a good understanding of applications of Data Structures.
- To develop a base for advanced study in Computer Science.

COURSE OUTCOMES
- Able to Argue the correctness of algorithms using inductive proofs and Analyze worst-case running times of algorithms using asymptotic analysis.
- Able to explain important algorithmic design paradigms (divide-and-conquer, greedy method, dynamic-programming and Backtracking) and apply when an algorithmic design situation calls for it.
- Able to Describe the classes P, NP, and NP-Complete and be able to prove that a certain problem is NP-Complete.

UNIT – WISE SYLLABUS

UNIT-I
Algorithms and Analysis: Introduction, Algorithms specification, Recursive algorithms, space and time complexity, Asymptotic Notation (O, Ω, and Θ, o) practical complexities, Best, average and worst-case performance of algorithms, examples, Introduction to recurrence relations.

UNIT-II
Divide and Conquer Methods: Selection sort, Merge sort, Quick sort. Binary search, Strassen's Matrix Multiplication and analysis of these problems.

UNIT-III
Dynamic Programming: Elements of Dynamic Programming, Assembly Line Scheduling, Matrix Chain Multiplication, Shortest paths, optimal search trees, etc.

UNIT-IV
Greedy Techniques and Randomized algorithms: Elements of Greedy Algorithms, Prim's algorithm- Kruskal's Algorithm- Dijkstra's Algorithm-Huffman Trees, Randomized Algorithms.

UNIT-V
Backtracking and Branch and Bound: Introduction, The Eight Queens Problem, Knapsack Problem, Travelling Salesman Problem, Minimax Problem.
Complexity Theory and Approximation algorithms: Introduction, P, NP, NP-Hard, NP Complete and Associated Problems, Approximation Algorithm- Vertex Cover and Travelling Salesman-Problem.

TEXT & REFERENCE BOOKS
- Sridhar, Design and Analysis of Algorithms, OUP.
- Aho, The Design and Analysis of Computer Algorithms, Addison-Wesley.
- Paneerselvam, Design and Analysis of Algorithm, PHI.
- Dave, Design and Analysis of Algorithm, PE.
- Goodman, Introduction to the Design and Analysis of Algorithms, TMH.

SEMESTER – III
3MCACCC4 – 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 3MCACCC2
2. Paper 3MCACCE(A)
3. Paper 3MCACCE(C)
4. Paper 3MCASEC(A)
5. Paper 3MCASEC(C)

SEMESTER – III
3MCACCE(A) – BIG DATA ANALYTICS

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

COURSE OBJECTIVES
- Familiarize the students with most important information technologies used in manipulating, storing, and analyzing big data
- This course gives students all around learning of the big data framework using Hadoop and spark, including yarn, HDFS and MapReduce.
- It provides an overview of approaches facilitating data analytics on huge datasets.

COURSE OUTCOMES
- Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.
- Demonstrate an ability to use Hadoop framework to efficiently store, retrieve and process Data for Analytics.
- Implement several Data Intensive tasks using the MapReduce Paradigm

UNIT – WISE SYLLABUS

UNIT-I
Big Data- Introduction, Characteristics, Types, Elements, Traditional vs. Big Data Business Approach, Big Data Analytics, Advantages, Applications, Distributed & Parallel Computing for Big Data, Components in Big Data Architecture, Virtualization Approaches.

UNIT-II
Statistics and Probability: Sampling Techniques - Data Classification, Tabulation, Frequency and Graphic Representation, Measures of Central Value - Mean, Mode, Median, Random Variable and Probability Theory.

UNIT-III
Hadoop- Introduction, Features, Advantages, Versions, Key Considerations of Hadoop, RDBMS Vs Hadoop, Hadoop Ecosystem, HDFS - Architecture, Features, Commands, Processing Data with Hadoop, Hadoop Yarn.

UNIT-IV
MapReduce Framework, Features, Uses, Working on MapReduce, MapReduce Input and Output Operations, Exploring Map and Reduce Functions, MapReduce Optimization Technique, HBASE Introduction, Architecture, HBASE in Hadoop Applications.

UNIT-V
Processing Data with MapReduce, Task Execution & Environment – Installation of Eclipse, Hadoop, Java Development Kit and Linux Ubuntu OS, MapReduce Program Steps to Obtain Word Count, Functionality of Input Format - Inputsplit, Recordreader, Fileinputformat, Output Process of Fileoutputformat – Outputformat, Recordwriter, Role of Combiner, Partitioner, Debugging MapReduce.

TEXT & REFERENCE BOOKS
- Rob Kitchin The Data Revolution: Big Data Open Data Data Infrastructures and their Consequences SAGE Publications Ltd
- Croll and B. YoskovitzLean Analytics: Use Data to Build a Better Startup Faster o'reilly
- Mayer-Schönberger and K. CukierBig Data: A Revolution That Will Transform How We Live Work and Think
- E. Siegel-Predictive Analytics: The Power to Predict Who Will Click Buy Lie or Die
- Bernard Marr-Big Data in Practice Wiley publication

SEMESTER – III
3MCACCE(B) – THEORY OF COMPUTATION

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
- Learn and Understand FSA, DFA, NDFA, Turing Machine, Regular Expression, Push Down Automaton.
- Learn and Understand Properties of Languages, Grammars and Automata.
- Gain knowledge of Computing and Mathematics to Solve Problems.

COURSE OUTCOMES
- Demonstrates Models, Turing Machine, Regular Expression, Push Down Automaton.
- Model, Compare and analyze different Computational Models.
- Apply and Prove properties of Languages, Grammars and Automata.
- Apply Knowledge of Computing and Mathematics to Solve Problem
- Apply Mathematical Foundations, Algorithmic Principles and Computer Science Theory to the Modeling

UNIT – WISE SYLLABUS

UNIT-I
Introduction to Theory of Computation: Basic Computational Constructs: Finite State Systems, Non-Deterministic Finite Automata (NDFA), Deterministic Finite Automata (DFA), Equivalence of DFA and NDFA, Finite Automata with E- Moves, Limitations of FSM, Minimization of Finite Automata, Moore and Mealy Machines, Equivalence of Moore and Mealy Machines.

UNIT-II
Regular Sets, Closure Properties of Regular Sets, Pumping Lemma, Applications of Pumping Lemma. Regular Expression, Laws for Regular Expression, Equivalence of Finite Automata and Regular Expression, Introduction to Regular Grammar.

UNIT-III
Introduction to Context Free and Context Sensitive Grammar, Ambiguity, Parse Tree Representation of Derivations, Simplification of Context Free Grammar, Normal Forms (Chomsky Normal Form (CNF) and Griebach Normal Form (GNF)).

UNIT-IV
Definition, Deterministic Push Down Automaton (DPDA), Non-Equivalence of PDA & DPDA, Equivalence of CFG and PDA, Pumping Lemma for CFL's, Closure Properties of CFL, Non-CFL.

UNIT-V
Turing Machine (TM): Introduction, Types of Turing Machine, Universal Turing Machine and Other Modifications, Construction of Tm for Simple Problems, Turing Machine as Enumerators, Relation Between Languages of Classes, Computational Complexity Theory. Computable.
Functions: Partial, Total, Constant Functions, Primitive Recursive Function, Regular Function, Recursive Functions.

TEXT & REFERENCE BOOKS
- John E Hopcroft, Rajeev Motwani, Jeffrey D. Ullman. Introduction to Automation Theory, Languages & Computation
- Mishra &Chandrasekaran-Theory of Computer Science (Automata Languages and Computation PHI ISBN-81-203-1271-6
- Lewis & Papadimitriou Elements of the Theory of Computation, PHI ISBN 81-203-1016-0
- John C. Martin -Introduction to Languages and Theory of Computation ISBN – 0-07-463722-3
- Bernard M. Moret Pearson - Theory of Computation ISBN-81-7808-550
- Raymond Greenlaw & H. James Hoover (Harcount) - Fundamentals of Theory of Computation, ISBN: 81-7867-036-4

SEMESTER – III
3MCACCE(C) – MOBILE APPLICATION DEVELOPMENT

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
- To introduce Android platform and its architecture.
- To learn activity creation and Android UI designing.
- To be familiarized with Intent, Broadcast receivers and Internet services.
- To work with SQLite Database and content providers.
- To integrate multimedia, camera and Location based services & REST full web Services in Android Application.
- To explore publishing process of Android Application

COURSE OUTCOMES
- Describe Android platform, Architecture and features.
- Design User Interface and develop activity for Android App.
- Use Intent, Broadcast receivers and Internet services in Android App.
- Design and implement Database Application and Content providers.
- Use multimedia, camera and Location based services in Android App.
- Discuss various stages in Android App publishing.

UNIT – WISE SYLLABUS

UNIT-I
Various mobile platforms, introduction to android, history and versions of android, android API, android architecture, android runtime, dal vik virtual machine, features of android, introduction and installation of eclipse and ADT plugin and / or introduction and installation of android studio, requirements and installation of android SDK, SDK manager, emulator, avd, android virtual device manager, google play account, installing android app from google play, APK file.

UNIT-II
Setting up Development Environment, Installing Packages using SDK Manager, Android Project Structure, Creating Hello Android App, Deploy it on USB- connected Android device, Setting up an Emulator, Android Tool Repository, Manifest File, DDMS, File Explorer, Installing and Running Android - Hello App, Activity Life Cycle and its methods, Logcat, Components of an Android App – Activity, Service, Broadcast Receiver, Content Provider

UNIT-III
Layout – Linear Layout, Relative Layout, Scroll View Layout, Table Layout, Frame Layout, UI Resources – Layout Resources, UI Elements, Views - Text view, Edit Text, Button, Check Box, Radio Button, Image Button, Spinner, Navigating between Activities - Intent, Exchanging Data between Activities, Action Bar, Event Handling, Listeners, Notifying the User - Toast.

UNIT-IV
Using Threads, Image View, Exception Handling, Multimedia - Playing Audio using an Intent, Playing Video using an Intent, Playing Audio using Media Player, Playing Video using Video View, Fragment, Fragment Life Cycle.

UNIT-V
SQLite database, creation of database and tables, CRUD operations – create, retrieve, update and delete operations, Cursor, list view, etc. Introduction – REST full web Services, JSON, Google Play Services, location services, publishing apps.

TEXT & REFERENCE BOOKS
- Michael Burton, Donn Felker, "Android Application Development for Dummies", Dummies, ISBN: 9788126538775
- Pradeep Kothari, "Android Application Development (with Kitkat Support)", Kogent Learning Solutions Inc., Black Book, DreamTech Press, ISBN: 9789351194095
- W. Frank Ableson, Robi Sen, Et. Al., "Android in Action", Manning, ISBN: 9789350042915
- Charlie Collins, Michael Galpin, Et. Al., " Android in Practice", Manning, ISBN: 9789350042397
- Anubhav Pradhan, Anil V Deshpande, "Composing Mobile App, Learn | Explore | Apply Using Android", Wiley, ISBN : 9788126546602
- James C. Sheusi, " Android Application Development For Java Programmers", Cengage Learning, 2013.
- Wallace Jackson, "Android Apps for Absolute Beginners", Apress, ISBN: 9788132211372
- http://www.developer.android.com

LIST OF PRACTICALS

1. Installing Android Environment
2. Create "Hello World" application. That will display "Hello World" in the middle of the screen in the emulator. Also display "Hello World" in the middle of the screen in the Android Phone.
3. Create an application with login module. (Check username and password).
4. Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.
5. Create a menu with 5 options and selected option should appear in text box.
6. Create a list of all courses in your college and on selecting a particular course teacher charge of that course should appear at the bottom of the screen.
7. Create an application with three option buttons, on selecting a button color of the screen will change.
8. Create and Login application as above. On successful login, pop up the message.
9. Create an application to Create, Insert, update, Delete and retrieve operation on the database.
10. Create a Simple Application using Android Resources.
11. Create a Simple Application using Layouts.
12. Create a Simple Application using Intents.
13. Create a Simple Application using user interfaces.
14. Create a Simple Application for playing Audio and Video files.

SEMESTER – III
3MCACSEC(A) – PROGRAMMING WITH R

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
- Provide the knowledge of Basic R Programming Language to Students.
- Prepare Students for Role of Professional Data Analyst.
- Learn about Concepts of R Programming like Control Structures, Functions, Arrays.
- This course will teach students, How to develop workflows going from raw data to graphics and statistical analysis, Using the Programming Language and Statistical Environment R.
- Over the Course of the Semester, Students will Learn the Skills to Write Scripts to automate data formatting and analysis, making their studies replicable.
- Student will be able Apply Programming Knowledge to Develop R Programs Based on Simulation.

COURSE OUTCOMES
- Learn and apply the features of R Programming Tool to Carry out Statistical Analysis of data
- Write, Compile and Execute the Programs Written in R Programming Language
- Implement Intelligent Algorithms in R to Solve Statistical and Decision-Making Problems
- Understand the basics in R programming in terms of constructs, control statements, string functions
- Understand the use of R for Big Data analytics
- Learn to apply R programming for Text processing
- Able to appreciate and apply the R programming from a statistical perspective

UNIT – WISE SYLLABUS

UNIT-I
OVERVIEW— Evolution of R, Features of R
ENVIRONMENT SETUP— Try it Option Online, Local Environment Setup
BASIC SYNTAX—R Command Prompt, R Script File, Comments
DATA TYPES—Vectors, Lists, Matrices, Arrays, Factors, Data Frames
VARIABLES—Variable Assignment, Data Type of a Variable, Finding Variables, Deleting Variables
OPERATORS—Types of Operators, Arithmetic Operators, Relational Operators, Logical
Operators, Assignment Operators, Miscellaneous Operators
DECISION MAKING—If Statement, If-Else Statement, The if. else if. else Statement, Switch Statement
LOOPS—Repeat Loop, While Loop, For Loop, Loop Control Statements, Break Statement, Next Statement

UNIT-II
FUNCTION—Function Definition, Function Components, Built-In Function, User-Defined Function, Calling a Function, Lazy Evaluation of Function, Calling a Function, Lazy Evaluation of Function
STRINGS—Rules Applied in String Construction, String Manipulation
VECTORS—Vector Creation, Accessing Vector Elements, Vector Manipulation
LISTS—Creating a List, Naming List Elements, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting List to Vector
MATRICES—Accessing Elements of a Matrix, Matrix Computations
ARRAYS—Naming Columns and Rows, Accessing Array Elements, Manipulating Array Elements, Calculations Across Array Elements
FACTORS—Factors in Data Frame, Changing the Order of Levels, Generating Factor Levels
DATA FRAMES—Extract Data from Data Frame, Expand Data Frame

UNIT-III
PACKAGES – Introductions, Uses, Install R Package
DATA RESHAPING, —Joining Columns and Rows in a Data Frame, Merging Data Frames, Melting and Casting, Melt the Data, Cast the Molten Data
CSV FILES—Getting and Setting the Working Directory, Input as CSV File, Reading a CSV File, Analyzing the CSV File, Writing into a CSV File

EXCEL FILE—Install xlsx Package, Verify and Load the "xlsx" Package, Input as xlsx File, Reading the Excel File, 21. BINARY FILES, Writing the Binary File, Reading the Binary File, XML FILES, Input Data, Reading XML File, Details of the First Node, XML to Data Frame

JSON FILE—Install rjson Package, Input Data, Read the JSON File, Convert JSON to a Data Frame

WEB DATA

DATABASES—RMySQL Package, Connecting R to MySql, Querying the Tables, Query with Filter Clause, Updating Rows in the Tables, Inserting Data into the Tables, Creating Tables in MySql, Dropping Tables in MySql

UNIT-IV

PIE CHARTS—Pie Chart Title and Colors, Slice Percentages and Chart Legend, 3D Pie Chart,

BAR CHARTS—Bar Chart Labels, Title and Colors, Group Bar Chart and Stacked Bar Chart

BOXPLOTS—Creating the Boxplot, Boxplot with Notch,

HISTOGRAMS—Range of X and Y values

LINE GRAPHS—Line Chart Title, Color and Labels, Multiple Lines in a Line Chart

SCATTERPLOTS—Creating the Scatterplot, Scatterplot Matrices

UNIT-V

MEAN, MEDIAN & MODE—Mean, Applying Trim Option, Applying NA Option, Median, Mode

LINEAR REGRESSION—Steps to Establish a Regressionlm() Functionpredict() Function

MULTIPLE REGRESSION—lm() FunctionExample

LOGISTIC REGRESSION—Create Regression Model

NORMAL DISTRIBUTION—dnorm() pnorm() qnorm() rnorm()

BINOMIAL DISTRIBUTION—dbinom() pbinom() qbinom() rbinom()

Poisson Regression, Analysis of Covariance

TIME SERIES ANALYSIS—Different Time Intervals, Multiple Time Series

Nonlinear Least Square, Decision Tree Install R Package

RANDOM FOREST—Install R Package, Survival Analysis, Chi Square Test

TEXT & REFERENCE BOOKS

- The Art of R Programming: A Tour of Statistical Software Design, by Norman Matloff, No Starch Press, 2011
- R for Everyone: Advanced Analytics and Graphics by Jared P. Lander, Addison-Wesley Data & Analytics Series, 2013
- Beginning R – The Statistical Programming Language by Mark Gardener, Wiley, 2013
- Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R, by Robert Knell, Amazon Digital South Asia Services Inc, 2013
- W. N. Venables, D. M. Smith, An introduction to R, r-core team, 2015
- Alain F. Zuur, Elena n. Ieno, & Erik Meesters, A beginner's guide to R. Use R. Springer, 2009. ISBN: 978-0-387-93836-3
- Roger D. PengR Programming for Data Science, https://leanpub. com/rprogramming
- John Verzani, chapman -Using R for introductory statistics, ISBN- 1584884509
- https://www. r-project. org/doc/bib/r-bools.html

LIST OF PRACTICALS

1. Write a program that prints 'Hello World' to the screen
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n.
3. Write a program that prints a multiplication table for numbers up to 12
4. Write a function that returns the largest element in a list.
5. Write a function that computes the running total of a list
6. Write a function that tests whether a string is a palindrome
7. Implement the following sorting algorithms: Selection sort, Insertion sort, Bubble Sort.
8. Implement linear search.
9. Implement binary search
10. Implement matrices addition, subtraction and Multiplication.

SEMESTER – III
3MCASEC(B) – MANAGEMENT THEORY AND PRACTICES

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 help the students gain understanding of the functions and responsibilities of managers.
- To provide them fundamental knowledge of Management theories and take cognizance of the importance of management
- Acquire the knowledge of different Planning, strategies, decision making and forecasting techniques and implement them to solve organizational problems.
- Learn and develop the management skills such communication, presentation, leadership and motivation skills for team building.
- To help the students to learn budgetary control, inventory control and quality control Theory with the help of case study.

COURSE OUTCOMES
- Explain the fundamental knowledge of Management theories and practice them to investigate and solve the organizational.
- Design, Develop and Implement Plans and Strategies, and take decisions to solve organizational problems.
- Demonstrate the management skills through effective communication, presentation, leadership skills and motivate team members for obtaining targets of organization and individual team member.
- Explain and apply budgetary control, inventory control and quality control Theory with the help of case study.

UNIT – WISE SYLLABUS

UNIT-I
Management practices- Meaning and Functions, Development of Management Thought, F.W. Taylor and Herry Fayol's Theories of Management, Qualities of an Efficient Management, Management Principles of Modern Times (Empowerment, Kaizen, Quality Circles, and Total Quality Management.

UNIT-II
Planning-Plan, policies, strategies and programs, steps in planning & decision making, forecasting, qualities of an effective planner, relevant case study

UNIT-III
Organizing-Organizational Design, Organizational Structure, Centralization & Decentralization, Delegation, Gantt chart and PERT / CPM, Relevant Case Study

UNIT-IV
Directing-Motivation and teambuilding, theories of motivation, factors affecting motivation.
Leadership, leadership styles, theories of leadership, qualities of an effective leader, effective communication and presentation skills, relevant case studies

UNIT-V
Controlling Meaning and basic principles, types of controls, budget and budgetary control, inventory control and quality control relevant case studies.

TEXT & REFERENCE BOOKS
- Joseph L. Massie, Essentials of Management, Prentice Hall of India
- Biswajeet Patanayak, Human Resource Management, Prentice Hall of India
- Gomes-Mejia, Balkin& Hardy, Managing Human Resource, Prentice Hall of India
- Lesslic W. Rue Llyod Byurs, Management, Tata McGraw Hill
- Joseph M. Putti, Harold Koontz, Essentials of Management, An Asian Perspective, Tata McGraw hill
- David Boddy, Management: An Introduction, Pearson
- Laurie J. Mullins with Gill Christy, Management & Organisational Behaviour, Pearson

SEMESTER – III
3MCASEC(C) – DEVELOPMENT AND OPERATIONAL TOOLS (DEVOPS)

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 principles of continuous development and deployment.
* Understand and use AWS Services.
* Concepts of version control and using Git for version control
* Understand and use the container Technology
* Using DevOps tools like Git, Docker etc. in various aspects of DevOps delivery model.

COURSE OUTCOMES
* Explain the principles of continuous development and deployment of software.
* Using AWS Services
* Using Git for version control
* Use container Technology in Software development
* Using DevOps tools like Git, Docker etc in various aspects of DevOps delivery model.

UNIT – WISE SYLLABUS

UNIT-I
What is DevOps?, Why is DevOps is Needed?, How is DevOps different from traditional IT?, Why is DevOps used?, DevOps Lifecycle, DevOps Work Flow, DevOps Vs Agile, DevOps Principles, Roles, Responsibilities, and Skills of a DevOps Engineer, Various DevOps Tools
Amazon Web Services - Cloud Computing, Advantages, Types of Cloud Computing, Amazon Web Services Cloud Platform Overview, Features of Elastic Compute Cloud (EC2), AWS Services, AWS Management Console, AWS Command Line Interface, Region, availability Zone and edge location, Amazon EC2 root device volume, Creating and Launching EC2 windows and Linux Instances, Connecting to Linux and Windows Instances, Managing Security Group, Identity access Management (IAM), Create IAM users and Group, Assign policy to IAM users and Groups, Configure IAM roles to access AWS resources

UNIT-II
Version Control with Git - About Version Control, Local Version Control Systems, Centralized Version Control Systems, Distributed Version Control Systems, What is Git?, A Short History of Git, difference between Git and any other VCS, The Three States of Git - modified, staged, and committed, Why Git for your organization, Install and Using Git, Common commands in Git, Working with Remote Repositories

UNIT-III
Container Technology - Introduction to Containers?, Benefits of Contain erization, How Do Containers Work?, Virtual Machines vs Containers, brief intro to Container Terminology, Overview of Container Architecture, Installing Container engine tool, Creating Containerized Services, Provisioning Containerized Services

UNIT-IV
Managing Containers - What is Container management, Benefits of Container management, Container management strategy, Pull Docker images from Docker hub, Managing the Life Cycle of Containers, Attaching Persistent Storage to Containers, Accessing containers, Managing Container Images - Accessing Registries (public and Private), Manipulating Container Images

UNIT-V
Creating Custom Container Images - Designing Custom Container Images, Building Custom Container Images with Docker file Configuration Management with Ansible - Introduction to Ansible, Ansible Installation, Configuring Ansible Roles, Write Playbooks, working with playbooks, manage ansible variables, Executing adhoc command, Ansible Variables

TEXT & REFERENCE BOOKS
* DevOps For Dummies 2ndIBMLimitedEdition by Sanjeev Sharma and Bernie Coyne
* DevOps_Revealed_by_International_DevOps_Certification_Academy
* Effective DevOps by Jennifer Davis & Katherine Daniels
* The DevOps Handbook_ How to Create World- Class Agility, Reliability, and Security in Technology Organizations.

LIST OF PRACTICALS

UNIT-I
1. Create AWS Account
2. Launch Linux and Windows Instances
3. Connecting to Linux and Windows Instances
4. Create IAM users and Groups
5. Manage IAM Policy and Roles

UNIT-II
1. Create github account
2. Create public and private repository
3. Working with github repository

UNIT-III
1. Installation of Docker / Podman / Rocket
2. Creating Containerized Services (Database and webserver instances)
3. Maria DB / My Sql / Nginx / Httpd

UNIT-IV
1. Persisting a MYSQL Database
2. Managing a MYSQL Container
3. Managing Images (tags)

UNIT-V
1. Creating Custom Container Images
2. Install ansible on control node
3. Execute adhoc command
4. Working with playbooks
5. Manage ansible variables

SEMESTER – III
3MCASEC(D) – ENTERPRISE RESOURCE PLANNING (ERP) AND CRM

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	3	70	30	0	100

COURSE OBJECTIVES
- The Definition of ERP and CRM Integration
- Five Key ERP, CRM Integration Benefits
- Typical Challenges with ERP, CRM Integration
- How to Create a Successful ERP, CRM Integration Strategy

COURSE OUTCOMES
- **Communicate with Employees:** Don't keep all your initial information about your ERP software implementation process with just your management team. Keep your employees in the loop and get their feedback throughout all your system implementation steps.
- **Be Flexible:** Workflow conflicts may crop up as you're going through the implementation process. You can avoid ERP implementation failure by building some flexibility into your strategy.
- **Do Your Research:** An ERP software implementation plan shouldn't be done on the fly. Research different types of software platforms, your organization's processes, and software implementation phases ahead of time to reduce your risk of failure.
- **Make a Roadmap:** You can't just assume that as soon as you download the new ERP software that everything will magically work. A successful ERP implementation takes careful planning and that includes timeframes, responsibility assignments, and KPIs to measure success.

UNIT – WISE SYLLABUS

UNIT-I

ERP Overview, Benefit, Common myths and evolving realities, Business Process Reengineering, Data ware Housing, Data Mining, LAP, Supply chain Management, ERP Drivers, Decision support system, ERP Domain.

UNIT-II

ERP -A Manufacturing Perspective, ERP Module, ERP Market, ERP implementation life cycle, Options of various paradigms, Identification of suitable platforms, Role of SDLC / SSAD, Object Oriented architecture. Framework for evaluating ERP acquisition, Analytical Hierarchy Processes (AHP), Applications of AHP in evaluating ERP, Selection of Weights, Role of consultants, vendors and users in ERP implementation; Implementation vendors evaluation criterion, ERP Implementation approaches and methodology, ERP implementation strategies, ERP Customization

UNIT-III

Critical success and failure factors for implementation, Model for improving ERP effectiveness, ERP implementation, Hidden costs, ERP success inhibitors and accelerators, Management concern for ERP success, Strategic Grid: Useful guidelines for ERP Implementations, Technologies in ERP Systems

UNIT-IV

Introduction to CRM, Definitions - Concepts and Context of relationship Management - Evolution - Transactional Vs. Relationship Approach - CRM as a strategic marketing tool - CRM significance to the stakeholders. Understanding Customers, Customer information Database - Customer Profile Analysis - Customer perception, Expectations analysis - Customer behavior in relationship perspectives; individual and group customer's - Customer life time value – Selection of Profitable customer segments

UNIT-V

CRM Structures, Elements of CRM - CRM Process – Strategies for Customer acquisition - Retention and Prevention of defection - Models of CRM – CRM road map for business applications. CRM Planning and Implementation, Strategic CRM planning process - Implementation issues - CRM Tools- Analytical CRM – Call Center Management - Role of CRM Managers

TEXT & REFERENCE BOOKS
- Lexis Leon, "Enterprise Resource Planning", TMH
- Brady, Manu, Wegner, "Enterprise Resource Planning", TMH
- Prof. Antony Lawrence, "Customer Relationship Management", Himalaya Publishing House

SEMESTER – IV
4MCACCC1 – 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 4MCACCE(B)
2. Paper 4MCASEC(A)
3. Paper 4MCASEC(B)
4. Paper 4MCASEC(C)

SEMESTER – IV
4MCACCC2 – PROJECT WORK

CC/CE/ SE/OE	L	T	P	Credit	End-Term Theory Exam Marks	Continuous Evaluation Marks	End-Term Practical Marks	Total Marks
CC	0	2	6	15	0	100	200	300

4MCACCC2 – PROJECT WORK – PROJECT GUIDELINES FOR MCA

WILL BE ANNOUNCED AT THE END OF THIRD SEMESTER
(I.E., AT THE BEGINNING OF FOURTH SEMESTER)

(Refer ANNEXURE – I)

SEMESTER – IV
4MCACCE(A) – CLOUD COMPUTING

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 get Introduced to various Computing Paradigms
- To Learn Fundamentals of Cloud Computing and managements.
- To Know Various Cloud Computing Technologies
- To Understand and implement Virtualization
- To study Technological Drivers for Cloud Computing
- To learn Data Storage in Cloud
- To Learn Elements and Services in Cloud Computing
- To Learn and implement Application Platform for Cloud Applications.
- To understand Various Cloud Services.
- To Know and implement Tools of Cloud Computing

COURSE OUTCOMES
- Describe the Key concepts, Advantages, Limitations and Applications of Cloud Computing
- Explain the various Models and services of Cloud.
- Understand and Describe the Core Issues and challenges of cloud computing Such as Security, Privacy, and Interoperability.
- Select and Apply Suitable Technologies, Tools and Applications in the Cloud Computing Driven Systems
- Design and develop the efficient solutions of the Cloud Computing problems and issues with consideration of environment and sustainable development.
- Analyze the interface requirement for deploying the Applications in Cloud

UNIT – WISE SYLLABUS

UNIT-I
Introduction to Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Biocomputing, Mobile Computing, Quantum Computing, Optical Computing, Nano-computing, Network Computing.
Cloud Computing Fundamentals: Motivation, Need, Definition, Principles, Characteristics, Four Cloud Deployment Models, Three Service Offering Models, Cloud Ecosystem, Requirements for Cloud Services, Cloud Computing Architecture – User / Client Layer, Network Layer, Cloud Management Layer, Hardware Resource Layer, Network Connectivity in Cloud Computing, Public Cloud Access Networking, Private Cloud Access Networking.

UNIT-II
Cloud Computing Management: Cloud Applications, Managing the Cloud, Managing the Cloud Infrastructure, Managing the Cloud Application, Migrating Application to Cloud, Cloud Deployment Models: Private Cloud, Outsourced Private Cloud, Community Cloud, On-Premise Community Cloud, Hybrid Cloud. Cloud Service Models: Infrastructure as a Service, Platform as a Service, Software as a Service, Introduction to Open-Source Tools for IaaS, PaaS & SaaS.

UNIT-III
Technological Drivers for Cloud Computing: SOA and Cloud, SOA and SOC, Benefits of SOA, Multicore Technology: Multicore Processors and VM Scalability, Memory and Storage Technologies, Cloud Storage Requirements, Networking Technologies, Web 2.0: Characteristics, Difference from Web 1.0, Applications, Social Media, Marketing, Education, Web 3.0: Components, Semantic Web, Web Services, Characteristics, Convergence of Cloud and Web 4.0, Connecting Information: Facebook, Agile Software Models: Agile SDLC for Cloud Computing, Features of Cloud SDLC, Agile Software Development Process, Advantages of Agile, Cloud Application Development Platforms: Windows Azure, Google App Engine, Forcecom, IBM Cloud Computing API

UNIT-IV
Virtualization: Full Virtualization, Para virtualization, Hardware-Assisted Virtualization, Hypervisor, OS Virtualization, Server Virtualization, Memory Virtualization, Storage Virtualization, Network Virtualization, Application Virtualization, Processor Virtualization, Memory Virtualization, Storage Virtualization, Network Virtualization, Data Virtualization, Application

Virtualization, Hypervisors, Types of Hypervisors, Security Issues and Recommendations, From Virtualization to Cloud Computing, VMware, Microsoft Hyper-V, Open Virtualization (Ovirt) overview

UNIT-V

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue Service, Microsoft Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM Smart Cloud, Security in Cloud Computing, Cloud General Challenges.

TEXT & REFERENCE BOOKS

- Essentials of CLOUD COMPUTING, K Chandrasekaran, CRC Press [ISBN: 3: 978-4822-0544-2]
- Raj Kumar Buyya, James Broberg, and RezeiM Goscinski - Cloud Computing: Principles and Paradigms-Wiley.
- Srinivasan, J.Suresh - Cloud Computing - A Practical Approach for Learning and Implementation, Pearson India, [ISBN 978131776513]
- Toby Velte, Anthony Velte, Robert Elsenpeter - Cloud Computing, A Practical Approach - McGraw Hill, ISBN: 0071626948
- Greg Schulz -Cloud and Virtual Data Storage Networking, Auerbach Publications, ISBN: 978-1439851739.
- Marty Poniatowski- Foundations of Green IT, ISBN: 978-0137043750.
- Learning Spring Application Development, Ravi Kant Soni, Packt Publishing.
- Michael Miller, Cloud Computing.
- Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, Cloud Computing for Dummies.
- Borko Furht, Armando Escalante, Handbook of Cloud Computing, Springer, 2010

LIST OF PRACTICALS

Suggested Practical for development of applications for following tasks / tools:
1. Install Virtual Machine
2. Create Virtual Machine
3. Manage Virtual Machine Images
4. Installing and Configuring Ovirt
5. Creating Managing Data Centers and Clusters
6. Adding Physical Hosts (Configure Hypervisors)
7. Managing User Accounts and Roles
8. Managing Red Hat Virtualization Storage
9. Deploying and Managing Virtual Machines
10. Managing Virtual Machine Images
11. Automating Virtual Machine Deployment

SEMESTER – IV
4MCACCE(B) – ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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
- To Understand the Concepts of Artificial Intelligence and Machine Learning such as supervised and unsupervised learning, knowledge representation, Possibility and probability theory and also get update about current and futuristic trends of AI problems and solutions.
- To Gain Knowledge of search space and search strategies, different algorithms of Supervised and Unsupervised Learning
- Understand the various architectures and activation functions, training and testing approach used in Artificial Neural Network and also acquire knowledge of expert systems.
- Understand the concepts of Fuzzy Logic, Genetic Algorithms, and apply them to solve the real-life problems.

COURSE OUTCOMES
- Demonstrate Artificial Intelligence Techniques, Various Types of Production Systems, and Characteristics of Production Systems.
- Design and implement Neural Networks using layers, various activation functions and Various Algorithms to solve real life problems.
- Analyze fuzzy nature problem and Design, implement and test the Fuzzy Inference Systems for vague nature real life problem
- Explain Genetic Algorithms theory, Design and validate the Genetic Algorithms based systems for search space driven problems.

UNIT – WISE SYLLABUS

UNIT-I
AI Introduction, The AI problems, AI technique, Characteristics of AI Applications, Current Trends in AI. Machine Learning: Machine Learning Overview, Design of a Learning system, Types of machine learning, Applications of machine learning, Variables and probabilities - Probability Theory, Probability distributions

UNIT-II
Problem Solving, General Problem Solving, Production Systems, Control Strategies Forward and Backward Chaining, Searching: Searching for Solutions, Uniformed Search Strategies - Breadth First Search, Depth First Search. Heuristic Search, Greedy Best First Search, Knowledge Representations Mapping & Issues

UNIT-III
Soft Computing: Introduction to Soft Computing, Soft Computing vs. Hard Computing, Various Types of Soft Computing Techniques, Applications of Soft Computing. Basic Concepts of Neural Network, Human Brain- Biological Neural Network, Evolution of Artificial Neural Network, Structure and Function of a Single Neuron, Difference Between ANN and Human Brain, Characteristics and Applications of ANN, Learning Methods, Activation Function, Neural Network Architecture.

UNIT-IV
Supervised Learning: Perceptron learning - Single layer, multilayer, Back propagation network, Unsupervised Learning Neural Networks - Competitive Learning Networks - Kohonen Self-Organizing Networks

UNIT-V
Introduction to expert system and application of expert systems, case studies, MYCIN Fuzzy Logic: Fuzzy Set Theory, Crisp Set, Fuzzy Set, Operations on Fuzzy Sets: Compliment, Intersections, Unions, Product, Difference, Properties of Fuzzy set. Genetic Algorithm: Fundamentals, Basic Concepts, Working Principle, Encoding, Fitness Function, Reproduction, Crossover, Mutation

TEXT & REFERENCE BOOKS
- Elaine Rich and Kevin Knight "Artificial Intelligence" - Tata McGraw Hill.
- Dan W. Patterson "Introduction to Artificial Intelligence and Expert Systems" – Prentice India.
- Nils J. Nilson "Principles of Artificial Intelligence", Narosa Publishing House
- Christopher Bishop, "Pattern Recognition and Machine Learning", Springer
- Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press

- Ethem Alpaydin, "Introduction to Machine Learning", MIT Press
- Tom Mitchell, "Machine Learning", McGraw-Hill
- Stephen Marsland, "Machine Learning - An Algorithmic Perspective", Chapman and Hall / CRC Press
- S. Rajasekaran & G.A. VijayalakshmiPai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI publication.
- S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications.

SEMESTER – IV
4MCACCE(C) – CYBER SECURITY

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 importance of taking a multi- disciplinary approach to cyber security
- To understand the cyber threat landscape, both in terms of recent emergent issues and those issues which recur over time
- To understand the roles and influences of governments, commercial and other organisations, citizens and criminals in cyber security affairs
- Identify general principles and strategies that can be applied to systems to make them more robust to attack
- Understand key factors in cyber security from different disciplinary views including computer science, management, law, criminology, and social sciences
- Identify various issues surrounding privacy, anonymity and pervasive passive monitoring
- Understand how to manage security incidents, including digital forensic principles

COURSE OUTCOMES

- Understand the importance of cyber security
- Understand various cyber security threats
- Understand the roles and responsibilities of governments, commercial and other organisations, citizens and criminals in cyber security affairs
- Apply general principles and strategies to systems to make them more robust to attack
- Identify various key factors in cyber security from different disciplinary views including computer science, management, law, criminology, and social sciences
- Identify various issues surrounding privacy, anonymity and pervasive passive monitoring
- Manage & response simple security incidents.

UNIT – WISE SYLLABUS

UNIT-I

Concepts and Definitions - Difference between IT Security, Information Security and Cyber Security, Assets, Cyber Security threats & Vulnerabilities, Likelihood, Consequence and Impact, Inherent Risk, Current Risk and Residual Risk, Cyber Threats — Cyber Warfare-Cyber Crime-Cyber Terrorism-Cyber Espionage, Need for a Comprehensive Cyber Security Policy, Ethical Hacking, Anonymity in Cyberspace.

Cyber Security Strategy - Supporting Business Goals and Objectives, Cyber Security Policy Framework, Awareness, Training and Education

Risk Management Concepts - Risk Avoidance, Mitigation, Transfer and Acceptance, Risk Appetite and Risk Tolerance

Threats and Opportunities - Assessing the current threat landscape, Advanced Persistent Threats, Bring Your Own Device or Technologies, The Internet of Things, Insourcing and Outsourcing, Controls and Enablers, Business Impact Analysis

UNIT-II

Security Architecture - The key role of security architecture, Concepts and Definitions, Security Architecture Frameworks. Security Architecture Design Principles, Service Models - In-sourcing, Managed Services, Cloud Services, OSI and TCP/IP Models, Cryptography - Symmetric, Asymmetric and Hashing Algorithms, Non- Repudiation, Real-world Use Cases, Overview of Firewalls - Types of Firewalls, User Management, VPN Security, Security Protocols: - security at the Application Layer- PGP and S / MIME, Security at Transport Layer- SSL and TLS, Security at Network Layer-IPSec.

UNIT-III

Implementing Security - Network Security - Routers, switches, firewalls, intrusion detection and prevention, Endpoint Security - Servers, desktop systems, laptops, tablets and mobile devices, Application Security - Software Development Lifecycle, OWASP Top 10, Web Application Firewall, Data Security - Data owners, data classification, labelling, Access control, Data governance and lifecycle, Data remanence

UNIT-IV

Cyberspace and the Law – Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013.

Cybercrime – Various types of cybercrimes, Privacy & Anonymity issues

UNIT-V

Business Continuity and Disaster Recovery Planning - Business Continuity Planning, Disaster Recovery Planning, BCP / DRP Training and Awareness, Testing and Maintenance of the BCP / DRP, Security Assurance - Vulnerability Assessments and Penetration Testing, Minimum Security Baselines

Incident Response – Detection - Auditing, logging and security technologies, Security Information and Event Management System (SIEM), Prevention - Authorisation, encryption, firewalls, intrusion prevention, anti-malware, Response — Security events and incidents, Legal aspects, Incident Response Process, Incident Management Team, Computer Forensics, CERT - In — Roles & Responsibilities.

TEXT & REFERENCE BOOKS

- Mayank Bhushan, Rajkumar Singh Rathore, Aatif Jamshed, Fundamentals of Cyber Security, BPB Publications, ISBN: 9789386551559
- Mark Merkow, Information Security: Principles and Practices, Pearson Education, ISBN: 9788131712887
- Nina Godbole, Sunit Belapure, Cyber Security, Wiley India, ISBN: 9788126521791
- Matt Bishop, Introduction to Computer Security, Pearson Education, ISBN: 8177584251
- Kumar K -Cyber Laws: Intellectual Property & E Commerce, Security, Dominant Publisher
- Information Security Policy & Implementation Issues, NIIT, PHI
- Marine R.C.- Cyber Crime Impact in the New Millennium, Auther Press

SEMESTER – IV
4MCASEC(A) – PROGRAMMING WITH GO

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 learn the fundamental programming concepts and methodologies which are essential to building good Go language programs.
- To Install and run the Go language environment on a PC &Create and execute Go language programs
- To practice the fundamental programming methodologies in the Go programming language via laboratory experiences.
- To code, document, test, and implement a well-structured, robust computer program using the Go programming language.
- To write Go Packages for reuse.

COURSE OUTCOMES
- Install and run the Go language environment on a PC
- Create and execute programs using basic data structures available in Go Language.
- Able to make Go language programs using functions, pointers, Structs and Methods.
- Demonstrate to develop program for file handling, databases and socket in Go language.
- Able to write reusable packages in Go language and use various programming concepts to solve different problems.

UNIT – WISE SYLLABUS

UNIT-I
Development Environment – Installation, Development Tools, Go Packages. Go Programming Language –Hello world in Go, Common Rule, Variables - Declaring & Assigning Variables, Comment, Arithmetic Operations, Mathematical Functions, Increment and Decrement, Getting Input from Keyboard, Comparison Operators, Logical Operators, Decision, if..then, switch..case, Iteration – for, Iteration - while, break and continue. Arrays, Slices and Maps - Array, Slice, Map

UNIT-II
Functions - Creating A Simple Function, Function with Parameters, Function with Returning Value, Function with Multiple Returning Values, Function with Multiple Parameters and Returning Value, Closure Function, Recursion Function, Testing. Pointers - Pointer in Go, Structs and Methods. String Operations, - Concatenating Strings, String To Numeric, Numeric to String, String Parser, Check String Data Length, Copy Data, Upper and Lower Case Characters, Testing A Program

UNIT-III
File Operations, Writing Data Into A File, Reading Data From A File, Writing All Error Handling and Logging - Error Handling, defer, panic(), and recover(), try..catch, Logging, Building Own Go Package - Creating Simple Module, Building Own Package

UNIT-IV
Concurrency, Goroutines, Synchronizing Goroutines, Channels Encoding, Encoding Base64, Hexadecimal, JSON, XML, CSV. Hashing and Cryptography, Getting Started, Hashing, Hashing with MD5, Hashing with SHA256, Hashing with Key Using HMAC, Testing, Cryptography - Symmetric Cryptography, Asymmetric Cryptography

UNIT-V
Database Programming- Database for Go, MySQL Driver for Go, Testing Connection, Querying. Socket Programming - Socket Module, Client / Server Socket, Server Socket, Client Socket, Testing

TEXT & REFERENCE BOOKS
- Guney Tarik Hands-On Go Programming by Paperback, Packt Publishing Limited, ISBN: 9781789531756, 9781789531756
- Alan A. A. Donovan, Brian W. Kernighan, The Go Programming Language by Paperback, Pearson, ISBN: 9789332569713, 9332569711
- Vivien Vladimir, Learning Go Programming by Paperback, Packt Publishing Limited, ISBN: 9781784395438, 9781784395438
- Caleb Doxsey, An Introduction to Programming in GO, Online available at - https://www.golang-ook.com/public/pdf/gobook.3186517259.pdf

- Alan Donovan and Brian Kernighan, The Go Programming Language, Addison-Wesley Professional Computing Series) Kindle Edition
- Agus Kurniawan, Go Programming by Examples, Kindle Edition, PE Press
- William Kennedy, Go In Action, Paperback, Manning Publications
- Mark Summerfield, Programming in Go, Paperback, Addison Wesley

LIST OF ONLINE RESOURCES
- Go Language Download Page - https://golang.org/
- Go Language Official Documentation Page - https://golang.org/doc/
- Golang Tutorial – Learn Go Programming Language = https://www.geeksforgeeks.org/golang- tutorial-learn-go-programming-language/
- https://www.tutorialspoint.com/go/index.htm
- https://gobyexample.com/
- http://www.golangbootcamp.com/book
- https://www.cosmiclearn.com/go/

LIST OF PRACTICALS
1. Create a program with comments that shows your name and address
2. Create a program that holds your name in a string.
3. Get a number and a string from the console and check if the numbers is between 1 and 10 and the string length is not greater than 10.
4. Create a program that calculates the average weight of 5 people.
5. Create an array with the number 0 to 10
6. Create an array of strings with names
7. Make a program with loop that counts from 1 to 10.
8. Check if a file exists on your local disk or on an external disk?
9. Create a new file containing names and read it into an array
10. Write a list of cities to a new file.
11. Write a program which uses the package has the rename function.
12. Create a struct house with variables no, Rooms, price and city
13. Create a method that sums two numbers
14. Create a method that calls another method.
15. Write a program that uses a goroutine

SEMESTER – IV
4MCASEC(B) – BLOCKCHAIN TECHNOLOGY

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 provide conceptual understanding of how blockchain technology
- To provide conceptual understanding of how blockchain technology can be used to innovate and improve business processes
- To acquire skills to develop blockchain based solutions and write smart contract using Hyperledger Fabric and Ethereum frameworks.
- To develop & integrate ideas from various domains and implement them using block chain technology in different perspectives

COURSE OUTCOMES
- Understand block chain technology
- Develop blockchain based solutions and write smart contract using Hyperledger Fabric and Ethereum frameworks.
- Build and deploy block chain application for on premise and cloud-based architecture.
- Integrate ideas from various domains and implement them using block chain technology in different perspectives

UNIT – WISE SYLLABUS

UNIT-I
Distributed computing introduction, Electronic Cash System introduction, The shortcomings of current, transaction systems, Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block in a Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, Understanding Crypto currency to Block chain, Permissioned Model of Block chain, Overview of Security aspects of Block chain

UNIT-II
Cryptography- encryption and decryption model, services-Confidentiality, Integrity, Authentication, Non-repudiation and Accountability, Symmetric cryptography, Asymmetric cryptography, Cryptographic Hash Function, Properties of a hash function, SHA-256, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic cryptocurrency.

UNIT-III
Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay. Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in a Bitcoin network, Proof of Work (PoW) - basic introduction, Hashcash PoW, Bitcoin PoW, Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

UNIT-IV
Permissioned Block chain: Permissioned model and use cases, Design issues for Permissioned block chains, Execute contracts, State machine replication, Overview of Consensus models for permissioned block chain- Distributed consensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem, Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT over Asynchronous systems.
Enterprise application of Block chain: Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, Identity on Block chain

UNIT-V
Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric, Writing smart contract using Ethereum, Overview of Ripple and Corda

TEXT & REFERENCE BOOKS
- Mastering Blockchain by Imran Bashir, Packt Publishing Ltd. ISBN 978-1-78883-904-4
- Mastering Bitcoin by Andreas M. Antonopoulos, O'Reilly Media, Inc.
- Blockchain For Dummies, IBM Limited Edition by Manav Gupta, John Wiley & Sons, Inc., ISBN: 978-1-119-37123-6 (pbk); ISBN: 978-1-119-37139-7 (ebk)
- BLOCKCHAIN E-BOOK by Cybrosys Limited Edition

- Melanie Swan, "Block Chain: Blueprint for a New Economy", O'Reilly, 2015
- Josh Thompsons, "Block Chain: The Block Chain for Beginners - Guide to Block Chain Technology and Leveraging Block Chain Programming"
- Daniel Drescher, "Block Chain Basics", Apress; 1st edition, 2017
- Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna Publishing House, Delhi
- Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Packt Publishing
- Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Block Chain", Packt Publishing
- Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, "Hands-On Block Chain with Hyperledger: Building Decentralized
- Applications with Hyperledger Fabric and Composer", Import, 2018

LIST OF PRACTICALS
1. Install and understand Docker container, Node.js, Java and Hyperledger Fabric, Ethereum and perform necessary software installation on local machine / create instance on Cloud to run.
https://github.com/hyperledger/
https://docs.docker.com/get-started/
https://console.ng.bluemix.net/docs/services/blockchain/index.html
https://console.bluemix.net/docs/containers/container_index.html#container_index
2. Create and deploy a block chain network using Hyperledger Fabric SDK for Java Set up and initialize the channel, install and instantiate chain code, and perform invoke and query on your block chain network
(https://developer.ibm.com/patterns/create-and-deploy-blockchain-network-using-fabric-sdk-java/)
3. Interact with a block chain network. Execute transactions and requests against a block chain network by creating an app to test the network and its rules
(https://developer.ibm.com/patterns/interacting-with-a-blockchain-network/)
4. Deploy an asset-transfer app using block chain. Learn app development within a Hyperledger Fabric network
(https://developer.ibm.com/patterns/deploy-an-asset-transfer-app-using-blockchain/)
5. Use block chain to track fitness club rewards. Build a web app that uses Hyperledger Fabric to track and trace member rewards
(https://developer.ibm.com/patterns/fitness-club-rewards-points-iot-and-retail-integration/)
6. Car auction network: A Hello World example with Hyperledger Fabric Node SDK and IBM Block chain Starter Plan. Use Hyperledger Fabric to invoke chain code while storing results and data in the starter plan
(https://developer.ibm.com/patterns/car-auction-network-hyperledger-fabric-node-sdk-starter-plan/)
7. Develop an IoT asset tracking app using Block chain. Use an IoT asset tracking device to improve a supply chain by using Block chain, IoT devices, and Node-RED
(https://developer. ibm.com/patterns/develop-an-iot-asset-tracking-app-using-block chain/)
8. Secure art using block chain digital certificates. Node.js - based auction application can help democratize the art market
(https://developer.ibm.com/patterns/securing-art-using-blockchain-digital-certificates/)
9. Mini projects such as:
   - Block chain for telecom roaming, fraud, and overage management. See how communication service providers use block chain to enhance their value chains
https://developer.ibm.com/patterns/blockchain-for-telecom-roaming-fraud-and-overagemanagement/
   - Use IoT dashboards to analyze data sent from a Block chain network. Build an IoT app and IoT dashboards with Watson IoT Platform and Node-RED to analyze IoT data sent from a Block chain network
https://developer.ibm.com/patterns/iot-dashboards-analyze-data-blockchain-network/)
   - Create an Android app with Block chain integration. Build a Block chain enabled health and fitness app with Android and Kubernetes
https://developer.ibm.com/patterns/create--an-android-app-with-blockchain-integration/
   - Create a global finance block chain application with IBM Block chain Platform Extension for VS Code. Develop a Node.js smart contract and web app for a Global Finance with block chain use case
https://developer.ibm.com/patterns/global-financing-use-case-for-blockchain/
   - Develop a voting application using Hyperledger and Ethereum. Build a decentralized app that combines Ethereum's Web3 and Solidity smart contracts with Hyperledger's hosting Fabric and Chain code EVM
https://developer.ibm.com/patterns/voting-app-hyperledger-ethereum/
   - Create a block chain app for loyalty points with Hyperledger Fabric Ethereum Virtual Machine. Deploy Fabric locally with EVM and create a proxy for interacting with a smart contract through a Node.js web app
https://developer.ibm.com/patterns/loyalty-points-fabric-evm/

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SEMESTER – IV
4MCASEC(C) – DIGITAL MARKETING

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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
- The Digital Marketing career track is a program that gives the opportunity to understand the balance between the Creative, Technology and Analytical part of Digital Marketing.
- The Marketing landscape is changing and Digital is playing an integral part in how brands grow.
- It will be learning practical skills on how to create and execute and effective Digital Marketing strategy by leveraging a range of digital marketing tools, tactics and techniques.

COURSE OUTCOMES
- Develop an effective Digital Strategy
- Understand the role of Digital Marketing in integrated marketing communications
- Target and grow the right audience for your brand
- Optimize a multi-channel marketing campaign using web Analytics
- Create engaging and high-impact marketing content
- Search Engine Optimization and Pay-Per Click Advertising
- Develop Email Marketing Strategies that convert
- Understand Growth Hacking
- Data Analytics
- Roll-Out and Take to Market Strategy

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UNIT – WISE SYLLABUS

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UNIT-I
Digital Marketing - Introduction, Key terms and concepts, understanding marketing strategy, The building blocks of marketing strategy, Crafting a digital marketing strategy, Case study: Nike digital strategy
Market Research - Introduction, importance of market research, Key terms & concepts in market research, Online research methodologies, Justifying the cost of research, Tools of the trade, Advantages and challenges, Case Study: Rocking the Daisies – 2011 & 2012
Content Marketing Strategy - Introduction, Defining Content marketing, Key terms and concepts, Strategic building blocks, Content creation, Content channel distribution, Tools of the trade, Advantages and challenges, Case study: Coca-Cola Company.

UNIT-II
User Experience Design - Introduction, Key terms and concepts, Understanding UX design, Core principles of UX design, Mobile UX, Step in UX design, Tools of the trade, Case study: Rail Europe
Web Development and Design - Introduction, Key terms and concepts, Web design, Web development, Mobile development, Steps in building a website, Case study – The Boston Globe
Writing for Digital - Introduction, Key terms and concepts, Writing for your audience, Types of web copy, HTML for formatting, SEO copywriting, Best practices for online copywriting, Tools of the trade, Case study: Encyclopaedia Britannica Online

UNIT-III
Customer Relationship Management - Introduction, Key terms and concepts, A CRM model, Understanding customers, CRM and data, The benefits of CRM, Social CRM, Steps in implementing a CRM strategy, Tools of the trade, Case study: Fuji Xerox
Search Engine Optimisation (SEO) - Introduction, Key terms and concepts, Understanding SEO, Search engine friendly website structure, SEO and key phrases, Link popularity, User insights, What not to do, Tools of the trade, Benefits and challenges, Case study: Viewpoints.com and the Panda update
Search Advertising - Introduction, Key terms and concepts, Advertising in search, The elements of a search ad, Targeting options, Bidding and ranking for search ads, Tracking, Planning and setting up a search advertising campaign, Tools of the trade, Advantages and challenges, Case study – 'Sister Act' on Broadway

UNIT-IV
Online Advertising - Introduction, Key terms and concepts, Online advertising objectives, The key differentiator, Types of display adverts, Payment models for display advertising, Getting your ads online, Targeting and optimising, Tracking, Steps in online advertising, The future of online advertising, Advantages and challenges, Case study: Toyota Prius

Affiliate Marketing - Introduction, Key terms and concepts, The building blocks of affiliate marketing, Setting up a campaign, Tools of the trade, Advantages and challenges, Case study.

Video Marketing - Introduction, Key terms and concepts, Video content strategy, Video production step by step, Video promotion, Tools of the trade, Advantages and challenges, Case study – Woolworths: 'Cook like a MasterChef' for MasterChef South Africa

UNIT-V

Social Media Channels - Introduction, Key terms and concepts, Social media channels, Social networking, Content creation, Bookmarking and aggregating, Location and social media, Tracking social media campaigns, Social media marketing: Rules of engagement, Tools of the trade, Advantages and challenges, Case study - Col'Cacchio #PriceSlice

Social Media Strategy - Introduction, Key terms and concepts, Using social media to solve business challenges, Step-by-step guide to creating a social media strategy, Documents and processes, Dealing with opportunities and threats, Step-by-step guide for recovering from an online brand attack, Social media risks and challenges, Case study – Super Bowl Social Media Command Center

Email Marketing - Introduction, Key terms and concepts, Email strategy and planning, Step by-step process, Tools of the trade, Advantages and challenges, Case study - Zando

Mobile Marketing - Introduction, Key terms and concepts, The role of mobile in personal communication, Mobile messaging channels, Location and mobile, Mobile commerce, Integrating mobile into online marketing, Augmented reality, Mobile analytics, Advantages and challenges, Case study – Carling Black Label's "Be the Coach"

TEXT & REFERENCE BOOKS
- eMarketing: The Essential Guide to Marketing in a digital world, 5th Edition, Rob Stokes and the Minds of Quirk, Availbale online at https://www.redandyellow.co.za/content/uploads/woocommerc_uploads/2017/10/emar
- keting_textbook_download.pdf
- Ryan Deiss, Russ Henneberry - "Digital Marketing for Dummies", John Wiley & Sons.
- AhujaVandana- "Digital Marketing", Oxford University Press.
- Ira Kaufman, Chris Horton-"Digital Marketing: Integrating Strategy and Tactics with Values, A Guidebook for Executives, Managers, and Students", Routledge,
- Matt Chiera- "Digital Marketers Sound Off: Tips, Tactics, Tools, and Predictions from 101 Digital Marketing Specialists", Matt Chiera,
- Puneet Bhatia- "Fundamentals of Digital Marketing", Pearson India
- Dan Zarrella- "The Social Media Marketing Book", O'Reilly Media.
- Krista Neher- "Visual Social Media Marketing: Harnessing Images, Instagram, Infographics and Pinterest to Grow Your Business Online", Boot Camp Digital.
- Damian Ryan, Understanding Digital Marketing Strategies for Engaging the Digital Generation

SEMESTER – IV
4MCASEC(D) – DATA VISUALIZATION

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
- Acquire and develop the skills for both design and critique visualizations through Conducting Exploratory and Explanatory analysis of data using visualization.
- Understand the importance data visualization, type of data and its impacts on data visualization.
- Understand and learn the principles of perception for Crafting visual presentations of data for effective communication and evaluation of visual design alternatives.

COURSE OUTCOMES
- Prepare data for visualization and analysis.
- Demonstrate and apply Exploratory and Explanatory analysis skills for data visualization and evaluation of visual alternatives.
- Explain the importance data visualization, type of data and its impacts on data visualization.
- Demonstrate the color palettes, principles of perception and cognition and apply them for crafting visual presentations of data for effective communication and evaluation of visual design alternatives.

UNIT – WISE SYLLABUS

UNIT-I
Introduction to data visualization, The data visualization process, Importance of Data visualization, Model of communication systems, Types of Communication Problems- technical, semantic and effectiveness, Data types, relationships, and visualization formats, Basic principles for data visualization - Principles of Communicating Data- Know your goal, use the right data, select suitable visualizations, design for aesthetics, choose an effective medium and channel, check the results, Data story telling for social and market communication, Trends in market research and data visualization dashboards

UNIT-II
Tableau - Introduction, Features, Tableau Products, Tableau Architecture, Download and Installation of Tableau, Using Workspace Control, Tableau User Interface, Workspace, Toolbar, Menu, Sheets, Dashboards, Data Window, Data Types, File Types

UNIT-III
Data Connection with Data Sources like Text File and Microsoft Excel Tableau Calculation-Function, Field, Operator, Literal, Parameter, and Comment, Tableau Operators- General operators, Arithmetic operators, Relational operators and Logical operators. Tableau functions- Number functions, String functions, Date functions, Logical functions and Aggregate functions, Tableau Basic Filters

UNIT-IV
Visual displays of information- Simple text, Tables, Graphs, Points, Lines, Bars, Area Tableau Charts& Graphs- Bar Chart, Line, Pie, Bubble, Bump, Gantt, Crosstab, Motion, Scatterplot, Heatmap, Waterfall Etc.

UNIT-V
Clutter, Gestalt Principles of Visual Perception - proximity, similarity, enclosure, closure, continuity, and connection. Types of visual clutter- Lack of visual order, Alignment, White space and Non- strategic use of contrast, pre-attentive attributes.

TEXT & REFERENCE BOOKS
- Visualize It!: A Comprehensive Guide to Data Visualization by Netquest Available online at https://www.netquest.com/en/download-ebook-data-visualization
- Data Visualization Techniques Angie Ficek Available online at https://www.cehd.umn.edu/OLPD/MESI/spring/2015/Ficek-DataVis.pdf
- Ben Jones, Communicating Data with Tableau O'Reilly Media, Inc. Publication, ISBN: 978-1-449-37202-6
- Claus O. Wilke, Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures, O'Reilly Media, Inc. Publication, ISBN: 9781492031086
- Cole Nussbaumer-knaflic, Storytelling with Data, John Wiley Publication, ISBN: 9781119002062 (ePub)
- Interactive Data Visualization - Foundations, Techniques, and Applications by Matthew Ward, Georges Grinstein, Daniel Keim, CRC Press, Taylor & Francis Group

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MASTER OF COMPUTER APPLICATIONS

(MCA)

PROJECT GUIDELINES

DEPARTMENT OF COMPUTER SCIENCE / APPLICATIONS

INTRODUCCTION

The project work constitutes a major component in most professional programmes. It needs to be carried out with due care, and should be executed with seriousness by the students. Students are eligible to submit the project proposals any time after entering the 4th semester of MCA.

OBJECTIVES

The objective of the project is to help the student develop the ability to apply theoretical and practical tools / techniques to solve real life problems related to industry, academic institutions and research laboratories. After the completion of this project work, the student should be able to:

- Describe the Systems Development Life Cycle *(SDLC)*.
- Evaluate systems requirements.
- Complete a problem definition.
- Evaluate a problem definition.
- Determine how to collect information to determine requirements.
- Perform and evaluate feasibility studies like cost-benefit analysis, technical feasibility, time feasibility and Operational feasibility for the project.
- Work on data collection methods for fact finding.
- Construct and evaluate data flow diagrams.
- Construct and evaluate data dictionaries.
- Evaluate methods of process description to include structured English, decision tables and decision trees.
- Evaluate alternative tools for the analysis process.
- Create and evaluate such alternative graphical tools as systems flow charts and state transition diagrams.
- Decide the Software requirement specifications and H/W requirement specifications.
- Plan the systems design phase of the SDLC.
- Distinguish between logical and physical design requirements.
- Design and evaluate system outputs.
- Design and evaluate systems inputs.
- Design and evaluate validity checks for input data.
- Design and evaluate user interfaces for input.
- Design and evaluate file structures to include the use of indexes.
- Estimate storage requirements.
- Explain the various file update processes based on the standard file organizations.
- Decide various data structures.
- Construct and evaluate Entity-Relationship *(ER)* diagrams for RDBMS related projects.
- Perform normalization for the un-normalized tables for RDBMS related projects
- Decide the various processing systems to include distributed, client / server, online and others.
- Perform project cost estimates using various techniques.
- Schedule projects using both GANTT and PERT charts.
- Perform coding for the project.
- Documentation requirements and prepare and evaluate systems documentation.
- Perform various systems testing techniques / strategies to include the phases of testing.
- Systems implementation and its key problems.
- Generate various reports.
- Be able to prepare and evaluate a final report.

- Brief the maintenance procedures and the role of configuration management in operations.
- To decide the future scope and further enhancement of the system.
- Plan for several appendices to be placed in support with the project report documentation.

TYPE OF PROJECT

The majority of the students are expected to work on a real-life project preferably in some industry / Research and Development Laboratories / Educational Institution / Software Company. However, it is *not mandatory* for a student to work on a Real – Life Project. The student can formulate a project problem with the help of her / his Guide and submit the project of the same. The student can commence working on it.

ELIGIBILITY OF PROJECT GUIDE

1. A person having Ph.D. / M.Tech. in Computer Science.

or

2. A person having B.E. / B.Tech. *(Computer Science)*, MCA, M.Sc. *(Computer Science)* with minimum 5 years' experience, preferably in software development.

PROJECT REPORT FORMULATION

The project report should contain the following:

1. **Cover Page / Title of the Project** *(Format given on Pg. No. 6)*.
2. **Acknowledgement** *(Format given on Pg. No. 7)*.
3. **Deceleration** *(Format given on Pg. No. 8)*.
4. **Bio Data of the guide with her / his signature and date.**
5. **Certificate of Originality** *(Format given on Pg. No. 9)*.
6. **Certificate issued by the organization** *(from where the project has been carried out)*.
7. **The Project Report documentation may be about 70 to 100 pages** *(excluding coding)* **which should include the following topics** *(as per the project requirements)*.

- Table of Contents / Index with page numbering
- Introduction / Objectives / Scope of the project
- Theoretical Background
- Project Category *(RDBMS / OOPS / Networking / Multimedia / Artificial Intelligence / Expert Systems etc.)*
- System Planning *(PERT Chart, Gantt Chart)*
- System Analysis *(DFDs, ER Diagrams, Class Diagrams etc. as per the project requirements)*.
  - o Identification of Need / Definition of problem
  - o Preliminary Investigation
- Feasibility Study
  - o Technical Feasibility
  - o Economical Feasibility
  - o Operational Feasibility
- Software Engineering Paradigm applied
- Software and Hardware Requirement Specifications

- System Design
- A complete structure which includes:
  - Number of modules and their description to provide an estimation of the student's effort on the project.
  - Data Structures as per the project requirements for all the modules
  - Process Logic of each module
  - Reports generation.
- Coding
- Code Efficiency
- Optimisation of code
- Validation checks
- Implementation and Maintenance
  - Testing *(Testing techniques and Testing strategies used along with the test data and the errors listed for each test case).*
- System Security measures (Implementation of security for the S/W developed).
- Cost Estimation of the Project
- Reports.
- Overall network architecture (if required for your project)
- Future scope and further enhancement of the Project
- Bibliography
- Appendices (if any).
- Glossary.

SUBMISSION OF THE PROJECT REPORT

Only one hard copy of the **original project report** and **soft copy containing complete project and it's report** in bound form is to be submitted to the department concerned through registered insured by the date mentioned in the Calendar for the project.

A photocopy of the same Project Report must be retained by the student, which should be produced before the examiner at the time of viva-voce.

PROJECT EVALUATION

The **Continuous Evaluation / Internal Assessment** of the project work is evaluated for 100 marks. The **Project Report and Viva-voce** is evaluated for 200 marks. **Viva-voce is compulsory and forms part of evaluation**. **If a student fails to attend viva and seminar, her / his Project will remains incomplete.**

Student will be duly intimated about the viva-voce by a notice from the University / College / Department. Viva-voce will be held at the College / Department or at any work place as may be the case decided by the Examination Department. Viva-Voce will be conducted face-to-face. **Viva through telephone, e-mail or online is not permitted.** No student is allowed to take telephonic viva.

Unfair cases of copied versions of the project reports will be sent to Unfair Means Committee of University for action.

ENQUIRIES

Enquiries regarding the project reports should be addressed to the **department or concern faculty.**

IMPORTANT POINTS WHILE PREPARING THE PROJECT REPORT

1. The project report should be submitted in A-4 size *(29 x 20 cms)* typed in double space. Appropriate project report documentation should be done like how you have done the analysis, design, coding, use of testing techniques / strategies, etc., in respect of your project. To be more specific, whatever theory in respect of these topics is available in the reference books, should be avoided as far as possible. The project documentation should be in respect of your project.

2. If any project report is received in the absence of the bio-data of the guide with her / his signature on it and certificate of originality, it will be summarily rejected and returned to the student for compliance.

3. The project title throughout the project should be the same.

4. Only one properly bound original hard copy of the project report and soft copy of project and it's report is to be submitted to the department by registered insured and one photocopy of the same Project Report must be retained by the student which should be produced before the examiner at the time of viva-voce.

5. A photocopy of the project report is **not acceptable** for submission. This will facilitate sorting out project reports received by the department.

6. Preferably, not more than one student is permitted to work on a project. However, in case a project is comprehensive enough that requires three months or more time for its completion, then as per requirements of three months per student, at most two students may work on the same project. Prior approval in this regard must be obtained from the department.

7. If two students have been allowed to work on a project, the project reports by them must include only different modules undertaken / worked upon **individually.** Each student must submit a **separate** project reports related to her / his modules. **Completely identical project reports are not allowed**. Only introductory and possibly concluding remarks may be similar or common. Each student has to undergo all the phases / stages of the software project development life cycle.

8. In this case both the students must specify their names in both project reports**. A single copy of the project report comprising of work of two or more students shall not be entertained.**

9. Students are advised not to pay any fees / remuneration to the Project Guide as the University has no provision for paying remuneration to the guide.

10. Soft copy of project on CD / DVD in a thick envelope pasted inside of the back cover of the project report.

11. Before submission of the project and its' report, it must be verified by the faculty of the department *(i.e. Internal Guide)*.

12. Abstract of the project and its contents must be prepared in the form of presentation which is to be discussed in the Seminar. Questioners may be done by the other students, faculties and experts attending the seminar. Evaluation will be done on your presentation methodology.

NAME OF THE COLLEGE

COLLEGE LOGO
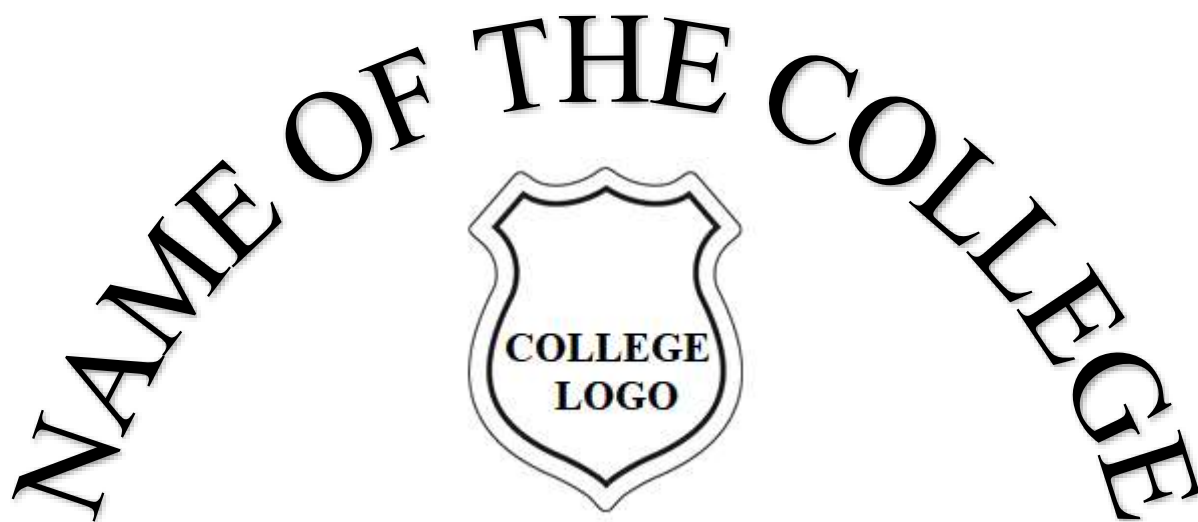
A PROJECT REPORT ON

TITLE OF THE PROJECT

For

Name of the company / organization

Submitted in partial fulfilment of the requirements for the award of the degree of Master of Computer Applications *(MCA)*

Department of Computer Science / Applications (MCA), Name of the College

Guide:
1. Full Name of External Guide / Supervisor

2. Full Name of Internal Guide / Supervisor

Submitted By:
Full Name of student
College Roll No.:
Univ. Exam Roll No.:
Univ. Regd. No.:
Session:

SUBMITTED TO

Patliputra University, Patna, Bihar

ACKNOWLEDGEMENT

In the "Acknowledgement" page, the writer recognises his indebtedness for guidance and assistance

of the thesis adviser and other members of the faculty. Courtesy demands that he also recognise

specific contributions by other persons or institutions such as libraries and research foundations.

Acknowledgements should be expressed simply, tastefully, and tactfully.

DECELERATION

This is to certify that the dissertation / project report entitled "_____"

is done by me is an authentic work carried out for the partial fulfilment of the requirements for the

award of the degree of Master of Computer Applications (MCA) under the guidance of Smt. /

Sh._____. The matter embodied in this project work has not been

submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student
(Name of the Student)
Univ. Exam. Regd. No.:
Univ. Exam. Roll No.:
Course:
Session:

CERTIFICATE OF ORIGINALITY

This is to certify that the project report entitled _____

submitted to **Patliputra University, Patna** in partial fulfilment of the requirement for the award

of the degree of **MASTER OF COMPUTER APPLICATIONS** *(MCA)* through the **Department**

of Computer Science / Applications *(MCA),* Name of the College, is original work carried out by

Ms / Mr_____ bearing college roll no. _____ and

University Registration No. _____ of the session _____

under my guidance / supervisor.

The matter embodied in this project is genuine work done by the student and has not been

submitted whether to this University or to any other University / College / Institute / Department for

the fulfilment of the requirement of any course of study.

………………………….   ..……………………….
Signature of the Student: Signature of the Guide

Date: ………………..   Date: …………………
Roll. No., Name,   Name, Designation
Course and Session   and Address of the
                                                                    Guide:
………………………..   ………………………..
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………………………..   ………………………..
………………………..   ………………………..

SOFTCOPY IN CD / DVD MUST CONTAIN THE FOLLOWING MATERIALS:

1. **All source codes in "Source Code" folder.**
2. **Database structure / Backup of database in "Database" folder.**
3. **Project report documentation in MS-Word file format in "Documentation" folder.**
4. **Presentation of project in MS-Power Point in "Presentation" folder.**

Softcopy in CD / DVD must be labelled in appropriate below given format and kept in envelop pasted inside the project report cover at back:

❀ ❀ ❀ ❀ ❀