DADI INSTITUTE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE STRUCTURE AND SYLLABUS

For PG –DR24

MASTER OF COMPUTER APPLICATIONS (MCA)

(For Two-Year PG Programme)

(Applicable for batches admitted from2024-2025)

DADI INSTITUTE OF ENGINEERING & TECHNOLOGY

ANAKAPALLE-531002, Andhra Pradesh, India

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COURSE STRUCTURE

I Semester

S. No	Course Code	Course Name	Category	L	T	P	Credits
1	DR24MCA1101	Business Communication	BS&H	2	0	0	2
2	DR24MCA1102	Mathematical and statistical Foundations	BS&H	3	0	0	3
3	DR24MCA1103	Computer Organization & Operating Systems	PC	3	1	0	4
4	DR24MCA1104	Data Structures	PC	3	0	0	3
5	DR24MCA1105	Object Oriented Programming With JAVA	PC	3	0	0	3
6	DR24MCA1106	Operating Systems and Linux Lab	LB	0	0	3	1.5
7	DR24MCA1107	Data Structures Lab	LB	0	0	3	1.5
8	DR24MCA1108	JAVA Programming Lab	LB	0	0	3	1.5
9	DR24MCA1109	Socially Relevant Project using Design Thinking	MC	0	0	1	0.5
			Total	15	1	10	20

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II Semester

S. No	Course Code	Course Name	Category	L	T	P	Credits
1	DR24MCA1201	Database Management Systems	PC	3	0	0	3
2	DR24MCA1202	Computer Networks	PC	3	0	0	3
3	DR24MCA1203	Software Engineering and Design Patterns	PC	3	0	0	3
4	DR24MCA1204	Data Warehousing and Mining	PC	3	0	0	3
5	DR24MCA1205A DR24MCA1205B DR24MCA1205C DR24MCA1205D DR24MCA1205E	**Elective-I** • No SQL Databases • Design and Analysis of Algorithms • Mobile Application Development • Artificial Intelligence • Accounting for Managers	PE	3	0	0	3
6	DR24MCA1206	DBMS Lab	LB	0	0	3	1.5
7	DR24MCA1207	Computer Networks Lab	LB	0	0	3	1.5
8	DR24MCA1208	Software Engineering and Design Patterns Lab	LB	0	0	3	1.5
9	DR24MCA1209	Employability Skills	MC	0	0	1	0.5
10	DR24MCA1210	Bridge Course (Python Programming To be taken through MOOCs)	MC	0	0	0	0
			Total	15	0	10	20

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III Semester

S. No	Course Code	Course Name	Category	L	T	P	Credits
1	DR24MCA2101	Machine Learning with Python	PC	3	0	0	3
2	DR24MCA2102	Internet of Things	PC	3	0	0	3
3	DR24MCA2103	Web Technologies	PC	3	0	0	3
4	DR24MCA2104	Cryptography and Network Security	PC	3	0	0	3
5	DR24MCA2105A DR24MCA2105B DR24MCA2105C DR24MCA2105D DR24MCA2105E	**Elective-II** • Soft Computing • Software Project Management • Cloud Computing • Optimization Techniques • Cyber Security	PE	3	0	0	3
6	DR24MCA2106	Machine Learning with Python Lab	LB	0	0	3	1.5
7	DR24MCA2107	IoT Lab	LB	0	0	3	1.5
8	DR24MCA2108	Web Technologies Lab	LB	0	0	4	2
9	DR24MCA2109	Internship/Industry Oriented Mini Project/ Skill Development Course (Minimum6-weeks)	PR	0	0	0	2
			Total	15	0	10	22

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IV Semester

S. No	Course Code	Course Name	Category	L	T	P	Credits
1	DR24MCA2201A DR24MCA2201B DR24MCA2201C DR24MCA2201D DR24MCA2201E	Elective-III* • Digital Marketing • Human Resource Management • Deep Learning • Ad-hoc and Sensor Networks • MOOCs-1(NPTEL/SWAYAM) - Full Stack Technologies - Any recommended course	PE	3	0	0	3
2	DR24MCA2202A DR24MCA2202B DR24MCA2202C DR24MCA2202D DR24MCA2202E	Elective-IV* • Network Programming • Block Chain technologies • Software Testing Methodologies • Big Data Analytics • MOOCs-2(NPTEL/SWAYAM) -Data Science -Any recommended course	PE	3	0	0	3
3	DR24MCA2203	Project Work/Dissertation	PR	0	0	0	12
			Total	6	0	0	18

***Students going for Industrial Project / Thesis will complete these courses through MOOCs (even in earlier semester)**

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I Semester		L	T	P	C
		2	0	0	2
BUSINESS COMMUNICATION(MCA1101)					

Course Objectives:
To acquaint the students with fundamentals of communication, help them honing oral, written and non- verbal communication skills and to transform them as effective communicators.

UNIT I:
Purpose and process of communication: Objectives of Communication-Process of Communication- Types of communication; noise, listening skills, Types of listening, essentials of good listening and tips.

UNIT II:
Managing Organizational Communication: Formal and Informal Communication- Interpersonal and Intrapersonal communication- Role of Emotion in Interpersonal Communication- Barriers to Interpersonal Communication – Exchange Theory-Gateways for Effective Interpersonal Communication.

UNIT III:
Non-verbal communication and Body Language: Kinesics, Proxemics, Paralanguage, Hap tics, handshakes, appropriate body language and mannerisms for interviews: business etiquettes- across different cultures.

UNIT IV:
Written communication: mechanics of writing, report writing- business correspondence- business letter format- Meetings and managing meetings- Resume Writing-Formats and Skills.

UNIT V:
Presentation skills: prerequisites of effective presentation, format of presentation; Assertiveness – strategies of assertive behavior; Communication skills for group discussion and interviews, Interview Techniques.

Note: Relevant case shave to bed is cussed in each unit and in examination case is compulsory from any unit.

Text Books:
1. Mallika Nawal: ―Business Communication, C engage Learning, New Delhi, 2012.
2. Edwin A. Gerloff, Jerry C. Wofford, Robert Cummins Organizational Communication: The key stone to managerial effectiveness.
3. Meenakshi Rama: ―Business Communication‖, Oxford University Press, New Delhi.

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4. C.S.G. Krishnamacharyulu and Dr. Lalitha Ramakrishnan, Business Communication, Himalaya Publishing House, Mumbai

Reference Books:

1. Paul Turner: — Organisational Communication‖, JAICO Publishing House, New Delhi.
2. Sathya Swaroop Debasish, Bhagaban Das‖—Business Communication‖, PHI Private Limited, New Delhi, 2009.
3. R.K. Madhukar: —Business Communication‖, Vikas Publishing House, NewDelhi,2012.
4. Kelly M Quintanilla, Shawn T. Wahl: —Business and Professional Communication‖, SAGE, New Delhi,2012.
5. Sangita Mehta, Neety Kaushish: —Business Communication, University Science Press, New Delhi, 2010.
6. Anjali Ghanekar: —Business Communication Skills‖, Everest Publishing House, New Delhi, 2011.

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I Semester		L	T	P	C
		3	0	0	3
MATHEMATICAL AND STATISTICAL FOUNDATIONS(MCA1102)					

Course Objectives:

This course is aimed at enabling the students to

- Understand the mathematical fundamentals that is prerequisites for variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems bioinformatics, Machine learning.
- Develop the understanding of the mathematical and logical basis to many modern techniques in computer science technology like machine learning, programming language design, and concurrency.
- Study various sampling and classification problems.

Course Outcomes:

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

- Apply the basic rules and theorems of probability theory such as Baye‘s Theorem, determine probabilities that help to solve engineering problems and to determine the expectation and variance of a random variable from its distribution.
- Able to perform and analyze of sampling, means, proportions, variances and estimates the maximum likelihood based on population parameters.
- Learn how to formulate and test hypotheses about sample means, variances and proportions and to draw conclusions based on the results of statistical tests.
- Design various ciphers using number theory.
- Apply graph theory for real time problems like network routing problem.

UNIT I:

Basic Probability and Random Variables: Random Experiments, Sample Spaces Events, the Concept of Probability the Axioms of Probability, Some Important Theorems on Probability Assignment of Probabilities, Conditional Probability Theorems on Conditional Probability, Independent Events, Baye’s Theorem or Rule. Random Variables, Discrete Probability Distributions, Distribution Functions for Random Variables, Distribution Functions for Discrete Random Variables, Continuous Random Variables

UNIT II:

Sampling and Estimation Theory: Population and Sample, Statistical Inference Sampling with and Without Replacement Random Samples, Random Numbers Population Parameters Sample Statistics Sampling Distributions, Frequency Distributions, Relative Frequency Distributions, Computation of Mean, Variance, and Moments for Grouped Data. Unbiased Estimates and Efficient Estimates PointEstimates and Interval Estimates. Reliability Confidence Interval Estimates of Population Parameters, Maximum Likelihood Estimates

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UNIT III:

Tests of Hypothesis and Significance: Statistical Decisions Statistical Hypotheses. Null Hypotheses Tests of Hypotheses and Significance Type I and Type II Errors Level of Significance Tests Involving the Normal Distribution One-Tailed and Two-Tailed Tests P Value Special Tests of Significance for Large Samples Special Tests of Significance for Small Samples Relationship between Estimation Theory and Hypothesis Testing Operating Characteristic Curves. Power of a Test Quality Control Charts Fitting Theoretical Distributions to Sample Frequency Distributions, The Chi-Square Test for Goodness of Fit Contingency Tables Yates' Correction for Continuity Coefficient of Contingency.

UNIT IV:

Algebraic Structures and Number Theory: Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism. Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat 's Theorem and Euler's Theorem)

UNIT V:

Graph Theory: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multi graphs, Planar Graphs, Euler 's Formula, Graph coloring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

Text Books:

1. Foundation Mathematics for Computer Science,1st Edition,JohnVince,Springer,2015
2. Probability & Statistics, 3rd Edition, Murray R. Spiegel, John J. Schiller and R. Alu Srinivasan, Schaum's Outline Series, Tata McGraw-Hill Publishers, 2018
3. Probability and Statistics with Reliability,2nd Edition,K.Trivedi,Wiley,2011
4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory,7th Edition, H. Rosen, Tata McGraw Hill, 2003.

Reference Books:

1. Probability and Computing: Randomized Algorithms and Probabilistic Analysis,1st Edition, M. Mitzenmacher and E. Upfal,2005
2. Applied Combinatorics, 6th Edition, Alan Tucker, Wiley,2012.

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I Semester		L	T	P	C
		3	1	0	4
COMPUTER ORGANIZATION & OPERATING SYSTEMS (MCA1103)					

Course Objectives:

The objectives of this course are to

Conceptualize the basics of organizational and architectural issues of a digital computer.

- Learn the function of each element of a memory hierarchy.
- Study various data transfer techniques in digital computer.

Course Outcomes:

(COs): At the end of the course, student will be able to

- Understandthebasicorganizationofcomputeranddifferentinstructionformatsandaddressing modes
- Analyze the concept of pipelining, segment registers and pin diagram of CPU.
- Understand and analyze various issues related to memory hierarchy
- Evaluate various modes of data transfer between CPU and I/O devices
- Examine various inter connection structures of multi processors

UNIT I:

Introduction: Basic Structure of Computers: Computer Types, Functional units, Basic Operational concepts, Bus structures, Software, Performance, multiprocessor and multi computers, Historical perspective.

Machine Instructions and Programs: Numbers, Arithmetic Operations, and c Characters, Memory locations and addresses, Memory operations, Instructions and Instruction sequencing, Addressing Modes, Assembly Languages, stacks and Queues Basic Input/output Operations, role of Stacks and Queues Additional Instructions

UNIT II:

Processing Unit: Fundamental Concepts: Register Transfers, Performing an Arithmetic or Logic Operation, fetching a Word from Memory, Execution of Complete Instruction, Hardwired Control, Micro Programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

UNIT III:

Introduction to Operating System Concept: Types of Operating Systems, Operating Systems Concepts, Operating System Operations. Operating Systems Structures- Operating System Services, User Operating-System Interface, Introduction to System calls, Types of System Calls.

Process Management: Process concept, Process State Diagram, Process control block, Process Scheduling, Inter process Communication, Threads- Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

UNIT IV:

Process Synchronization: The Critical-Section Problem, Peterson‘s Solution, Synchronization

Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Principles of

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deadlock: System Model, Deadlock characterization, Deadlock handling, Deadlock Prevention, Detection and Avoidance, Recovery Starvation, Critical Regions form Deadlock

UNITV:

Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation Virtual Memory Management- Demand Paging, Page-Replacement Algorithms, Thrashing. File-System Interface: File Concept, Access Methods, Directory structure, File-System mounting, Files Sharing, Protection. File-System implementation- File-System Structure, Allocation Methods, Free-Space Management, Disk Structure, Disk Scheduling

Text Books:

1. Computer Organization, Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5thed, Mc GrawHill.
2. Operating System concepts, 7thed, Abraham Siliberschatz, Galvin, John Wiley & Sons, Inc
3. Advanced Programming in the Unix environment by W. Richard Stevens

Reference Books:

a. Computer Architecture and Organization, John P.Hayes, 3rdEdition, McGraw Hill
b. Computer Organization and Architecture, William Stallings 6thEdition,Pearson/PHI
c. Operating Systems,6thEdition,WilliamStallings,PHI/Pearson
d. Unix and Shell Programming by B.M.Harwani, OXFORD University Press

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I Semester		L	T	P	C
		3	0	0	3
DATA STRUCTURES(MCA1104)					

Course Objectives:

The objective of this course is to explore basic data structures such as stacks and queues, introduce a variety of data structures such as hash tables, search trees, tries, heaps, graphs, sorting and pattern matching algorithms

Course Outcomes:

At the end of the course, student will be able to

- Implement basic programs by using C concepts.
- Select the data structures that efficiently model the information in a problem
- Assess efficiency trade-offs among different data structure implementations or combinations
- Implement and know the application of algorithms for sorting and pattern matching.

UNIT I:

Introduction to C: Constants and variables, Operators and Expressions, Managing Input and Output operators, Decision making-branching and looping, Arrays,

UNIT II:

Functions, Structures and Unions, Pointers, File handling in C.

UNIT III:

Data structure: Definition, types of data structures Recursion Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion. Preliminaries of algorithms, analysis and complexity. Linear list– singly linked list, Double linked list and circular linked list - implementation, insertion, deletion and searching operati6ons on linear list.

UNIT IV:

Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations. Hash Table Representation: hash functions, collision resolution- separate chaining, open addressing-linear probing, quadratic probing, double hashing and rehashing, extendible hashing.

UNIT V:

Sorting Techniques: Insertion sort, selection sort, exchange-bubble sort, quick sort and merge sort Algorithms. Trees: Binary Trees, terminology, representation and traversals- pre, post& in order traversals. Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion

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Text Books:

1. Let Us C: Authentic Guide to C Programming Language, 17thed., Yashavant Kanetkar, BPB Publications.
2. DataStructuresUsingC.2nd Edition,ReemaThareja,Oxford
3. DataStructuresandAlgorithmAnalysisinC,2nd ed,MarkAllenWeiss

Reference Books:

1. Data Structures: A Pseudo code Approach with C, 2ndEdition, R. F.Gilberg and B.A. Forouzan, Cengage Learning.
2. ProgramminginANSIC,5th ed,E. Balaguru swamy, TMH.

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I Semester		**L**	**T**	**P**	**C**
		3	0	0	3
OBJECT ORIENTED PROGRAMMING WITH JAVA (MCA1105)					

Course Objectives:

- To understand the basic concepts of object oriented programming concepts.
- To introduce the principles of inheritance and polymorphism and demonstrate how they are related to the design of abstract classes
- To understand the implementation of packages and interfaces
- To introduce the concept of multithreading and exception handling
- To learn and understand the design of Graphical
- User Interface using applets and swing controls

Course Outcomes:

At the end of the course, student will be able to

- Describe the uses OOP concepts
- Apply OOP concepts to solve real world problems
- Distinguish the concept of packages and interfaces
- Demonstrate the exception handing, multithread applications with synchronization
- Design the GUI based applications using AWT and Swings
- Discuss the Collection Framework

UNIT I:

Basics of Object Oriented Programming (OOP):Need for OO paradigm , A way of viewing world- Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of OOP concepts, coping with complexity, abstraction mechanisms. Java Basics: Data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects- concepts of classes, objects, constructors methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

UNIT II:

Inheritance: Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism, abstract classes. Packages and Interfaces: Defining, Creating and Accessing a package, Understanding CLASSPATH, Importing packages, differences between classes and interfaces, defining an interface, Implementing interface, applying interfaces variables in interface and extending interfaces.

UNIT III:

Exception handling and Multithreading: Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throws and finally, built in exceptions, creating own exception subclasses. Differences between multithreading and multitasking, thread life cycle, creating threads, synchronizing

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threads, daemon threads, thread groups.

UNIT IV:

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user- interface components-labels, button, canvas, scrollbars, text components, check box, check box groups, choices, list panes- scroll pane, dialogs, menu bar, graphics, layout manager- layout manager types- boarder, grid, flow, card and grid bag.

UNITV:

Applets:ConceptsofApplets,differencesbetweenappletsandapplications,lifecycleofanapplet, types of applets, creating applets, passing parameters to applets, Swings: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons-The JButton class, Check boxes, Radio Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees and Tables.

Text Books:

1. Java-Thecompletereference,7/e, Herbert Schildt, TMH
2. JAVA: How to program,8/e,Dietal, Dietal, PHI
3. Introduction of programming with JAVA, S.Dean, TMH
4. IntroductiontoJavaprogramming,6/e, Y .Daniel Liang, Pearson

Reference Books:

1) CoreJava2, Vol1(Vol2)Fundamentals(Advanced),7/e,Cay.S.Horstmann,GaryCornell,Pearson
2) BigJava2,3/e,Cay.S.Horstmann,Wiley
3) ObjectOrientedProgrammingthroughJava,P.RadhaKrishna,UniversityPress
4) JAVA&ObjectOrientationanIntroduction,2/e,JohnHunt,Springer
5) IntroductiontoJAVAProgramming,7/e,Y.DanielLiang,Pearson.,TMH

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I Semester		L	T	P	C
		0	0	3	1.5
OPERATING SYSTEMS AND LINUX LAB (MCA1106)					

Course Objectives:
This Course will enable students to implement CPU scheduling algorithms, Disk scheduling algorithms, Execute different types of Linux commands and Write shell scripts

Course Outcomes:
At the end of the course, student will be able to
- Implement various CPU scheduling algorithms and compare results
- Implement various disk scheduling algorithms and compare results
- Implement page replace algorithms
- Implement various memory management techniques.
- Execute basic Linux commands

List of Experiments:

UNIX Lab-Introduction to UNIX

1. Study of Unix/Linux general purpose utility commands
2. Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
3. Study of UNIX/LINUX File System(tree structure).
4. C program to emulate the UNIX l s –l command
5. C program that illustrates how to execute two commands concurrently with a command pipe. Ex:-l s –l | sort
6. Multi programming- Memory management-Implementation of fork(),wait(),exec() and exit(), System calls

Operating Systems Lab

1. Simulate the Following CPU Scheduling Algorithms A) FCFS B)SJF C)Priority D)Round Robin
2. Multiprogramming-Memory Management- Implementation of fork(), wait(),exec() and exit()
3. Simulate The Following

a. Multi programming with A Fixed Number Of Tasks (MFT)
b. Multi programming with A Variable Number Of Tasks (MVT)

4. Write a program to implement first fit, best fit and worst fit algorithm for memory management.
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Prevention.
7. Simulate The Following Page Replacement Algorithms. a) FIFO b)LRU c) LFU
8. Simulate the Following File Allocation Strategies a) Sequenced b)Indexed c)Linked

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Linux Lab

1. Write a Shell program to check whether given number is prime or not.
2. Write a shell script which will display Fibonacci series up to the given range.
3. Write a shell script to check whether the given number is Armstrong or not.
4. Write a shell script to the calculate the value of
5. Write a shell script to accept student number, name, marks in5subjects.
6. Find total, average and grade using the following rules: Avg >=80 then grade A Avg <80&&Avg>=70 then grade B Avg<70&&Avg>=60 then gradeC Avg<60&&Avg>=50 then grade D Avg<50&&Avg>=40 then grade E
7. Write a shell script to find minimum and maximum elements in the given list of elements.
8. Write a shell program to check whether the given string is palindrome or not.
9. Write a new program to print sum, avg of students marks list
10. Write a shell script to compute No.of character sand word sin each line of given file
11. Write a shell script to check whether the given input is a number or a string

Note: Fundamentals of UNIX and Linux to be taught in the lab.

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I Semester		L	T	P	C
		0	0	3	1.5
DATA STRUCTURES LAB(MCA1107)					

Course Objectives:

This Course will enable students to

- Design and implement various data structures.
- Implement operations like searching, insertion, and deletion, traversing mechanism
- Develop applications using data structure algorithms.

Course Outcomes:

At the end of the course, student will be able to

- Implement various basic data structures and its operations.
- Apply sorting and searching algorithms to given numbers
- Implement various tree operations.
- Implement various graphs algorithms.
- Develop applications using various data structures.

Experiment 1:

a) Write a program in C to display then terms of even natural number and their sum.

b) Write a program in C to display then terms of harmonic series and their sum.1+1/2+1/3+ 1/4 +1/5...1/n terms.

c) Write a C program to check whether a given number is an Armstrong number or not.

d) Write a C program to calculate the factorial of a given number.

Experiment2:

a) Write a program in C for multiplication of two square Matrices.

b) Write a program in C to find transpose of a given matrix.

Experiment3:

a) WriteaprograminCtocheckwhetheranumberisaprimenumberornotusingthefunction.

b) Writerecursiveprogramwhichcomputesthenth Fibonaccinumber,forappropriatevaluesof n.

c) Write a program in C to add numbers using call by reference.

Experiment4:

a) Write a program in C to append multiple lines at the end of a text file.

b) Write a program in C to copy a file in another name.

Experiment5:

Write recursive program for the following

a) Write recursive and non-recursive C program for calculation of Factorial of an integer.

b) Write recursive and non-recursive C program for calculation of GCD (n ,m)

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c) Write recursive and non-recursive C program for Towers of Hanoi: N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Experiment6:

a) Write C program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.

b) Write C program that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.

Experiment7:

a) Write C program that implement stack (its operations) using arrays.

b) Write C program that implement stack (its operations)using Linked list.

Experiment8:

a) Write a C program that uses Stack operations to convert in fix expression into post fix expression.

a) Write C program that implement Queue (its operations)using arrays.

b) Write C program that implement Queue (its operations)using linked lists.

Experiment9:

Write a C program that uses functions to create a singly linked list and perform various operations on it.

Experiment 10:

Write a C program to store a polynomial expression in memory using linked list and perform polynomial addition.

Experiment 11:

a) Write a recursive C program for traversing a binary tree in preorder, in order and post order.

b) Write a non recursive C program for traversing a binary tree in pre order, in order and post order.

Experiment 12:

a) Write a C program to implement Prims‘ algorithm.

b) Write a C program to implement Kruskal‘s algorithm.

Experiment 13:

Implementation of Hash table using double hashing a scollisionre solution function.

Experiment 14:

Implementation of Binary Search trees-Insertion and deletion.

Experiment 15:

a) Write C program that implement Bubble sort ,to sort a given list of integers in ascending order.

b) Write C program that implement Quick sort, to sort a given list of integers in ascending order.

c) Write C program that implement merge sort, to sort a given list of integers in

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ascending order.

I Semester		**L**	**T**	**P**	**C**
		0	0	3	1.5
JAVA PROGRAMMING LAB(MCA1108)					

Course Objectives:

- To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling and functions.
- TounderstandtheimportanceofClasses&objectsalongwithconstructors,Arraysand Vectors.
- Discuss the principles of inheritance, interface and packages and demonstrate though problem analysis assignments how they relate to the design of methods, abstract classes and interfaces and packages.
- TounderstandimportanceofMulti-threading&differentexceptionhandlingmechanisms.
- To learn experience of designing, implementing, testing, and debugging graphical user interfaces in Java using applet and AWT that respond to different user events.
- TounderstandJavaSwingsfordesigningGUIapplicationsbasedonMVCarchitecture

Course Outcomes:

At the end of the course, student will be able to

- Apply OOP concepts to solve real world problems
- Implement different forms of inheritance
- Create packages and tore use them.
- Implement multi threaded programs using synchronization concepts
- Create user defined exceptions
- Design GUI applications using AWT and SWINGS.

List of Experiments:

1. The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1,1. Every subsequent value is the sum ofthe2 values preceding it. Write a Java Program that uses both recursive and non recursive functions to print the nth value of the Fibonacci sequence.
2. Write a Java Program that prompts the user for an integer and then prints out all the prime numbers up to that Integer.
3. Write a Java Program that checks whether a given string is a palindrome or not .Ex. MALAYALAM is a palindrome.
4. Write a Java Program for sorting a given list of names in ascending order.
5. Write a Java Program that illustrates how runtime polymorphism is achieved.
6. Write a Java Program to create and demonstrate packages.
7. Write a Java Program, using String Tokenizer class, which reads a line of integers and then displays each integer and the sum of all integers.

8. Write a Java Program that reads on file name form the user then displays information about whether the file exists, whether the file is readable /writable, the

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type of file and the length of the file in bytes and display the content of the using File Input Stream class.

9. Write a Java Program that displays the number of characters, lines and words in a text/text file.
10. Write an Applet that displays the content to a file.
11. Write a Java Program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the+-*?% operations. Add a text field to display the result.
12. Write a Java Program for handling mouse events.
13. Write a Java Program demonstrating the life cycle of a thread.
14. Write a Java Program that lets users create Pie charts. Design your own user interface (with Swings & AWT).
15. Write a Java Program to implement a Queue, using user defined Exception Handling(also make use of throw, throws).

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I Semester		L	T	P	C
		0	0	1	0.5
SOCIALLY RELEVANT PROJECT USING DESIGN THINKING(MCA1109)					

Course Objectives:

- Build mind sets & foundations essential for designers
- Learn about the Human-Centered Design methodology and understand the real-world applications
- Use Design Thinking for problem solving methodology for investigating ill defined problems.
- Under go several design challenges and work towards the final design challenge

Apply Design Thinking on the following Streams to

- Project Stream1:Electronics,Robotics,IOTandSensors
- Project Stream2:Computer Science and IT Applications
- Project Stream3: Mechanical and Electrical tools
- ProjectStream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

How to Pursue The Project Work?

- The first part will be learning-based-masking students to embrace the methodology by exploring all the phases of design thinking through the wallet/ bag challenge and podcasts.
- The second part will be more discussion-based and will focus on building some necessary skills as designers and learning about complementary material for human-centered design.
- The class will then divide into teams and they will be working with one another for about 2 – 3 weeks. These teams and design challenges will be the basis for the final project and final presentation to be presented.
- TheteamsstartwithDesignChallengeandgothroughallthephasesmoreindepthfromcomin g up with the right question to empathizing to ideating to prototyping and to testing.
- Outside of class, students will also be gathering the requirements, identifying the challenges, usability, importance etc
- Attheend,Studentsarerequiredtosubmitthefinalreports,andwillbeevaluatedbythefaculty.

Tasks to be done:

Task1: Everyone is a Designer

- Understand class objectives & harness the designer mind set Task 2: The Wallet/Bag Challenge and Podcast
- Gain a quick introduction to the design thinking methodology
- Go through hall stages of the methodology Through a simple design challenge

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Task2:

- Podcast: Observe, Listen and Engage with the surrounding environment and identify a design challenge.

Task3: Teams & Problems

- Start Design Challenge and learn about teams & problems through this
- Foster team collaboration, find inspiration from the environment and learn how to identify problems

Task4: Empathizing

- Continue Design Challenge and learn empathy
- Learn technique son how to empathize with users
- Go to the field and interview people in their environments
- Submit Activity Card

Task 5: Ideating

- Continue Design Challenge and learn how to brain storm effectively
- Encourage exploration and foster spaces for brain storming
- Submit Activity Card

Task 6: Proto typing

- Continue Design Challenge and learn how to create effective prototypes
- Build tangible models and use the miscommunication tools
- Start giving constructive feedback to classmates and teammates
- Submit Activity Card

Task 7: Testing

- Finish Design Challenge and iterate prototypes and ideas through user feedback
- Evolve ideas and prototypes through user feedback and constructive criticism
- Get peer feedback on individual land group performance
- Submit Activity Card

Task 8:

- Final Report Submission and Presentation

Note: The colleges may arrange for Guest Speakers from Various Design Fields: Graphic Design, Industrial Design, Architecture, Product Design, Organizational Design, etc to enrich the students with Design Thinking Concept.

References:

1. TomKelly,TheArtofInnovation:LessonsinCreativityFromIDEO,America‘sLeading Design Firm (Profile Books, 2002)
2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (Harper Business, 2009)
3. JeanneLiedtka,RandySalzman,andDaisyAzer,DesignThinkingfortheGreaterGood: Innovation in the Social Sector (Columbia Business School Publishing, 2017)

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Other Useful Design Thinking Frameworks and Methodologies:

1. Human-CenteredDesignToolkit(IDEO);https://www.ideo.com/post/design-kit
2. Design Thinking Boot Camp Bootleg (Stanford D-School); https://dschool.stanford.edu/resources/the-bootcamp-bootleg
3. Collective Action Toolkit (frog design); https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT_2.0_English.pdf
4. DesignThinkingforEducators(IDEO);https://designthinkingforeducators.com/

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II Semester		**L**	**T**	**P**	**C**
		3	0	0	3
DATA BASE MANAGEMENT SYSTEMS(MCA2101)					

Course Objectives:

This Course will enable students to

- Explain the concept of databases, database management systems, database structures and how they work.
- Make use of Entity-Relationship Modeling and Relational Modeling for creating simple databases from the real world scenarios.
- Write relational algebra and structured query language (SQL)statements.
- Normalize a database using Normalization Rules.
- Discuss the issues associated with Transaction Management and Recovery, Tree Structured and Hash- Based Indexing

Course Outcomes:

At the end of the course the student will be able to

- Illustrate the concept of databases, database management systems, database languages, database structures and their work
- Apply ER modeling and Relational modeling for designing simple databases.
- Summarize the concepts related to relational model and SQL and Write database queries using relational algebra and structured query language.
- Design and develop databases from the real world by applying the concepts of Normalization.
- Outline the issues associated with Transaction Management and Recovery, Tree Structured and Hash-Based Indexing

UNIT I:

Introduction to Databases: Introduction, An Example, Characteristics of the Database Approach, Actor son Scene, Workers behind the scene, Advantages of Using the DBMS Approach ,A Brief History of Database Applications, When Not to Use a DBMS [Text book-3]

Overview of Database Languages and Architectures: Data Models, Schemas and Instances, Three- Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client/Server Architecture for DBMSs, Classification of Database Management Systems [Text book-3]

UNIT II:

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model, Conceptual Design for Large Enterprises

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Database Design: ER to Relational, Introduction to Views, Destroying/Altering Tables and Views

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UNIT III:

Relational Algebra: Selection and Projection, Set Operations, Renaming, Joins, Division, More Examples of Algebra Queries.

SQL: Queries, Constraints, Triggers: The Form of a Basic SQL Query, UNION, INTERSECT and EXCEPT, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Databases, Designing Active Databases.

UNIT IV:

Introduction to Normalization Using Functional and Multi valued Dependencies: Informal Design Guidelines for Relation Schema, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multi valued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

UNIT V:

Transaction Management and Concurrency Control: Transaction Concept, A Simple Transaction Model, Storage Structure, ACID Properties, Serializability, Transaction Isolation Levels, Concurrency Control, Lock-Based Protocols, Validation-Based Protocols [Text Book-2] Note: For Practical Examples Please Go Through Reference1

Text Books:

1) Database Management Systems, 3/e, Raghurama Krishnan,Johannes Gehrke ,McGraw-Hill
2) Database System Concepts, 6/e, Abraham Silberschatz, Henry F. Korth,S.Sudarshan,McGraw- Hill6
3) Database Systems,6/e Ra6mez Elmasri,ShamkantB. Navathe, Pearson

Reference Books:

1) Database Systems,9/e, CarlosCoronel, StevenMorris, PeterRob,Cengage
2) Introduction to Database Systems,8/e, CJDate,Pearson

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II Semester		**L**	**T**	**P**	**C**
		3	0	0	3
COMPUTER NETWORKS(MCA2102)					

Course Objectives:

At the end of the course, the students will be able to:

- Understands the fundamental concepts of computer networking and OSI Reference model.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Learn and understand the advanced networking concepts, preparing the student for entry advanced courses in computer networking.
- Develop and gain expertise in some specific are as of networking such as the design and maintenance of individual networks.

Course Outcomes:

At the end of the course, student will be able to

- Explain the network architecture, TCP/IP and OSI reference models
- Identify and understand various technique sand modes of transmission
- Demonstrate the data link protocols, multi-channel access protocols and IEEE802 standards for LAN
- Describer outing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme
- Discuss the elements and protocols of transport layer
- Develop network security and define various protocols such as FTP, HTTP, Telnet, DNS

UNIT I:

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models. Physical Layer –Introduction to physical layer-Data and Signals, Periodic analog signals, digital signals, transmission impairment, ,Data rate limits, performance - Introduction to Guided Media- Twisted-pair cable, Coaxial cable and Fiber optic cable and Unguided media: Wireless-Radio waves, microwaves, infrared.

UNIT II:

The Data Link Layer -Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction– Error- Correcting Codes–Error Detecting Codes. Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N- A Protocol Using Selective Repeat.

UNIT III:

The Medium Access Control Sub layer-The Channel Allocation Problem-Static Channel Allocation- Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Pure aloha- slotted aloha-Carrier Sense Multiple Access Protocols-Collision-Free Protocols-

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Limited Contention Protocols. Wireless LAN Protocols-Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sub-layer Protocol-Ethernet Performance-Fast Ethernet-Wireless LANs-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sub-layer Protocol- The 805.11 Frame Structure- Services.

UNIT IV:

The Network Layer Design Issues –Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical. Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding. Internet Working: How networks differ- How networks can be connected- Tunneling, internetwork routing-, Fragmentation, network layer in the internet – IP protocols-IP Version 4 protocol-, IP addresses-, Subnets-IP Version 6-The main IPV6 header-Internet control protocols- ICMP-ARP- DHCP.

UNIT V:

The Transport Layer: Transport layer protocols: Introduction-services- port number-User data gram protocol-User datagram-UDP services-UDP applications-Transmission control protocol: TCP services- TCP features- Segment- A TCP connection- windows in TCP- flow control-Error control. Application Layer–-World Wide Web: HTTP,FTP-Two connections-control connection-Data connection-security of FTP-Electronic mail-Architecture- web based mail- email security- TELENET-local versus remote Logging. Domain Name System: Name Space, DNS in Internet, - Resolution-Caching- Resource Records- DNS messages-Registrars-security of DNS Name Servers.

Text Books:

1) Computer Networks: Andrew S Tanenbaum DavidJ.Wetherall,5/e, Pearson
2) Data communications and networking: Behrouz Forouzan, 5/e, Mc GrawHill

Reference Books:

1) Computer Networks–A System Approach, Peterson, BruceDavie,2/e, Harcourt Asia
2) Compute communications and networking technologies, Gallo, Hancock, Cengage
3) An Engineering approach to compute net working, Kesha, Pearson

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II Semester		**L**	**T**	**P**	**C**
		3	0	0	3
SOFTWARE ENGINEERING AND DESIGN PATTERNS(MCA2103)					

Course Objectives:

- To understand the nature of software development and software life cycle models
- To understand methods of capturing, specifying, visualizing and analyzing software requirements.
- Understand the concept of Design patterns and its importance.
- Understand the behavioral knowledge of the problem and solutions.
- Relate the Creational, Structural, behavioral Design patterns.
- Apply the suitable design pattern store fine the basic design for given context.

Course Outcomes:

(COs): At the end of the course, student will be able to

- Define various software application domains and remember different process model used in software development.
- Explain needs for software specification so they can classify different types of software requirements and their gathering techniques.
- Convert the requirements model into the design model and demonstrate use of software and user interface design principles.
- Illustrate the appropriate design patterns to solve object-oriented design problems.
- Apply structural patterns to solve design problems.
- Evaluate the design solutions by using behavioral patterns.

UNIT I:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. (Text Book 3), The software problem: Cost, schedule and quality, Scale and change. Software Process: Process and project, component software process, Software development process models: Waterfall model, prototyping, iterative development, relational unified process, time boxing model, Extreme programming and agile process, using process models in a project, Project management process.

UNIT II:

Software requirement analysis and specification: Value of good SRS, requirement process, requirement specification, functional specifications with use-cases, other approaches for analysis, validation, Planning a software project: Effort estimation, project schedule and staffing, quality planning, risk management planning, project monitoring plan, detailed scheduling.

UNIT III:

Software Architecture: Role of software architecture, architecture views, components and connector view, architecture styles for C& C view, documenting architecture design, evaluating architectures, Design: Design concepts, function-oriented design, object oriented design, detailed design, verification, metrics.

Software Testing: Introduction, verification and validation, White box and black box

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techniques

UNIT IV:

Introduction: History and Origin of Patterns, Design Patterns in MVC, Describing Design Patterns, How Design Patterns Solve Design Problems, selecting a Design Pattern, Using a Design Pattern Design Patterns-1: Creational, Abstract Factory-Builder, Factory Method, Prototype-Singleton

UNIT V:

Design Patterns-2: Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy

Design Patterns-3:Behavioural Patterns, Chain of Responsibility, Command-Interpreter, Iterator- Mediator, Memento, Observer, State, Strategy, Template Method, Visitor

Text Books:

1) Software Engineering: A Practitioner's Approach, Roger S.Pressman, 10th ed, Mc GrawHill.
2) Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design patterns: Elements of Reusable object-oriented software, Addison-Wesley, 1995.
3) James WCooper, Java Design Patterns-A Tutorial, Addison-Wesley

Reference Books:

1) Software Engineering, 8/e,Sommerville,Pearson
2) Software Engineering principles and practice, WSJawadekar, TMH
3) Craig Larman, Applying UML and Patterns: An Introduction to object- Oriented Analysis and Design and iterative development,3rd Edition, Pearson,2005.
4) Thomas JMowbray and Raphael Malveau,CORBA and Design Patterns,JohnWiley,1997.
5) William JBrown, Anti-Patterns: Refactoring Software, Architectures and Projects in Crisis, John Wiley, 1998.

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II Semester		**L**	**T**	**P**	**C**
		3	0	0	3
DATA WARE HOUSING AND MINING(MCA2104)					

Course Objectives:

- Be familiar with mathematical foundations of data mining tools..
- Understand and implement classical models and algorithms in data ware houses and data mining
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Outcomes:

(COs): At the end of the course, student will be able to

- Understand the basic subtypes of data, quality of data, suitable techniques required for preprocessing and measures required to perform data analysis
- Describe the need of classification, identify suitable technique(s) to perform classification, model building and evaluation
- Identify the requirements and usage of association rule mining on categorical and continuous data.
- Compare and Identify suitable clustering algorithm(s) (apply with open source tools), interpret, evaluate and report the result
- Describe the requirements and the need of web mining

UNIT I:

Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, Data Warehouse, OLAP and multi dimensional data analysis.

UNIT II:

Classification: Basic Concepts, Decision Trees and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier. Nearest Neighborhood classifier, Bayesian Classifier, Support vector Machines: Linear SVM, Separable and Non Separable case.

UNIT III:

Association Analysis: Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms. Handling Categorical, Continuous attributes, Concept hierarchy, Sequential, Sub graph patterns

UNIT IV:

Clustering: Overview, K-means, Cluster Evaluation using cohesion and separation, using proximity matrix, Scalable Clustering algorithm

UNITV:

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Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining, Search Engines: Characteristics, Functionality, Architecture, Ranking of WebPages, Enterprise search

Text Books:

1) Introduction to Data Mining, Tan, Steinbach and Vipin Kumar, PearsonEducation,2016
2) Data Mining: Concepts and Techniques, 2nd Edition, JiaweiHan and Micheline Kamber, ELSEVIER

Reference Books:

1) Data Mining: The Text book, Springer,May2015,CharuC.Aggarwal.

Web resources:

1) NPTEL: https://nptel.ac.in/courses/106/105/106105174/
2) https://www.saedsayad.com/data_mining.htm

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II Semester		L	T	P	C
		3	0	0	3
NoSQL DATA BASES(MCA2105)					

Course Objectives:

The objective of the course is to:

- Define, compare and use the four types of NoSQL Databases (Document-oriented, Key Value 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
- Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data

Course Outcomes:

After the completion of the course, student will be able to do the following

- Identify what type of NoSQL database to implement based on business requirements (key-value, document, full text, graph, etc.)
- Apply NoSQL data modeling from application specific queries
- Use Atomic Aggregates and de-normalization as data modeling techniques to optimize query processing

UNIT I:

Introduction to NoSQL: Definition And Introduction, Sorted Ordered Column-Oriented Stores, Key/Value Stores, Document Databases, Graph Databases, Examining Two Simple Examples, Location Preferences Store, Car Make And Model Database, Working With Language Bindings.

UNIT II:

Interacting with NoSQL: If NoSQL Then What, Language Bindings For NoSQL Data Stores, Performing Crud Operations, Creating Records, Accessing Data, Updating And Deleting Data

UNIT III:

NoSQL Storage Architecture: Working With Column-Oriented Databases, Hbase Distributed Storage Architecture, Document Store Internals, Understanding Key/Value Stores In Memcached And Redis, Eventually Consistent Non-Relational Databases.

UNIT IV:

NoSQL Stores: Similarities Between Sql And Mongo db Query Features, Accessing Data From Column-Oriented Databases Like Hbase, Querying Redis Data Stores, Changing Document Databases, Schema Evolution In Column-Oriented Databases, Hbase Data Import And Export, Data Evolution In Key/Value Stores.

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UNITV:

Indexing and Ordering Data Sets :Essential Concepts Behind A Database Index, Indexing And Ordering In Mongodb, Creating and Using Indexes In Mongodb, Indexing And Ordering In Couchdb, Indexing In Apache Cassandra.

Text Books:

1) Pramod Sadalage and Martin Fowler, NoSQL Distilled6, Addison-Wesley Professional, 2012.
2) Dan McCreary and AnnKelly, Making Sense of NoSQL, Manning Publications,2013.

Reference Books:

1) Shashank Tiwari, Professional NoSQL, Wrox Press, Wiley,2011, ISBN:978-0-470-94224-6
2) Gaurav Vaish, Getting Started with NoSQL, Packt Publishing,2013.

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II Semester		**L**	**T**	**P**	**C**
		3	0	0	3
DESIGN AND ANALYSIS OF ALGORITHMS (MCA2105)					

Course Objectives:

- To provide an introduction to formalisms to understand, analyze and denote time complexities of algorithms
- To introduce the different algorithm ic approaches for problem solving through numerous example problems
- To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP- completeness

Course Outcomes:

- Describe a symptotic notation used for denoting performance of algorithms
- Analyzetheperformanceofagivenalgorithmanddenoteitstimecomplexityusingthe asymptotic notation for recursive and non-recursive algorithms
- List and describe various algorithmic approaches
- Solve problems using divide and conquer, greedy, dynamic programming, back tracking and branch and bound algorithmic approaches
- Apply graph search algorithms to real world problems
- Demonstrate an understanding of NP-Completeness theory and lower bound theory

UNIT I:

Introduction: Algorithm, Pseudo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, joint Sets-disjoint set operations, union and find algorithms, spanning trees, connected components and bi- connected components.

UNIT II:

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Stassen‘s matrix multiplication. Greedy method: General method, applications-Job sequencing with deadlines, 0/1knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT III:

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT IV:

Back tracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT V:

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem- LCBranch and Bound solution, FIFO Branch and Bound solution.NP-

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Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook‘s theorem.

Text Books:

1) Fundamentals of Computer Algorithms, EllisHorowitz, Satraj Sahni and Raja sekharam, Universities Press
2) The Algorithm Design Manual, 2nd edition, Steven S.Skiena, Springer
3) Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson ,R.L.Rivest and C. Stein, PHI Pvt. Ltd

Reference Books:

1) Introduction to the Design and Analysis of Algorithms, Anany Levitin, PEA
2) Design and Analysis of Algorithms, Pearson Education, Parag Himanshu Dave, Himansu Bala chandra Dave
3) Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, McGrawHill.
4) Design and Analysis of algorithms, Pearson education, Aho, Ullman and Hopcroft

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II Semester		**L**	**T**	**P**	**C**
		3	0	0	3
MOBILE APPLICATION DEVELOPMENT (MCA2105)					

Course Objectives:

- To demonstrate the introduction and characteristics of mobile applications
- Application models of mobile application frameworks. Managing application data and User- interface design for mobile applications
- Integrating networking, the OS and hardware into mobile-applications
- Addressing enterprise requirements in mobile applications – performance, scalability, modifiability, availability and security
- Testing methodologies for mobile applications–Publishing, deployment, maintenance and management. To demonstrate their skills of using Android software development tools
- To demonstrate their ability to deploy software to mobile devices

Course Outcomes:

Upon completion of the course students should be able to:

- Install and configure Android application development tools
- Design and develop user Interfaces for the Android platform
- Save state information across important operating system events
- Apply Java programming concepts to Android application development

UNIT I:

Introduction to mobile devices: Introduction to Mobile Computing, Introduction to Android Development Environment, Mobile devices vs. desktop devices, ARM and Intel architectures, Screen resolution, Touch interfaces, Application deployment, App Store, Google Play, Windows Store.

Development environments: XCode, Eclipse, VS2012, Phone GAP, etc.; Native vs. web applications. Factors in Developing Mobile Applications: Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User.

UNIT II:

Android User Interface: Measurements– Device and pixel density independent measuring units User Interface(UI)Components– Editable and non editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragment swith fragment transactions, interfacing between fragments and Activities, Multi-screen Activities.

UNIT III:

Back Ground Running Process, Networking and Telephony Services: Services: Introduction to services–local service, remote service and binding the service, the communication between service and activity, Intent Service.

Multi Threading: Handlers, Async Task.

Broad cast receivers: Local Broadcast Manager, Dynamic broadcast receiver, System

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Broadcast. Pending Intent, Notifications.

UNIT IV:

Android: Introduction– Establishing the development environment – Android architecture– Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications. Android network programming: Http Url Connection, Connecting to REST-based and SOAP based Web services.

UNIT V:

Advanced Topics: Power Management: Wake locks and assertions, Low-level OS support, Writing power-smart applications.

Augmented Reality via GPS and other sensors: GPS, Accelerometer, Camera.

Mobile device security in depth: Mobile malware, Device protections, iOS ―Jail breaking‖, Android ―rooting‖ and Windows‘ ―defenestration‖; Security and Hacking: Active Transactions, More on Security, Hacking Android.

Text Books:

1) Bill Phillips, Chris Stewart, Brian Hardy, and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch LLC, 2nd edition, 2015.
2) Valentino Lee, Heather Schneider, and Robbie Schell, Mobile Applications: Architecture, Design and Development, Prentice Hall, 2004.
3) Professional Android4 Application Development, RetoMeier, WileyIndia, (Wrox), 2012
4) Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013
5) Dawn Griffiths, David Griffiths, “HeadFirst: Android Development”, Oreilly2015, ISBN: 9781449362188
6) JeffMc Wherter and ScottGowell, "Professional Mobile Application Development", Wrox, 2012

Reference Books:

1) Beginning Android Application Development, Wei-MengLee, Wiley India(Wrox),2013
2) Tomasz Nurkiewicz and Ben Christensen, Reactive Programming with RxJava, O‘Reilly Media, 2016.
3) Brian Fling, Mobile Design and Development, O‘Reilly Media, Inc., 2009.
4) Maximiliano Firtman, Programming the Mobile Web, O‘Reilly Media, Inc.,2nd ed., 2013.
5) Cristian Crumlish and Erin Malone, Designing Social Interfaces, 2nd ed., O‘Reilly Media, Inc., 2014.
6) Suzanne Ginsburg, Designing the iPhone User Experience: A User-Centered Approach to Sketching and Prototyping iPhone Apps, Addison-Wesley Professional, 2010.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II Semester		**L**	**T**	**P**	**C**
		3	0	0	3
ARTIFICIAL INTELLIGENCE (MCA2105)					

Course Objectives:

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as mini max, resolution that play an important role in AI programs
- To have a basic understanding of some of the more advanced topics of AI

Course Outcomes:

- Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
- Apply the language/ frame work of different AI methods for a given problem
- Implement basic AI algorithms
- Design and carry out an empirical evaluation of different algorithms on problem formalization and state the conclusions that the evaluation supports

UNIT I:

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT II:

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

UNIT III:

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

UNIT IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web.

UNITV:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems

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Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory.

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

Text Books:

1) Artificial Intelligence-Saroj Kaushik, CENGAGE Learning.
2) Artificial intelligence, A modern Approach, 2nd ed, Stuart Russel, Peter Norvig,PEA.

Reference Books:

1) Artificial Intelligence- Deepak Khemani,TMH,2013.
2) Introduction to Artificial Intelligence, Patterson,PHI.
3) Artificial intelligence, structures and Strategies for Complex problem solving, George FLugar, 5th ed, PEA.

e- Resources:

1)https://nptel.ac.in/courses/106/105/106105077/2
2)http://aima.cs.berkeley.edu/

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II Semester		**L**	**T**	**P**	**C**
		3	0	0	3
ACCOUNTINGING FOR MANAGERS (MCA2105)					

Course Objectives:

- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. GAAP Principles
- To understand the concept of financial management and financial interpretations cost and management accounting principles and applications of standard costing and marginal costing analysis

Course Outcomes:

- The Learn erasable to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various techniques for decision making.

UNIT I:

Accounting Generally Accepted Accounting Principles (GAAP) & Accounting standards, Characteristics and limitations of single entry system, double entry system of accounting, introduction of basis books of accounts, ledgers. Preparation of trail balance – Final accounts – company final accounts – Users of Accounting Information, Role of Accountant in modern Organizations.

UNIT II:

Financial Management –meaning and scope, role, objectives of time value of money – over vitalization – under capitalization – profit maximization– wealth maximization – EPS maximization.

Ration Analysis -advantages -limitations- Fund flow analysis– meaning, importance, preparation and interpretation of Funds flow and cash flow statements – statements of changes in working capital.

UNIT III:

Costing – nature and importance and basic principles. Elements of cost – Absorption costing Vs. Marginal costing – Financial accounting vs. cost accounting vs. management accounting. Marginal costing and Break – even Analysis: nature, scope and importance– Practical applications of marginal costing, limitation and importance of cost – volume, profit analysis, short run decisions.

UNIT IV:

Standard costing and budgeting: nature, scope and computation and analysis – materials variance, labor variance and sales variance– cash budget, sales - budget – flexible Budgets, master budgets.

UNIT V:

Introduction to computerized accounting system: coding logic and codes, master files, transaction files, introduction documents used for data collection, processing of different files

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and Outputs obtained.

Text Books:

1) Accounting for Management, N.P. Srinivasan and M.Sakthivel Murugan
2) Financial Accounting, S.NMaheswari and S.K.Maheswari, Vikas.
3) Financial Analysis and Accounting, P.Prem chand Babu and M.Madan Mohan, Himalaya.

Reference Books:

1) Financial Accounting, A. Mukherjee and M.Heneef, TMH.
2) Basic Financial Accounting for Management, Ambaresh Gupta,Pearson.
3) Accounts And Finance for Non accounts, Chatterjee, D.K. Himalaya.
4) Essential of Financial Accounting, Ashish, Kand Ball acharya, PHI.
5) Guide to Financial Management, John Tannent, Viva.

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II Semester		**L**	**T**	**P**	**C**
		0	0	3	1.5
DBMS LAB (MCA2106)					

Course Objectives:

This Course will enable students to

1. Populate and query a database using SQL DDL/DML Commands
2. Declare and enforce integrity constraint son a database
3. Writing Queries using advanced concepts of SQL
4. ProgrammingPL/SQLincludingprocedures,functions,cursorsandtriggers

Course Outcomes:

At the end of the course the student will be able to:

1. Utilize SQL to execute queries for creating database and performing data manipulation operations
2. Examine integrity constraints to build efficient databases
3. Apply Queries using Advanced Concepts of SQL
4. Build PL/SQL programs including stored procedures, functions, cursors and triggers

List of Experiments:

1) Execute all DDL, DML and DCL commands on sample tables.
2) Implementation of different types of operators and built-in functions with suitable examples
3) Implementation of different types of joins with suitable examples
4) Create views, partitions, Sequence, Indexes and locks for a particular DB
5) Implement different types of constraints on relations.
6) Implementation of sub queries and nested queries.
7) Implement Queries on Group By & Having Clauses, ALIAS, Sequence By, Order By
8) Control Structure

a) Write a PL/SQL block for Addition of Two Numbers
b) Write a PL/SQL block for IF ,IF and else condition
c) Write a PL/SQL block for implementation of loops
d) Write a PL/SQL block for greatest of three numbers using IF and ELSEIF

9) Exception Handling-Implement the following with respect to exception handling. Raising Exceptions, User Defined Exceptions, Pre-Defined Exceptions
10) Write PL/SQL block for an application using exception handling Procedures

a) Write a PL/SQL Procedure using Positional Parameters
b) Write a PL/SQL Procedure using notational parameters
c) Write a PL/SQL Procedure for GCD Numbers
d) Write a PL/SQL Procedures for cursor implementation (explicit and implicit cursors)

11) Functions:

a) Write a PL/SQL block to implement factorial using functions
b) Write a PL/SQL function to search an address from the given database

12) Write a DBMS program to prepare Pl/SQL reports for an application using functions.

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13) Triggers:
a) Write a Trigger to pop- up the DML operations
b) Write a Trigger to check the age valid or not Using Message Alert.
c) Create a Trigger to Raise appropriate error code and error message.
d) Create a Trigger on a table so that it will update another table while inserting values
14) Write PL/SQL block for an application using cursors and all types of triggers.
15) Write a PL/SQL block for transaction operations of a typical application using package

Text Books:

1) Oracle: The Complete Reference by Oracle Press
2) Nilesh Shah, " Database Systems Using Oracle‖, PHI, 2007
3) Rick FVander Lans,—Introduction to SQL‖, Fourth Edition, Pearson Education, 2007.

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II Semester		L	T	P	C
		0	0	3	1.5
COMPUTER NETWORKS LAB(MCA2107)					

PART– A

1) Implement the data link layer farming methods such as character stuffing and bit stuffing.
2) Implement on a dataset of characters the three CRC polynomials– CRC12, CRC16 and CRC CCIP.
3) Implement Dijkstra_s algorithm to compute the Shortest path through a graph.
4) Take an examples ubnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm
5) Take an examples ubnet of hosts. Obtain broadcast tree for it.

PART–B

1) Implement the following forms of IPC.
a. a)Pipes b)FIFO
2) Implement file transfer using Message Queue form of IPC
3) Write a programme to create an integer variable using shared memory concept and increment the variable
4) Simultaneously by two processes. Use semaphores to avoid race conditions
5) Design TCP iterative Client and server application to reverse the given input sentence
6) Design TCP client and server application to transfer file
7) Design a TCP concurrent server to convert a given text in to uppercase using multiplexing system call ―select‖
8) Design a TCP concurrent server to echo given set of sentences using poll functions
9) Design UDP Client and server application to reverse the given input sentence
10) Design UDP Client server to transfer a file
11) Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
12) Design a RPC application to add and subtract a given pair of integers

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II Semester		**L**	**T**	**P**	**C**
		0	0	3	1.5
SOFTWARE ENGINEERING AND DESIGN PATTERNS LAB(MCA2108)					

1) Take any real time problem and do the following experiments
a. Write down the problem statement for a suggested system of relevance. Develop Flow-
Charts to understand and basic problem solving technique
b. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.
c. Using COCOMO model estimate effort.
d. Perform Estimation of effort using FP Estimation for chosen system
e. Analyze the Risk related to the project and prepare RMMM plan.
f. Develop Time-line chart and project table using PERT or CPM project scheduling methods.
g. Draw E-R diagrams, DFD,CFD and structured charts for the project.
h. Design of Test cases based on requirements and design.
i. Prepare FTR
j. Prepare Version control and change control for software configuration items.
2) Using UML/ JAVA, design Abstract Factory design pattern
3) Using UML/JAVA, design Builder design pattern
4) Using UML/ JAVA, design Façade design pattern
5) Using UML/ JAVA, design Bridge design pattern
6) Using UML/JAVA, design Decorator design pattern
7) User gives a print command from a word document. Design to represent this chain of responsibility design pattern

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II Semester		**L**	**T**	**P**	**C**
		0	0	1	0.5
EMPLOYABILITY SKILLS(MCA2109)					

Course Objectives:
The main of this course is

- To learn how to make effective presentations and impressive interviews
- To learn skills for discussing and resolving problems on the worksite
- To assess and improve personal grooming
- To promote safety awareness including rules and procedures on the work site
- To develop and practice self management skills for the worksite

Course Outcomes:
By the end of this course, the student

- Recite the soft skills
- Make presentations effectively with appropriate body language
- Be composed with positive attitude
- Apply their core competencies to succeed in professional and personal life

A list of vital employability skills from the stand point of engineering students with discussion how to potentially develop such skills through campus life.

1. Soft Skills: An Introduction–Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development.
2. Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue.
3. Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.
4. Time Management– Concept, Essentials, Tips.
5. Personality Development– Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.
6. Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills.
7. Conflict Management: Conflict- Definition, Nature, Types and Causes; Methods of Conflict Resolution.
8. Stress Management: Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and Management of Stress
9. Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behavior; Assertiveness Skills.

Note: The student shall be instructed to Record a 2 min video and add to profile before and

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after taking the course. Students are to be involved in Role Play, Team dynamics, Group Discussion and outcomes are to be recorded.

Reference Books:

1. Barun K.Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2. S.P.Dhanavel, English and Soft Skills, Orient Blackswan,2010.
3. R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand& Company Ltd., 2018.
4. Raman, Meenakshi & Sharma, Sangeeta Technical Communication Principles and Practice, Oxford University Press, 2011.
5. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.
6. English and Soft Skills–S.P.Dhanavel, Orient Blacks wan India,2010