



DEPARTMENT OF COMPUTER APPLICATIONS
Course Structure (Autonomous) for MCA.
MCA I Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18MC1T01	ESC	Introduction to Computer and C Programming	3			3	3
2	18MC1T02	PCC	Computer Organization	3			3	3
3	18MC1T03	PCC	Discrete Mathematical Structures and Graph Theory	3			3	3
4	18MC1T04	HSMC	Accountancy & Financial Management	3			3	3
5	18MC1T05	BSC	Probability & Statistics	3			3	3
6	18MC1L06	HSMC	English Communication Skills Lab			4	2	2
7	18MC1L07	ESC	C Programming Lab			4	2	2
8	18MC1T08	MC	Environmental Studies	2			2	--
Total credits								19

MCA II Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18MC2T01	PCC	Data Structures	3			3	3
2	18MC2T02	PCC	Operating Systems	3			3	3
3	18MC2T03	PCC	Data Base Management Systems	3			3	3
4	18MC2T04	HSMC	Management Science	3			3	3
5	18MC2T05	PCC	Unix Shell Programming	3			3	3
6	18MC2L06	PCC	Data Structures through C Lab			4	2	2
7	18MC2L07	PCC	DBMS Lab			4	2	2
8	18MC2L08	PCC	Unix Shell Programming Lab			4	2	2
Total credits								21



MCA III Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18MC3T01	PCC	Java Programming	3			3	3
2	18MC3T02	ESC	R Programming	3			3	3
3	18MC3T03	PCC	Software Engineering	3			3	3
4	18MC3T04	PCC	Computer Networks	3			3	3
5	18MC3T05	PCC	Design & Analysis of algorithms	3			3	3
6	18MC3L06	PCC	Java Programming Lab			4	2	2
7	18MC3L07	ESC	R Programming Lab			4	2	2
8	18MC3T08	HSMC	Professional Ethics & Human Values	2			2	--
Total credits								19

MCA IV Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18MC4T01	PCC	Web Technologies	3			3	3
2	18MC4T02	PCC	Python Programming	3			3	3
3	18MC4T03	PCC	Data warehousing & Data Mining	3			3	3
4	18MC4T04	PCC	E-Commerce	3			3	3
5	18MC4T05/ 18MC4T06/ 18MC4T07	PEC	Elective 1: Cryptography & Network Security Distributed Systems Artificial Intelligence	3			3	3
6	18MC4L08	PCC	Web Technologies Lab			4	2	2
7	18MC4L09	PCC	Python Programming Lab			4	2	2
8	18MC4L10	PCC	Object Oriented Analysis & Design Lab			4	2	2
9	18MC4T11	HSMC	Employability Skills	3			3	--
Total credits								21



MCA V Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18MC5T01	PCC	Software Testing Methodologies	3			3	3
2	18MC5T02	PCC	Hadoop & Big Data	3			3	3
3	18MC5T03	PCC	Mobile Computing	3			3	3
4	18MC5T04/ 18MC5T05/ 18MC5T06	PEC	Elective 2: Machine learning & Deep Learning Cloud computing Human Computer Interaction	3			3	3
5	18MC5T07/ 18MC5T08/ 18MC5T09	PEC	Elective 3: Internet of Things Software Project Management Data Analytics	3			3	3
6	18MC5L10	PCC	Hadoop & Big Data Lab			4	2	2
7	18MC5L11	PCC	Mobile Application Development Lab			4	2	2
8	18MC5T12	PROJ	Project – I			4	2	2
								21

MCA VI Semester

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18MC6T01	T	Technical Seminar		3		3	3
2	18MC6L02	PROJ	Project – II			32	16	16
								19



SEMESTER I

SYLLABUS

Introduction to Computer and C Programming

Scheme and Credits: L:3 T:0 P:0 C:3

Course Outcomes

The student will learn

- To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To use structures and files

UNIT – I:

Introduction to Computer Problem Solving: Programs and Algorithms, characteristics of an algorithm, Flowchart, Pseudo-code, The Problem – Solving Aspect, Top-Down design

Fundamental Algorithms Introduction, Summation of a set of numbers, Factorial computation, Generation of Fibonacci sequence, reversing the digits of an Integer.

UNIT – II:

Factoring Methods: Introduction, GCD of two Integers, Generating Prime numbers, Computing the Prime Factors of an Integer, Generation of pseudo-random numbers

Array Techniques: Introduction, Array Order Reversal, Finding the Maximum number in a set, Removal of duplicates from an ordered array, Partitioning an Array

UNIT-III:

Programming Languages and Introduction to C Programming: Properties of Machine Language, Assembly Language, High-Level Languages, Procedural and Object-Oriented Languages. Structure of C program, Indentation, Comments, Identifiers& variables, Data Types Interactive Input, Formatted Output, Format Modifiers, Operators, Operator precedence & Associativity, Relational expressions, Type Casting, Mathematical Library Functions, Selection control statements: if and switch

UNIT -IV:

Repetition structures: Basic Loop Structures: while, for , do-while, Nested loops, **Modular Programming:** Functions and parameter declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope

Modular Programming Variable Storage Class: Local, Global, **Pointers:** declaration and its usage, Functions with parameters: pass by value, pass by address, pointer to a function and function pointer

UNIT-V:

Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization,



Arrays as Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays- Matrices

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions related to strings.

TEXT BOOKS:

[1] R.G. Dromey, “How to Solve it By Computer”, Prentice-Hall International Series in Computer Science,1982.

[2] Reema Thareja, “Computer Fundamentals and C Programming”, Oxford, 2012

REFERENCE BOOKS:

[1] DENNIS M. RITCHIE, BRIAN W KERNIGHAN, “The C Programming Language”, Prentice-Hall International Series in Computer Science, Second Edition.

[2] Michael Schneider, Steven W. Weingart, David M. Perlman, “An Introduction to Programming and Problem Solving With Pascal”, John Wiley and Sons Inc ,1984.

[3] David Gries, “The Science of Programming”, Springer Verlag,1981.

COMPUTER ORGANIZATION

Scheme and Credits: L:3 T:0 P:0 C:3

PREREQUISITES: -DLD

COURSE OUTCOMES:

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

1. Understand the architecture of a modern computer with its various processing units.
2. Understand RTL, micro operations, instruction cycle
3. Understand the features of hardwired and micro programmed control units.
4. Analyze the memory hierarchy system and performance improvement by cache memory.
5. Analyze the communication methods of I/O devices and standard I/O interfaces.

SYLLABUS:

UNIT I:

Basic Structure of Computers: Computer Types, Functional unit, Basic Operational concepts, Bus structures, Data Representation: Data types, Complements, Fixed Point Representation. Floating – Point Representation. Other Binary Codes, Error Detection codes. Performance, The history of computer development.

UNIT II:

Register Transfer Language And Micro Operations: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Register, Computer instructions, Timing and control, Instruction cycle, Memory – Reference Instructions. Input – Output and Interrupt.

UNIT III :

Central Processing Unit: Stack Organization, Instruction formats, Addressing modes, Data Transfer and Manipulation Instructions, Program control Instructions.

Control Unit: Control Memory, Hard wired control, Micro programmed control and Micro Instruction Format, Address Sequencing, Design of Control Unit.

UNIT IV:

Memory Organization:

Memory Hierarchy, Primary Memory, Introduction to Secondary Memory, Associative Memory, Cache Memory, virtual Memory, Memory Management hardware.

UNIT V:



PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct memory Access, IOP, Serial Communication.

TEXT BOOKS

- 1.M.Morris Mano, —Computer Systems Architecture, Pearson Education publishers, 3rd edition.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, —Computer Organization, TMH publications, 5th edition, 2002.

REFERENCE BOOKS:

1. William Stallings, —Computer Organization and Architecture, Pearson/PHI publishers, 6th edition, 2004.
2. Andrew S. Tanenbaum, —Structured Computer Organization, Pearson/PHI publishers, 4th edition, 2005.
3. John D Carpinelli, —Computer Systems Organization and Architecture, Pearson Education, 1st edition, 2001

Discrete Mathematical Structures and Graph Theory

Scheme and Credits: L:3 T:0 P:0 C:3

SYLLABUS:

UNIT-I

Mathematical Logic: Introduction, Statements and Notation, Connectives, Normal forms, Theory of inference for Statement Calculus, The Predicate Calculus, Inference theory of Predicate calculus.

UNIT-II

Set Theory: Introduction, Basic concepts of set theory, Principle of Inclusion and Exclusion, Properties of Binary relations, Relation matrix and Digraph, operations on relations, Partition and covering, Transitive closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, Bijective functions, Inverse functions, Composition of functions, Recursive functions, Pigeonhole principle and its applications.

UNIT-III

Algebraic Structures: Algebraic systems and examples, general properties, semigroup, monoid, groups and subgroups.

Number Theory: Properties of integers, Division algorithm, The greatest common divisor, Euclidean algorithm (without proof), Least common multiple, testing of prime numbers, The fundamental theorem of Arithmetic, Fermat's theorem and Euler's theorem (without proofs) and its applications.

UNIT-IV

Combinatorics and Recurrence Relations: Basic counting principles- sum rule, solving recurrence relations by substitution and by the method of characteristic roots.

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, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).



TEXT BOOKS:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill
3. Mathematical Foundation for Computer science, S. Santha, E.V. Prasad, Cengage publications.

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REFERENCE BOOKS:

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.
2. Discrete Mathematical Structures, Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborty and B.K. Sarkar, Oxford, 2011.

Accountancy & Financial Management

Scheme and Credits: L:3 T:0 P:0 C:3

COURSE OBJECTIVES:

The main objectives of this course are given below:

- The Learning objective of this Unit is to understand the concept and nature of Managerial Economics and its relationship with other disciplines, Concept of Demand and Demand forecasting
- The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis
- The Learning Objective of this Unit is to understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods.
- The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles
- The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation
- The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods.

COURSE OUTCOMES:

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

- The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand.
- One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs.
- One has to understand the nature of different markets and Price Output determination under various market conditions.
- One should equipped with the knowledge of different Business Units
- The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.
- The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

Syllabus

UNIT – I:

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determinants-Law of Demand its Exception-Elasticity of Demand-Types and Measurement- Demand forecasting and its Methods.

UNIT – II:

Production and Cost Analyses:

Production function-Isoquants and Isocosts-Law of Variable proportions- Cobb-Douglas Production function-Economics of Sale-Cost Concepts- Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis- Determination of Break-Even Point (Simple Problem).

UNIT – III:

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson’s models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

UNIT – IV:

Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

UNIT – V:

Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Preparation of Financial Statements- Analysis and Interpretation of Financial Statements

Capital Budgeting: Meaning of Capital Budgeting-Need for Capital Budgeting- Techniques of Capital Budgeting-Traditional and Modern Methods.

TEXT BOOKS :

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: ‘Managerial Economics and Financial Analysis’, Cengage Publications, New Delhi – 2011.
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011.
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. ‘Managerial Economics and Financial Analysis’, Ravindra Publication.

REFERENCES :

1. V. Maheswari : Managerial Economics, Sultan Chand.
2. Suma Damodaran : Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana : Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
4. VanithaAgarwal : Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja : Financial Accounting for Managers, Pearson.
6. Maheswari : Financial Accounting, Vikas Publications.
7. S. A. Siddiqui & A. S. Siddiqui : Managerial Economics and Financial Analysis, New Age International Publishers, 2012.

PROBABILITY AND STATISTICS

Scheme and Credits: L:3 T:0 P:0 C:3

SYLLABUS:

UNIT I: Discrete Random variables and Distributions:

Introduction-Random variables- Discrete Random variable-Distribution function-Expectation-Moment Generating function-Moments and properties. Discrete distributions: Binomial and Poisson distributions.

UNIT II: Continuous Random variable and distributions:

Introduction-Continuous Random variable-Distribution function- Expectation-Moment Generating function-Moments and properties. Continuous distribution: Normal distributions, Normal approximation to Binomial distribution.

UNIT III: Sampling Theory:

Introduction - Population and samples- Sampling distribution of means (σ known)-Central limit theorem- t-distribution- Sampling distribution of means (σ unknown)- Sampling distribution of variances $-\chi^2$ and F-distributions- Point estimation- Maximum error of estimate - Interval estimation.

UNIT IV: Tests of Hypothesis:

Introduction –Hypothesis-Null and Alternative Hypothesis- Type I and Type II errors –Level of significance - One tail and two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences- ANOVA for one-way and two-way classified data.

UNIT V: Curve fitting and Correlation:

Introduction - Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares-Goodness of fit. Correlation and Regression – Properties.

Text Books:

1. **Richards A Johnson, Irvin Miller and Johnson E Freund.** Probability and Statistics for Engineering, 9th Edition, PHI.
2. **Jay L devore,** Probability and Statistics for Engineering and the Sciences, 8th edition, Cengage.

Reference Books:

1. **Shron L. Myers, Keying Ye, Ronald E Walpole,** Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
2. **William Menden Hall, Robert J. Bever and Barbara Bever,** Introduction to probability and statistics, Cengage learning, 2009.

ENGLISH COMMUNICATION SKILLS LAB

L	T	P	C
0	0	4	2

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

List of Experiments:

- 1 Greetings and Introduction**
- 2 Request Permission & Giving Directions**
- 3 Inviting/Complaining/Congratulating**
- 4 Root Words**
- 5 Phonetics-Sounds and Symbols**
- 6 Pronunciation Rules**

References:

- 1. *Strengthen Your Steps*, Maruti Publications**
- 2. *Interact*, Orient Blackswan**
- 3. *Word Power Made Easy*, Pocket Books**

L	T	P	C
0	0	4	2

C PROGRAMMING LAB

List of Experiments

- Write an algorithm, flowchart and pseudo code to perform all arithmetic operations
 - Write an algorithm, flowchart and pseudo code to find average of three numbers
 - Write an algorithm, flowchart and pseudo code to find smallest of three numbers
- Write an algorithm, flowchart and pseudo code for finding smallest divisor of an integer.
 - Write an algorithm, flowchart and pseudo code to find x^y
- Write a C program to convert temperature from Fahrenheit to Celsius and vice versa.
- Write a C program to find the roots of quadratic equation
- Write a C program to find whether a given number is prime
- Write a C program find whether a given number is armstrong
- Write a C program to display reverse of a given number
- Write a C program to generate first n- terms of a Fibonacci sequence.
- Write a C program to calculate $\sin(x)$ value, where x is input given by user
- Write a C program to calculate $\cos(x)$ value, where x is input given by user
- Write a C program to perform operations on one dimensional array
 - Smallest element of an array
 - Largest element of an array
 - swap smallest and largest element in an array
- Write a C program to implement the following
 - Addition of two matrices
 - Multiplication of two matrices
- Write a C program to perform the following operations on strings without using string handling functions
 - To display length of the string
 - To check whether a string is palindrome
 - To delete n characters from a given position in a given string
- Write recursive and non recursive programs for the following
 - Factorial of a number
 - GCD of two numbers
 - Fibonacci series
- Write a program which illustrates Storage classes

ENVIRONMENTAL STUDIES

COURSE OUTCOMES:

1. The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.
2. The concepts of the ecosystem and its function in the environment.
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
4. The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
5. The environmental legislations of India and Social issues and the possible means
6. Environmental assessment and the stages involved in EIA.

SYLLABUS:

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Introduction- Scope of Environmental Studies- Importance of Environmental Studies- Need for public awareness, Environmental ethics- Contemporary Environmentalists- Environmental Global moves: Stockholm conference, Earth summit

Concept of an ecosystem - Structure of an ecosystem- function of an ecosystem- Food chains, food webs- ecological pyramids- Energy flow in the ecosystem- Ecological succession- Nutrient cycling- 1^oproduction & 2^oproduction- Major ecosystems: Forest ecosystem- Grass land ecosystem, Desert ecosystem- Aquatic ecosystem: pond, lake ecosystem- Streams, river ecosystem, Oceans

UNIT-II : NATURAL RESOURCES AND CONSERVATION

Introduction and classification of natural resources-Forest resources: Use and over-exploitation - Deforestation-Timber extraction-Mining- Conservation-Water resources: Use and over utilization of surface and ground water,- Floods, drought, Dams and associated problems- Water conservation, rain water harvesting, water shed management-Energy resources: renewable energy sources –solar-wind-hydro-tidal- Ocean thermal-geo thermal-bio mass-bio gas-bio fuels- Hydrogen.- Non-renewable energy sources-coal-petroleum-natural gas-Nuclear energy

UNIT-III: BIODIVERSITY AND ITS CONSERVATION

Definition, classification- Value of biodiversity-Threats to biodiversity: habitat loss, man-wildlife conflicts- Endangered and endemic species of India-Conservation of biodiversity- Biodiversity at national and local levels, Hot-spots of biodiversity

UNIT-IV:ENVIRONMENTAL PROBLEMS

Global warming, Climate change- Acid rain , Ozone depletion- Air pollution- Water pollution- Soil pollution- Noise pollution, Nuclear hazards- Solid Waste Management: Causes, Consequences and Control methods- Solid Waste Management- Population growth and explosion, effects, control measures- Pollution case studies- Role of an individual in prevention of pollution

UNIT-V: ENVIRONMENTALLEGISLATION&MANAGEMENT

Sustainable development- Air (Prevention and Control of Pollution) Act-Drawbacks- Water (Prevention and control of Pollution) Act- Drawbacks- Wildlife Protection Act- Drawbacks- Forest Conservation Act- Drawbacks- Environmental Protection Act- Drawbacks- Environmental Impact Assessment and its significance- Preparation of Environmental Management Plan and Environmental Impact Statement- Ecotourism

TEXT BOOKS:

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age Publications, New Delhi
2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
4. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE:

1. Text Book of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Delhi



II SEMESTER

SYLLABUS

Data Structures

Prerequisites: C PROGRAMMING

SYLLABUS:

UNIT - I:

Sortings: Bubble sort, Insertion sort, selection sort

Searching: linear search, binary search

UNIT II:

Pointers: Introduction, Pointer Arithmetic and Arrays, Memory Allocations Functions, Compatibility, Lvalue and Rvalue, Arrays and Pointers, Passing an Array to a Function, Array of Pointers. Pointers For Inter Function Communications, Pointers to Pointers

UNIT III:

Structures: Structure Type Declaration, Initialization, Accessing Structures, Operations on Structures, Complex Structures, Structures and Functions, Sending the Whole Structure, Passing Structures through Pointers.

Unions: Referencing Unions, Initializers, Unions and Structures, Applications.

Text Input/output: Files, Streams, Standard Library Input/Output Functions, Formatting Input/output Functions and Character Input/Output Functions, Command-Line Arguments.

UNIT IV:

Stacks: Definition, Representing stacks, ADT Stack and its operations: Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms. Recursion, Towers of Hanoi problem.

Queues: Queue and its Sequential Representation, Queue as an abstract data type, Types of Queue: Simple Queue, Circular Queue, Operations on each types of Queues: Algorithms.

UNIT V:

Linked lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; **Doubly linked list:** operations and algorithms.

Circular Linked Lists: all operations their algorithms, Linked representation of Stack and Queue. Polynomials: Addition, Multiplication.

TEXT BOOKS:

- [1] ReemaThareja, “Computer Fundamentals and C Programming”, Oxford, 2012
- [2] Mark Allen Weiss,”Data structure and Algorithm Analysis in C”. Addison Wesley Publication.2006.



[3] SEYMOUR LIPSCHUTZ, “Data Structures With C – by Schaum Series”.

REFERENCE BOOKS:

[1] Horowitz Sahni and Anderson-Freed “Fundamentals of Data Structures in C”. 2nd Edition, Universities Press,2008.

[2] Richard F. Gilberg& B. A. Forouzan “Data Structures A Pseudocode Approach with C”, Second Edition, CENGAGE Learning.

OPERATING SYSTEMS

COURSE OUTCOMES:

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

1. Understand the functionalities of an operating system and Evaluate different CPU scheduling algorithms.
2. Apply synchronization to cooperating processes and handle the deadlocks
3. Learn various management techniques for efficient utilization of system memory.
4. Understand and analyze theory and implementation of files and Evaluate different disk scheduling algorithms.
5. Analyze the functionalities in various operating systems.

SYLLABUS:

UNIT I

Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

Process Management – Process concept, the process, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Inter process Communication, Scheduling-Basic Concepts, Scheduling Criteria, and Scheduling Algorithms.

UNIT-II:

Concurrency: Process Synchronization, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples

Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

UNIT-III:

Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation

Virtual Memory Management:

Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

UNIT-IV:

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management

Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

UNIT V:

Linux System: Components of LINUX, Inter process Communication, Synchronization, Interrupt, Exception and System Call.

Android Software Platform: Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management

TEXT BOOKS:

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.
3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016 .

REFERENCES:

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.
2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education”, 1996.
3. Operating Systems: A Concept-Based Approach, D M Dhamdhare, Second Edition, Tata Mc Graw-Hill Education, 2007.

DATA BASE MANAGEMENT SYSTEMS

COURSE OUTCOMES:

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

1. Describe a database and different database models
2. Design Entity Relationship models And Relational Model
3. Design and implement queries using Structured Query Language
4. Design database schema using normalization.
5. Understand the characteristics of database transaction management.

SYLLABUS:

Unit – I:

Introduction: Database system, Characteristics (Database Vs File System), Database Users (Actors on Scene, Workers behind the scene), Advantages of Data base systems, and Database applications.

Brief introduction of different Data Models- the ER Model – Relational Model – Other Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure.

Unit – II:

Entity Relationship Model: Introduction, Representation Of Entities, Attributes, Entity Set, Relationship, Relationship Set, Constraints, Sub Classes, Super Class, Inheritance, Specialization, And Generalization Using ER Diagrams.

Relational Model: Introduction to Relational Model, Concepts of Domain, Attribute, Tuple, Relation, Importance Of Null Values, Constraints (Domain, Key Constraints, Integrity Constraints) And Their Importance

Unit – III:

SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion), Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering.

Implementation of different types of joins, view(updatable and non-updatable), relational set operations, Definition of NOSQL, History of NOSQL and Different NOSQL products, Applications, features of NoSQL, Difference between SQL and NoSQL

Unit-IV

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF),

concept of surrogate key, Boyce-Codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

Indexing: Hashing, single and multi-level indexes, dynamic multilevel indexing using B-Tree and B+ tree, index on multiple keys.

Unit-V

Transaction Management And Concurrency Control: Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and savepoint, Concurrency control for lost updates, uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods: lock granularity, lock types, two-phase locking for ensuring serializability, deadlocks.

Recovery System: Introduction to ARIE, The Log, The Write-Ahead Log Protocol, check pointing, Recovery from system crash

TEXT BOOKS:

1. Raghurama Krishnan, Johannes Gehrke, “*Data base Management Systems*”, 3rd Edition, TATA McGrawHill, 2008.
2. Silberschatz, Korth, “*Data base System Concepts*”, 6th Edition, McGraw Hill, 2010.
3. C.J.Date, “*Introduction to Database Systems*”, 7th Edition, Pearson Education, 2002.
4. Professional NOSQL” by Shashank Tiwari, 2011, WROX Press.

REFERENCES:

1. Peter Rob & Carlos Coronel, “*Data base Systems design, Implementation, and Management*”, 7th Edition, Pearson Education, 2000.
2. ElmasriNavrate, “*Fundamentals of Database Systems*”, 5th Edition, Pearson Education, 2007.



UNIX SHELL PROGRAMMING

OBJECTIVES:

- Written technical communication and effective use of concepts and terminology.
- Facility with UNIX command syntax and semantics.
- Ability to read and understand specifications, scripts and programs.
- Individual capability in problem solving using the tools presented within the class.
- Students will demonstrate a mastery of the course materials and concepts within in class discussions.

SYLLABUS

UNIT-I

Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT-II

The File system –The Basics of Files-What’s in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

UNIT-III

Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

UNIT-IV

Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

UNIT-V

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The \$? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command.

TEXT BOOKS:

1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

REFERENCE BOOKS:

1. Unix and shell programming by B.M. Harwani, OXFORD university press.

Data Structures Lab

List of Experiments

1. Write C programs to sort the list of elements using following techniques
 - a. Bubble Sort
 - b. Insertion Sort
 - c. Selection Sort
2. Write C programs to search for an element in an array using following techniques
 - a. Linear Search
 - b. Binary Search
3. Write a C program to demonstrate call by value and call by reference
4. Write a C program to display student information using structures
5. Write a C program to count number of lines, words and characters in a file
6. Write a C program to perform stack operations using arrays
7. Write a C program to perform queue operations using arrays
8. Write C program to implement stack applications.
 - a. Conversion of Infix expression to postfix expression
 - b. Evaluation of postfix expression
 - c. Towers of Hanoi
9. Write a C program to perform circular queue operations using arrays
10. Write a C program to implement following operations on Single Linked List
 - a. Insertion
 - b. Deletion
 - c. Search
11. Write a C program to implement following operations on Double Linked List
 - a. Insertion
 - b. Deletion
 - c. Search
12. Write a C program to implement stack operations using linked list
13. Write a C program to implement queue operations using linked list
14. Write a C program to add two polynomials using linked list
15. Write a C program to multiply two polynomials using linked list

DATA BASE MANAGEMENT SYSTEMS LAB

COURSE OUTCOMES:

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

1. Create own database.
2. Manipulate data in database using SQL language.
3. Experiment with various SQL queries with database created
4. Write programs using PL/SQL language.
5. Create triggers using PL/SQL.

LIST OF LAB EXPERIMENTS:

1. Introduction to SQL: DDL, DML, DCL, TCL.
2. Queries for Creating Tables with Constraints, Views.
3. Example SQL Queries using select.
4. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN).
5. Queries using Group By, Order By, and Having Clauses and Working with Index, Sequence, Synonym.
6. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
7. Queries on Joins and Correlated Sub-Queries.
8. Write a PL/SQL Code using Basic Variable, Anchored declarations, and Usage of Assignment Operation.
9. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL.
10. Write a PL/SQL block using SQL and Control Structures in PL/SQL.
11. Write a PL/SQL Code using Cursors, Exceptions and Triggers.
12. Write a PL/SQL Code using Procedures, Functions, and Packages.

TEXT BOOKS :

- 1) ORACLE PL/SQL by example. Benjamin Rosenzweig, Elena Silvestrova, Pearson
- 2) ORACLE DATA BASE LOG PL/SQL Programming SCOTT URMAN, TMH.
- 3) SQL & PL/SQL for Oracle 10g, Black Book, Dr.P.S. Deshpande.
- 4) Data Base Management System, Oracle SQL and PL/SQL, Pranabkumar Das Gupta, P Radha Krishna, PHI.



UNIX PROGRAMMING LAB

1. a) Study of Unix/Linux general purpose utility command list
man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.
- b) Study of vi editor.
- c) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
- d) Study of Unix/Linux file system (tree structure).
- e) Study of .bashrc, /etc/bashrc and Environment variables.
2. Write a C program that makes a copy of a file using standard I/O, and system calls
3. Write a C program to emulate the UNIX `ls -l` command.
4. Write a C program that illustrates how to execute two commands concurrently with a command pipe.
Ex: - `ls -l | sort`
5. Write a C program that illustrates two processes communicating using shared memory
6. Write a C program to simulate producer and consumer problem using semaphores
7. Write C program to create a thread using pthreads library and let it run its function.
8. Write a C program to illustrate concurrent execution of threads using pthreads library.



SEMESTER III

SYLLABUS

JAVA PROGRAMMING

Lecture :3	Practical : 0	Internal Marks:30
Credits: 3	Tutorial :0	External Marks:70

COURSE OUTCOMES:

1. Understand the principles of object oriented concepts. Define classes and objects by identifying real world entities, their properties and functionalities.
2. Reuse the existing classes by using inheritance and understand the concepts of packages and exception handling.
3. Make use of built-in classes in Java and understand the concept of thread.
4. Develop user interfaces using applets, AWT and Event handling in java.
5. Create portable GUI applications using Swing components.

UNIT-I:

Introduction to OOP, procedural programming language vs object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector.

UNIT-II:

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

Exception handling, importance of try, catch, throw, throws and finally block, userdefined exceptions, Assertions.

UNIT-III:

Multithreading: Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

UNIT-IV:

Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

UNIT-V:

AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List, Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

TEXT BOOKS:

1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
3. JAVA for Beginners,4e,JoyceFarrell,Ankit R. Bhavsar,Cengage Learning.
4. Object oriented programming with JAVA,Essentials and Applications, Raj Kumar Bhuyya,Selvi,Chu,TMH.
5. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

REFERENCE BOOKS:

1. JavaProgramming,K.Rajkumar.Pearson
2. CoreJava,BlackBook,RNageswararao,Wiley,Dream Tech
3. Core Java for Beginners, Rashmi Kanta Das,vikas.
4. Object Oriented Programming Through java, P.Radha Krishna,Universities Press

R PROGRAMMING

18MC3T02

Lecture : 3	Practical : 0	Internal Marks:30
Credits: 3	Tutorial : 0	External Marks:70

COURSE OBJECTIVES:

After taking the course, students will be able to

- Use R for statistical programming, computation, graphics, and modeling,
- Write functions and use R in an efficient way,
- Fit some basic types of statistical models
- Use R in their own research,
- Be able to expand their knowledge of R on their own.

UNIT-I: Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

UNIT-II: R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quick sort Implementation Extended Example: A Binary Search Tree.

UNIT-III: Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus,Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files,

UNIT-IV: Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot () Function – Customizing Graphs, Saving Graphs to Files.

UNIT-V: Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,- ANOVA. Linear Models, Simple Linear Regression, -Multiple Regression.

OUTCOMES:

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

- List motivation for learning a programming language
- Access online resources for R and import new function packages into the R workspace
- Import, review, manipulate and summarize data-sets in R
- Explore data-sets to create testable hypotheses and identify appropriate statistical tests
- Perform appropriate statistical tests using R Create and edit visualizations with

TEXT BOOKS:

- 1) The Art of R Programming, A K Verma, Cengage Learning.
- 2) R for Everyone, Lander, Pearson
- 3) The Art of R Programming, Norman Matloff, No starch Press.

REFERENCE BOOKS:

- 1) R Cookbook, Paul Teetor, O'Reilly.
- 2) R in Action, Rob Kabacoff, Manning



SOFTWARE ENGINEERING

18MC3T03

Lecture : 3

Practical : 0

Internal Marks:30

Credits: 3

Tutorial : 0

External Marks:70

COURSEOUTCOMES

At the end of the Course Students will be able to:

CO1: Understand the software life cycle models and the importance of the software process.

CO2: Acquire skills to think about problems and their solutions using appropriate methods of analysis and design.

CO3: Understand the importance of modeling and modeling languages.

CO4: Design and develop correct and robust software products.

CO5: Understand the basics of deployment and maintenance of software development project.

UNIT I-INTRODUCTION

Software Engineering, Software Process-Generic process model-Prescriptive process model-specialized, unified process-Agile development-Agile Process-Extreme Programming-Other agile Process models-Software Engineering Knowledge-core Principles.

UNIT II-REQUIREMENTS

Requirements Engineering-Establishing the Groundwork-Eliciting Requirements-Developing use cases-Building the requirements model-Negotiating, validating Requirements-Requirements Analysis-Requirements Modeling Strategies.

UNIT III-DESIGN

MODELING WITH UML: Modeling Concepts and Diagrams-Use Case Diagrams-Class Diagrams-Interaction Diagrams-State chart Diagrams-Activity Diagrams-Package Diagrams-Component Diagrams-Deployment Diagrams

Design Process-Design concepts: Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object Oriented Design Concepts, Design Classes-Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements .

UNIT IV-SOFTWARE IMPLEMENTATION

Structured coding Techniques-Coding Styles-Standards and Guidelines-Documentation Guidelines-Modern Programming Language Features: Type checking-User defined data types-Data Abstraction-Exception Handling-Concurrency Mechanism.

UNIT V-TESTING AND MAINTENANCE

TESTING: Software Quality-Software Quality Dilemma-Achieving Software Quality-Testing: Strategic Approach to software Testing-Strategic Issues-Testing: Strategies for Conventional Software, Object oriented software, System Testing, Art of Debugging

MAINTENANCE: Software Maintenance-Software Supportability-Reengineering-Business Process Reengineering-Software Reengineering-Reverse Engineering-Restructuring-Forward Engineering-Economics of Reengineering

TEXT BOOKS

1. Roger S, "Software Engineering–A Practitioner’s Approach", seventh edition, Pressman, 2010.
2. Pearson Edu, "Software Engineering by Ian sommerville", 9th edition, 2010.

REFERENCES

1. Hans Van Vliet, "Software Engineering: Principles and Practices", 2008.
2. Richard Firley, "Software Engineering Concepts", 2008.

COMPUTER NETWORKS

18MC3T04

Lecture : 3

Practical : 0

Internal Marks:30

Credits: 3

Tutorial : 0

External Marks:70

COURSE OUTCOMES:

After completing this course the student must demonstrate the knowledge and ability to:

- Independently understand basic computer network technology.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- Perform internal connections between the devices.
- Implement IP address and manipulate within the network.

UNIT – I:

Introduction: OSI overview, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT – II:

Physical Layer and overview of PL Switching: Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, introduction to switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

UNIT – III:

Data link layer: Design issues, **Framing:** fixed size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, services provided to Network, **Elementary Data Link Layer protocols:** simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. **Sliding window protocol:** One bit, Go back N, Selective repeat-Stop and wait protocol.

UNIT – IV:

Random Access: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: frequency division multiple access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA).

IEEE Standards: – data link layer, physical layer, Manchester encoding, Standard Ethernet: MAC sub layer, physical layer, Fast Ethernet: MAC sub layer, physical layer, IEEE-802.11: Architecture, MAC sub layer, addressing mechanism, frame structure.

UNIT – V:

Application layer (WWW and HTTP): ARCHITECTURE : Client (Browser) ,Server ,Uniform Resource Locator, Resource Record, HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Request Message Format, HTTP Response Message Format.

TEXT BOOKS:

1. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH.
2. Computer Networks, 5ed, David Patterson, Elsevier
3. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
4. Computer Networks, Mayank Dave, CENGAGE

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

DESIGN AND ANALYSIS OF ALGORITHMS

18MC3T05

Lecture : 3	Practical : 0	Internal Marks:30
Credits : 3	Tutorial : 0	External Marks:70

COURSE OUTCOMES:

CO1 Understand the basic notation for analyzing the performance of the algorithms.
CO2 Describe Divide-and-Conquer Paradigm
CO3 Describe Greedy Paradigm to find the Optimal Solution.
CO4 Describe Dynamic Programming Paradigm
CO5 Describe and Distinguish Backtracking and Branch and Bound Paradigms

UNIT 1 :

Introduction: Algorithm, Pseudo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Solving Recurrence relations, Amortized Analysis

UNIT 2 :

Divide and Conquer Method: General Method, Applications: Binary search, Quick sort, Merge sort, Finding the Maximum and Minimum ,Defective Chessboard.

UNIT 3:

Greedy Method: General method, Applications: Minimum cost spanning tree(Prim's and Kruskal's Algorithms) , Optimal Merge Patterns ,Fractional Knapsack Problem, Single source shortest path, Job Sequencing with Deadlines.

UNIT 4:

Dynamic programming: General Method, Applications: Optimal Binary Search Tree, String Editing, 0/1 knapsack , Travelling Salesperson Problem ,Reliability Design.

UNIT 5 :

Back tracking: General Method, Applications: Sum of Subsets, Hamiltonian Cycles. Graph Coloring,8-Queen Problem.

Branch and bound: General Method , Applications: Travelling Salesman Problem,0/1 Knapsack problem using FIFO and LC Branch and Bound.

Text Books:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press
2.Introduction to Algorithmsby Thomas H. Cormen, Charles E. Leiserson ,Ronald L. Rivest, Clifford Stein .PHI Learning.

Reference Books :

1.The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman
2. Algorithm Design, Jon Kleinberg, Pearson.

JAVA PROGRAMMING LAB

18MC3L06

Lecture : 0

Practical : 4

Internal Marks:30

Credits : 2

Tutorial : 0

External Marks:70

COURSE OUTCOMES:

1. Understand the behavior of primitive data types, object references, and arrays.
2. Implement Java classes from specifications
3. Implement interfaces, inheritance, and polymorphism as programming techniques
4. Apply exceptions handling
5. Design and develop GUI applications

Exercise - 1 (Basics)

- a). Write a JAVA program to display default value of all primitive data type of JAVA
- b). Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.
- c). Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.
- d) Write a case study on **public static void main(250 words)**

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

- a). Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
- b). Write a JAVA program to sort for an element in a given list of elements using bubble sort
- (c). Write a JAVA program to sort for an element in a given list of elements using merge sort.
- (d) Write a JAVA program using StringBuffer to delete, remove character.

Exercise - 3 (Class, Objects)

- a). Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
- b). Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

- a). Write a JAVA program to implement constructor overloading.
- b). Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)

- a). Write a JAVA program to implement Single Inheritance
- b). Write a JAVA program to implement multi level Inheritance
- c). Write a java program for abstract class to find areas of different shapes

Exercise - 6 (Inheritance - Continued)

- a). Write a JAVA program give example for “super” keyword.
- b). Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

- a). Write a JAVA program that describes exception handling mechanism

b). Write a JAVA program Illustrating Multiple catch clauses

Exercise – 8 (Runtime Polymorphism)

a). Write a JAVA program that implements Runtime polymorphism

b). Write a Case study on run time polymorphism, inheritance that implements in above problem.

Exercise – 9 (User defined Exception)

a). Write a JAVA program for creation of Illustrating throw

b). Write a JAVA program for creation of Illustrating finally

c). Write a JAVA program for creation of Java Built-in Exceptions

d). Write a JAVA program for creation of User Defined Exception

Exercise – 10 (Threads)

a). Write a JAVA program that creates threads by extending Thread class .First thread display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds ,(Repeat the same by implementing Runnable)

b). Write a program illustrating **isAlive** and **join ()**

c). Write a Program illustrating Daemon Threads.

Exercise - 11 (Threads continuity)

a). Write a JAVA program Producer Consumer Problem

b). Write a case study on thread Synchronization after solving the above producer consumer problem.

Exercise – 12 (Packages)

a). Write a JAVA program illustrate class path

b). Write a case study on including in class path in your os environment of your package.

c). Write a JAVA program that import and use the defined your package in the previous Problem.

Exercise - 13 (Applet)

a). Write a JAVA program to paint like paint brush in applet.

b) Write a JAVA program to display analog clock using Applet.

c). Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 14 (Event Handling)

a). Write a JAVA program that display the x and y position of the cursor movement using Mouse.

b). Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

Exercise - 15 (Swings)

a). Write a JAVA program to build a Calculator in Swings

b). Write a JAVA program to display the digital watch in swing tutorial.

Exercise – 16 (Swings - Continued)

a). Write a JAVA program that to create a single ball bouncing inside a JPanel.

b). Write a JAVA program JTree as displaying a real tree upside down

R PROGRAMMING LAB

18MC3L07

Lecture : 0	Practical : 4	Internal Marks:30
Credits : 2	Tutorial : 0	External Marks:70

COURSE OUTCOMES:

1. Implement the basic concepts of R.
 2. Implement the basic data structures in R
 3. Implement loops and functions in R
 4. Implement mathematical functions and handling files
 5. Use various graphical tools in R
-
1. Write a program to illustrate basic Arithmetic in R
 2. Write a program to illustrate Variable assignment in R
 3. Write a program to illustrate data types in R
 4. Write a program to illustrate creating and naming a vector in R
 5. Write a program to illustrate create a matrix and naming matrix in R
 6. Write a program to illustrate Add column and Add a Row in Matrix in R
 7. Write a program to illustrate Selection of elements in Matrixes in R
 8. Write a program to illustrate Performing Arithmetic of Matrices
 9. Write a program to illustrate Factors in R
 10. Case study of why you need to use a Factor in R
 11. Write a program to illustrate Ordered Factors in R
 12. Write a program to illustrate Data Frame Selection of elements in a Data frame
 13. Write a program to illustrate Sorting a Data frame
 14. Write a program to illustrate List ? Why would you need a List
 15. Write a program to illustrate Adding more elements into a List
 16. Write a program to illustrate if-else-else if in R
 17. Write a Program to illustrate While and For loops in R
 18. Write a program to illustrate Logical & and Logical | operators in R.
 19. Write a program to illustrate Functions in Quick sort implementation in R
 20. Write a program to illustrate Function inside function in R
 21. Write a program to illustrate to create graphs and usage of plot() function in R
 22. Write a program to illustrate Customising and Saving to Graphs in R.
 23. Write a program to illustrate some built in Mathematical Functions



SEMESTER IV

SYLLABUS



WEB TECHNOLOGIES

18MC4T01

Lecture : 3

Practical : 0

Internal Marks:30

Credits : 3

Tutorial : 0

External Marks:70

COURSE OUTCOMES:

1. Describe the concepts of WWW including browser and HTTP protocol.
2. List the various HTML tags and use them to develop the user friendly web pages.
3. Define the CSS with its types and use them to provide the styles to the web pages at various levels.
4. Develop the modern web pages using the HTML and CSS features with different layouts as per need of applications.
5. Use the JavaScript to develop the dynamic web pages.
6. Use server side scripting with PHP to generate the web pages dynamically using the database connectivity.
7. Develop the modern Web applications using the client and server side technologies and the web design fundamentals.

UNIT-I:

Introduction : Concept of WWW, Internet and WWW, HTTP Protocol :Request and Response, Web browser and Web servers, Features of Web Web Design: 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.

UNIT-II:

HTML : Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Website structure. Overview and features of HTML5

Style sheets : Need for CSS, introduction to CSS, 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.

JavaScript: Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript:

JavaScript and objects, JavaScript own objects, the DOM and web.

UNIT-III:

XML: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT



UNIT-IV:

PHP : Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP.

UNIT-V:

PHP and MySQL: Basic 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, PHPmyadmin and database bugs

TEXT BOOKS:

1. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India
2. Web Technologies, Black Book, dreamtech Press
3. HTML 5, Black Book, dreamtech Press

REFERENCE BOOKS:

1. Web Design, Joel Sklar, Cengage Learning
2. Developing Web Applications in PHP and AJAX, Harwani, McGrawHill
3. Internet and World Wide Web How to program, P.J. Deitel& H.M. Deitel, Pearson



PYTHON PROGRAMMING

18MC4T02

Lecture : 3

Practical : 0

Internal Marks:30

Credits : 3

Tutorial : 0

External Marks:70

OBJECTIVES: The objective of this course is to make students:

1. To define Python functions and call them.
2. To develop Python programs with conditionals and loops.
3. To use Python data structures – , lists, tuples, dictionaries.
4. To learn object- oriented programming concepts.

Outcomes: At the end of the subject, students will be able to:

1. Structure simple Python programs for solving problems.
2. Decompose a Python program into functions.
3. Represent compound data using Python lists, tuples, and dictionaries.
4. Read and write data from/to files in Python Programs.
5. To build software for real needs.

UNIT – I:

Introduction: History of Python, Need of Python Programming, Application Basics of Python, Installing Python in Windows, Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Comments, Input-Output, Indentation.

UNIT – II:

Types, Operators and Expressions:Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

UNIT – III:

Data Structures Lists – Introduction, Accessing, Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

Functions- Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default



Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

UNIT – IV:

Modules: Creating modules, import statement, from. Import statement, name spacing,

Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

Files: Persistence, reading and writing, format operator, filenames and paths, catching exceptions, databases, pipes, writing modules.

Case Study :Brief Tour of the following Standard Packages-System, Date and Time, Math, Random, Numpy, Matplotlib, Multithreading, Internet Access and Turtle Graphics

UNIT – V:

Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding,

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

TEXT BOOKS

1. Learning Python, Mark Lutz, Orielly
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. John V Guttag, —Introduction to Computation and Programming Using Python“, Revised and expanded Edition, MIT Press , 2013.

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage
4. “Python in easy steps In Easy Steps”, Mike MC Grath, illustrated edition, In easy steps 2013 publishers.
5. Professional Python Frameworks: Web 2.0 Programming, Dana Moore, Raymond Budd, William Wright, Wrox Publication, ISBN: 978-0-470-13809-0, October 2007.



DATA WAREHOUSING AND DATA MINING

18MC4T03

Lecture : 3	Practical : 0	Internal Marks:30
Credits : 3	Tutorial : 0	External Marks:70

COURSE OUTCOMES:

- 1) Understand Data Warehouse fundamentals, Data Mining Principles
- 2) Design data warehouse with dimensional modeling and apply OLAP operations.
- 3) Identify appropriate data mining algorithms to solve real world problems
- 4) Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining

COURSE OBJECTIVES:

- 1) Identify the scope and necessity of Data Mining & Warehousing for the society.
- 2) Describe the design of Data Warehousing so that it can be able to solve the root problems.
- 3) To understand various tools of Data Mining and their techniques to solve the real time problems.
- 4) To develop ability to design various algorithms based on data mining tools.
- 5) To develop further interest in research and design of new Data Mining Techniques.

Unit – I Warehouse: What is it, Who Need It, and Why?, Things to Consider, Managing the Data Warehouse, Data Warehouse Design Methodology, Data Marts and Star Schema Design, Fundamentals of ETL Architecture, Partitioning Data, Indexing Data.

Unit – II Data mining: Introduction, Data mining on What Kind of Data, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining. **Data Preprocessing:** Why Preprocess the Data? Data Cleaning, Data Integration, Data Transformation, Data Reduction, Data Discretization.

Unit – III Classification and Prediction: Introduction, Classification by Decision Tree Induction, Bayesian Classification. Other Classification Methods, Classification by Back Propagation, Prediction, Classifier Accuracy.

Unit – IV Association Analysis: Mining Association Rules in large databases - Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multi-Dimensional Association Rules from Relational Databases and Data Warehouses.

Unit – V Cluster analysis – Introduction, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density Based Methods: DBSCAN, Grid-Based method: STING, Model Based Clustering Method: Statistical Approach, Outlier Analysis.

Prescribed Books:

- 1) Michael Corey, Michael Abbey, Ian Abramson, Ben Taub, “Oracle 8i Data Warehousing”, TMH (Unit-I)



- 2) Jiawei Han Micheline Kamber, “Data mining & Techniques”, Morgan Kaufmann Publishers (Units-II-V)
- 3) Pang-Ning Tan, Michael Steinbach, Vipin Kumar, “Introduction to Data Mining”, Pearson Publications. (Units-III-V)

Reference Books:

- 1) S.N.Sivanandam, S.Sumathi, “Data Mining – Concepts, Tasks and Techniques”, Thomson (2006).
- 2) Ralph Kimball, “The Data Warehousing Toolkit”, Wiley.
- 3) Margaret H. Dunham, “Data mining - Introductory and advanced topics”, Pearson Education.
- 4) D.Hand, H. Mannila and P.Smyth, “Principles of Data mining”, PHI (2001).



E COMMERCE

18MC4T04

Lecture : 3	Practical : 0	Internal Marks:30
Credits : 3	Tutorial : 0	External Marks:70

UNIT-I: Electronic Commerce

Introduction, Anatomy of E Commerce Applications, E Commerce Consumer , Applications, E Commerce organization Applications, Consumer oriented E commerce, Mercantile Process Models

UNIT-II: Electronic Payment Systems

Introduction, Digital Token Based Systems, Smart Cards, Credit Cards, Risks in Electronic Payment Systems, Inter Organizational Commerce, EDI- EDI Implementation, Value Added Networks

UNIT-III: Inter Organizational Commerce

Introduction to Inter Organizational Commerce, Workflow, Automation, Customization , Internal Commerce, Supply Chain Management

UNIT-IV: Corporate Digital Library

Document Library, Digital Document Types, Corporate Data Warehouses, Advertising and Marketing, Information Bases Marketing, Advertising on Internet, Online Marketing Process, Market

Research

UNIT-V: Consumer Search and Resource Discovery& Multimedia

Introduction, Information Search and Retrieval, Commerce Catalogues, Information Filtering, Key Multimedia Concepts, Digital Video and Electronic Commerce, Desktop Video Processing

TEXT BOOKS:

1. Frontiers of electronic commerce – Kalakata, Whinston, Pearson

REFERNCE BOOKS:

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.

2. E-Commerce, S.Jaiswal – Galgotia.

3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.

4. Electronic Commerce – Gary P.Schneider – Thomson.

5. E-Commerce – Business, Technology, Society, Kenneth C.Taudon, Carol GuyericoTra



CRYPTOGRAPHY AND NETWORK SECURITY **(Elective)**

18MC4T05

Lecture : 3
Credits : 3

Practical : 0
Tutorial : 0

Internal Marks:30
External Marks:70

COURSE OBJECTIVES:

At the end of the course the student is able to understand

- Basics of Information Security
- How to provide security with Symmetric Encryption Methods
- How to provide security with Asymmetric Encryption Methods
- About E-Mail Privacy
- Web Security
- Basic principles of SNMP
- About Firewalls

COURSE OUTCOMES:

1. Be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.
2. Be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

UNIT I : Classical Encryption Techniques

Introduction: Security attacks, services & mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber threats and their defense(Phishing Defensive measures, web based attacks, SQL injection & Defense techniques)(TEXT BOOK 2), Buffer overflow & format string vulnerabilities, TCP session hijacking(ARP attacks, route table modification) UDP hijacking (man-in-the-middle attacks)(TEXT BOOK 3).

UNIT II: Block Ciphers & Symmetric Key Cryptography

Traditional Block Cipher Structure, DES, Block Cipher Design Principles, AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-128, IDEA, Block Cipher Modes of Operations

UNIT III: Number Theory & Asymmetric Key Cryptography

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.

Public Key Cryptography: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

UNIT IV: Cryptographic Hash Functions & Digital Signatures, IP Security

Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC& CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.



IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT V: User Authentication, Transport Layer Security & Email Security, Intrusion detection systems

User Authentication: Remote user authentication principles, Kerberos

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell(SSH)

Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.

Intrusion detection: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS. (TEXT BOOK 2)

TEXT BOOKS:

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press
3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

REFERENCE BOOKS:

1. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford
2. Network Security & Cryptography, Bernard Menezes, Cengage, 2010



Distributed Systems

18MC4T06

Lecture : 3
Credits : 3

Practical : 0
Tutorial : 0

Internal Marks:30
External Marks:70

COURSE OUTCOMES:

The student should be made to:

- Understand foundations of Distributed Systems.
- Understand about various issues in Inter-process communication.
- Introduce the idea of peer to peer services and file system.
- Understand in detail the system level and support required for distributed system.
- Understand the issues involved in distributed transactions & concurrency control.

UNIT I

Examples of Distributed Systems–Trends in Distributed Systems, Focus on resource sharing, Challenges, Case study: World Wide Web.

System Models – Physical Model, Architectural Model, Fundamental Model.

UNIT II

Interprocess Communication: Introduction, The API for the Internet Protocols, The Characteristics of Interprocess communication. Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling;

Multicast Communication – IP Multicast, Reliability & ordering of multicast; Network virtualization: Overlay networks – Example.

UNIT III

Peer-to-peer Systems – Introduction, Napster and its legacy, Peer-to-peer, Middleware, Routing overlays, Overlay case studies: Pastry, Tapestry.

Distributed File Systems – Introduction, File service architecture, Network File system, Andrew File system, Enhancements and further developments.

UNIT IV

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects-Object Model, Distributed Object Model; Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVARMI

Operating System Support: Introduction, the Operating System Layer, Protection, Processes and Threads - Address Space, Creation of a New Process, Threads.

UNIT V

Transactions and Concurrency Control– Transactions -Nested transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control, **Distributed Transactions** - Flat and nested distributed transactions, Atomic Commit protocols, Concurrency Control in Distributed



Transactions, Distributed deadlocks, Transaction recovery.

TEXT BOOKS:

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems- Concepts and Design", Fourth Edition, Pearson Publication.
2. Ajay D Kshemkalyani, MukeshSignal, "Distributed Computing, Principles, Algorithms and Systems", Cambridge.



ARTIFICIALINTELLIGENCE

(Elective)

18MC4T07

Lecture : 3
Credits : 3

Practical : 0
Tutorial : 0

Internal Marks:30
External Marks:70

COURSEOBJECTIVES:

- To learn the difference between optimal reasoning vs human like reasoning
- To understand the notions of state space representation , exhaustive search, heuristic search along with the time and space complexities
- To learn different knowledge representation techniques
- To understand the applications of AI: namely Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing

UNIT-I

Introduction, History, Intelligent Systems, Foundations of AI, Sub areas of AI, Applications. ProblemSolving-State-SpaceSearchandControlStrategies:Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques, Iterative-Deepening A*, Constraint Satisfaction. Game Playing, Bounded Look-ahead Strategy and use of Evaluation Functions, Alpha-Beta Pruning

UNIT-II

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR.

UNIT-III

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems Vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of Shells and Tools.

Uncertainty Measure-Probability Theory: Introduction ,Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory.

UNIT-IV

Machine-Learning Paradigms: Introduction. Machine Learning Systems, Supervised and Unsupervised Learning. Inductive Learning. Learning Decision Trees, Deductive Learning. Clustering, Support Vector Machines.

UNIT-V

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed-Forward



Networks, Multi-Layer Feed-Forward Networks, Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks.

TEXTBOOKS:

1. SarojKaushik.ArtificialIntelligence.CengageLearning.20112. Russell, Norvig: Artificial intelligence, A Modern Approach, Pearson Education, SecondEdition.2004

REFERENCEBOOK:

1. Rich, Knight, Nair:Artificialintelligence,TataMcGrawHill,ThirdEdition2009.
2. Introduction to Artificial Intelligence by Eugene Charniak, Pearson.
3. IntroductiontoArtificialIntelligenceandexpertsystemsDanW.Patterson.PHI.
4. Artificial Intelligence by George Flugerrearson fifth edition.



PYTHON PROGRAMMING LAB

18MC4L08

Lecture: 0
Credits : 2

Practical : 4
Tutorial : 0

Internal Marks:30
External Marks:70

Exercise 1 - Basics

- Running instructions in Interactive interpreter and a Python Script
- Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations

- Write a python program to compute distance between two points taking input from the user (Pythagorean Theorem)
- Write a program add.py that takes 2 numbers as command line arguments and prints its sum.
- Write a program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.

Exercise - 3 Control Flow

- Write a Program for checking whether the given number is a even number or not.
- WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :

Grade A: Percentage ≥ 80

Grade B: Percentage ≥ 70 and < 80

Grade C: Percentage ≥ 60 and < 70

Grade D: Percentage ≥ 40 and < 60

Grade E: Percentage < 40

- Using a for loop, write a program that prints out the decimal equivalents of $1/2$, $1/3$, $1/4$, . . . , $1/10$
- Write a program using a for loop that loops over a sequence. What is sequence ?
- Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow – Continued

Find the sum of all the primes below two million. Each new term in the Fibonacci sequence is generated by



adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

- a) By considering the terms in the Fibonacci sequence, find the sum of the even-valued terms.

Exercise - 5 - DS

- a) Write a Python program using string slices and methods.
- b) Implement a Python program using Lists and perform various operations.
- c) Write a Python program to implement Dictionaries.

Exercise - 6 Files

- a) Write a program to print each line of a file in reverse order.
- b) Write a program to compute the number of characters, words and lines in a file.
- c) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise – 7 Functions

- a) Write a function `ball_collide` that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r) , r being the radius. If $(\text{distance between two balls centers}) \leq (\text{sum of their radii})$ then (they are colliding)

- b) Write a function `cumulative_product` to compute cumulative product of a list of numbers.

Exercise - 8 Functions - Continued

- a) Write a python program to display the powers of 2 using anonymous function.
- b) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.
- c) Write a Python program to implement
 - a) Linear search
 - b) Binary search using functions.

Exercise 10 – Numpy Module

- a) Write a program to perform addition of two square matrices
- b) Write a program to perform multiplication of two square matrices

Exercise - 11 – Internet Access Module

- a) Write a script that imports requests and fetch content from the page. Eg. (Wiki)
- b) Write a simple script that serves a simple HTTP Response and a simple HTML Page

Exercise -12 Visualization Modules



- a) WAP to read n integers and display them as a histogram.
- b) WAP to display sine, cosine, polynomial and exponential curves.
- c) WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
- d) Develop a Python program that implements the Turtle module.

Exercise - 13 OOP

- a) Write a python program to demonstrate Constructors.
- b) Write a python program to demonstrate Inheritance
- c) Write a python program to handle Runtime Exceptions.



18MC4L10

WEB TECHNOLOGIES LAB

18MC4L09

Lecture : 0	Practical : 4	Internal Marks:30
Credits : 2	Tutorial : 0	External Marks:70

1. Design multiple webpages with navigation facility by utilizing all the html elements in Unit II
2. Design multiple page website with different types of styling like Inline Internal and External.
Note: By the end of this task student should be clear on cascading.
3. Design a webpage to perform client side actions like validations and all using JavaScript.
4. Example on usage of DTD.
5. Example on usage of Schema.
6. Different examples using XSL and XSLT.
7. Develop a website to use PHP Cookies for Logins of Different users
8. Develop a website to use PHP MYSQL for Logins of Different users
9. Example using PHP Arrays All types.
10. Example using PHP Sessions and use them in handling a website with login system.
11. Develop an attractive Web site for an event to be organized in your institute.
12. Develop a Web based application to manage the Visiting Cards which allows user to add new cards, delete the cards, update the cards etc.
13. Develop a web based application for online purchasing of products with payment facility



Object Oriented Analysis and Design Lab

Lecture : 0

Practical : 4

Internal Marks:30

Credits : 2

Tutorial : 0

External Marks:70

OBJECTIVES:

- Construct UML diagrams for static view and dynamic view of the system.
- Generate creational patterns by applicable patterns for given context.
- Create refined model for given Scenario using structural patterns.
- Construct behavioral patterns for given applications.

Case Study 1: ATM

Case Study 2: Library Management System

Case Study 3: Railway Reservation System

Case Study 4: Online Shopping

Week 1:

Familiarization with Rational Rose or Umbrello

For each case study:

Week 2, 3 & 4:

For each case study:

- a) Identify and analyze events
- b) Identify Use cases
- c) Develop event table
- d) Identify & analyze domain classes
- e) Represent use cases and a domain class diagram using Rational Rose
- f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

Week 5 & 6:

• For each case study:

- a) Develop Use case diagrams
- b) Develop elaborate Use case descriptions & scenarios
- c) Develop system sequence diagrams

Week 7, 8, 9 & 10:

For each case study:

- a) Develop high-level sequence diagrams for each use case
- b) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
- c) Develop detailed design class model (use GRASP patterns for responsibility assignment)
- d) Develop three-layer package diagrams for each case study

Week 11 & 12:

For each case study:

- a) Develop Use case Packages
- b) Develop component diagrams
- c) Identify relationships between use cases and represent them



- d) Refine domain class model by showing all the associations among classes

Week 13

For each case study:

- a) Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

OUTCOMES:

- Understand the Case studies and design the Model.
- Understand how design patterns solve design problems.
- Develop design solutions using creational patterns.
- Construct design solutions by using structural and behavioral patterns



EMPLOYABILITY SKILLS: Arithmetic and Logical Reasoning

III Year - II Semester

Course Code: 18CS6T07

Lecture: 3 Practical: 0

Internal Marks: 30

Credits: 3 Tutorial: 0

External Marks: 70

SYLLABUS

UNIT-I

Divisibility and remainder rules of numbers, Unit digit, square root, cube root and simplification of numbers, HCF and LCM of numbers, Averages and Percentages Alphabetical and miscellaneous series, Coding and decoding and Blood Relations

UNIT-II

Profit & loss, Simple interest and Compound Interest Direction, Order and Ranking, Sitting arrangement and Puzzle

UNIT-III

Ratio & proportions, Partnership, Alligation and mixtures and Ages. Data sufficiency, Inequalities and Decision making.

UNIT-IV

Time and work, Pipes & cisterns and Time and distance. Syllogism, Statement and course of action and Statement and Assumption.

UNIT-V

Boats and streams, Areas, Volume and surface areas. Statement and argument, Cause and effect and Drawing inference.

Note: Students shall be able to solve the problems to the standard of examinations like GRE and

CAT TEXT BOOKS:

- 1) "Objective Arithmetic" by R.S. Agarwal, S. Chand Publications.
- 2) Verbal and non-verbal Reasoning, R.S. Agarwal, S. Chand Publications

REFERENCES:

- 1) Quantitative Aptitude by Dinesh Khattar, Pearson Education.
- 2) .Quantitative Aptitude by Abhjit Guha.
- 3) Fast Track objective Arithmetic, Rajesh Verma, Arihant publications.



SEMESTER V

SYLLABUS



SOFTWARE TESTING METHADOLOGIES

V Semester- MCA

18MC5T01

Lecture : 3	Practical : 0	Internal Marks:40
Credits : 3	Tutorial : 0	External Marks:60

COURSE OBJECTIVES:

- 1) To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
- 2) To Understand different levels of Testing
- 3) Apply Black Box and White Box Testing Techniques
- 4) To learn how to plan a test project, design test cases and data, conduct testing operations, and generate a test report.
- 5) To understand software test automation problems and solutions.

COURSE OUTCOMES:

- 1) Have an ability to apply software testing knowledge and engineering methods.
- 2) Ability to identify the needs of software test automation, and define a test tool to support test automation.
- 3) Understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
- 4) Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.
- 5) Apply techniques and skills to use modern software testing tools to support software testing projects.

SYLLABUS

UNIT I:

Software Testing: Introduction, Evolution, Dichotomies, Goals & Typical Objectives of Testing, Model for testing, Software Testing Principles

Software Testing Terminology and Methodology: Software Testing Terminology, Errors, Defects, Failures, Root Causes and Effects, Software Testing Life Cycle, Software Testing Methodology.

UNIT II:

Verification and Validation: Verification & Validation Activities, Categories of Test Techniques: Dynamic



Testing,

Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing,

White-Box Testing: Need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing

UNIT III:

Experience Based Testing Techniques: Error Guessing, Exploratory Testing, Checklist- based Testing

Static Testing: Inspections, Structured Walkthroughs, Technical reviews, Benefits of Static Testing, Static Vs Dynamic Testing.

Levels of Testing: Unit testing, Integration Testing,. Function testing, System testing and Acceptance testing.

Regression testing: Progressive Vs Regressive testing, Objectives of regression testing, Regression testing techniques

UNIT IV:

Test Management: Test Organization, Test Planning, Test Design and Test case specifications, Structure of a Testing Group, Reasons for the growth of a Test suite, Test suite Minimization, Test suite prioritization, Types of test case prioritization, prioritization techniques, Measuring the effectiveness of a prioritized test suite.

Debugging: Debugging process, Debugging Techniques, Correcting Bugs, Debuggers

UNIT V:

Automation and Testing Tools: Need for automation, Testing Tool Considerations, Test Tool Classification, Benefits and Risks of Test automation, Special Considerations for Test execution and Test Management Tools, Principles for tool selection, Testing tools- success factors, Guidelines for automated testing, overview of some commercial testing tools.

TEXT BOOKS:

1. Software testing techniques - Baris Beizer, International Thomson computer press, second edition.

(Unit 1)

2. Software Testing, Principles and Practices, Naresh Chauhan, Oxford Publishers(Unit 2,3,4,5)

REFERENCES

1. Effective Methods for Software testing, Willian E Perry, 3ed, Wiley
2. Software Testing, Principles, techniques and Tools, M G Limaye, TMH



HADOOP & BIG DATA

V Semester- MCA

18MC5T02

Lecture : 3

Practical : 0

Internal Marks:40

Credits : 3

Tutorial : 0

External Marks:60

COURSE OBJECTIVES:

- 1) Optimize business decisions and create competitive advantage with Big Data analytics
- 2) Introducing Java concepts required for developing map reduce programs
- 3) Derive business benefit from unstructured data
- 4) Imparting the architectural concepts of Hadoop and introducing map reduce paradigm

COURSE OUTCOMES:

- 1) Understand methods for data summarization, query, and analysis.
- 2) Apply data modeling techniques to large data sets
- 3) Creating applications for Big Data analytics
- 4) Building a complete business data analytic solution.
- 5) Understand programming tools PIG & HIVE in Hadoop eco-system.

SYLLABUS

UNIT-I

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Name node, Data node, Secondary Name node, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III

Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop Map Reduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner



UNIT-IV

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

UNIT-V

Pig: Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

TEXT BOOKS:

- 1) Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC (Unit 1)
- 2) Hadoop: The Definitive Guide by Tom White, 3 Edition, O'reilly(Unit 2,3,4)
- 3) Hadoop in Action by Chuck Lam, MANNING Publ.9(Unit 2)
- 4) Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss (Unit 5)

REFERENCE BOOKS:

- 1) Hadoop in Practice by Alex Holmes, MANNING Publ.
- 2) Hadoop MapReduce Cookbook, SrinathPerera, ThilinaGunarathne



MOBILE COMPUTING

V Semester- MCA

18MC5T03

Lecture : 3

Practical : 0

Internal Marks: 40

Credits : 3

Tutorial : 0

External Marks:60

COURSE OBJECTIVES:

- 1) To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
- 2) To understand the typical mobile networking infrastructure through a popular GSM protocol.
- 3) To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer.
- 4) To understand the database issues in mobile environments & data delivery models.
- 5) To understand the ad hoc networks and related concepts.

COURSE OUTCOMES:

- 1) Develop new mobile applications.
- 2) Identify solutions to the technical issues in the mobile communication paradigm.
- 3) Understand the ad hoc network applications and/or algorithms/protocols.
- 4) Understand & develop any existing or new protocol related to mobile environment.
- 5) Understand the platforms and protocols used in mobile environment

SYLLABUS

UNIT-I

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices. GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

UNIT-II

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed Terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/ (IEEE 802.11)

UNIT-III

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location



Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT-IV

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT-V

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing methods, Data Synchronization – Introduction, Software, and Protocols.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2009.(Units 1,2,3)
2. Raj Kamal, “Mobile Computing”, Oxford University Press, 2007, ISBN: 0195686772(Units 4,5)

REFERENCES:

1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, “Mobile Computing, Technology Applications and Service Creation” Second Edition, McGraw Hill.
2. UWE Hansmann, LotharMerk, Martin S. Nocklous, Thomas Stober, “Principles of Mobile Computing,” Second Edition, Springer.



(Elective II)

MACHINE LEARNING & DEEP LEARNING

V Semester MCA

18MC5T04

Lecture : 3

Practical : 0

Internal Marks:40

Credits : 3

Tutorial : 0

External Marks:60

COURSE OBJECTIVES:

- 1) To introduce students to the basic concepts and techniques of Machine Learning and deep learning.
- 2) To develop skills of using recent deep learning software for solving practical problems.
- 3) To gain experience of doing independent study and research.

COURSE OUTCOMES:

- 1) Understand the basic concepts of concept learning
- 2) Understand the concepts of evaluating the hypothesis
- 3) Understand the concept behind neural networks for learning non-linear functions.
- 4) Develop a deep neural network for image classification
- 5) Develop a deep network for sequence data analysis

SYLLABUS

UNIT-I

Introduction: Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning.(Text Book 1)

Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.(Text Book 1)

UNIT-II

Evaluating Hypothesis: Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. (Text Book 1)

Features: Kinds of feature, Feature transformations, Feature construction and selection. (Text Book 2). Model ensembles: Bagging and random forests, Boosting (Text Book 3)

UNIT-III

Artificial Neural Networks: Introduction, Neural Network representation, Perceptrons, multi layer perceptron, Feed



forward neural network, Training Neural Network: Risk minimization, loss function, regularization, model selection, and optimization, Back propagation with case study (Text Book 1)

UNIT-IV

Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolution Neural Network.

UNIT-V

Recurrent Neural Network, Autoencoders

Introduction to Deep Learning Tools: Tensor Flow, keras

TEXT BOOKS:

- 1) Tom M. Mitchell, "Machine Learning", India Edition 2013, McGraw Hill Education (Unit 1, 2, 3)
- 2) Huan Liu and Hiroshi Motoda, "Feature Selection For Knowledge Discovery And Datamining", Springer Science + Business Media, LLC 1998. (Unit 2)
- 3) Cha Zhanga and YunqianMa, "Ensemble Machine Learning Methods and Applications", Springer Science + Business Media, LLC 2012 (Unit 2)
- 4) Goodfellow, I., Bengio, Y., and Courville, A., Deep Learning, MIT Press, 2016. (Unit 4)

REFERENCES:

1. Deep Learning with python by Francois Chollet, Manning Publications.
2. Hands-on Machine Learning with Scikit-learn and TensorFlow by AurelienGeron, O'Reilly Media, 2017
3. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.



(Elective II)

CLOUD COMPUTING

V Semester MCA

18MC5T05

Lecture : 3

Practical : 0

Internal Marks:40

Credits : 3

Tutorial : 0

External Marks:60

COURSE OBJECTIVES:

- 1) Explain the technology and principles involved in building a cloud environment
- 2) Apply Map-Reduce concept to applications.
- 3) To implement Virtualization
- 4) Contrast various programming models used in cloud computing
- 5) Choose appropriate cloud model for a given application.

COURSE OUTCOMES:

- 1) Explain and characterize different cloud deployment models and service models
- 2) Understand different cloud programming platforms and tools\
- 3) Illustrate Virtualization for Data-Center Automation.
- 4) Identify the security issues in cloud computing
- 5) Understand various basic concepts related to cloud computing technologies

SYLLABUS

UNIT-I

Introduction and Evolution of Computing Paradigms: Overview of Existing Hosting Platforms, Cluster Computing, Grid Computing, Utility Computing, Autonomic Computing, Green Computing, Cloud Computing, history and evolution, practical applications of cloud computing for various industries, IoT, economics and benefits of cloud computing, spot markets, pricing models, Supercomputing-on-demand.

UNIT-II

Cloud Issues and Challenges: Cloud computing issues and challenges like Security, Elasticity, Resource management and Scheduling, QoS (Quality of Service) and Resource Allocation, Cost Management, Big Data, Pre-reservation and Cloud



bursting.

Cloud Computing Architecture: Cloud Architecture model, Types of Clouds: Public Private & Hybrid Clouds, Cloud based services: IaaS, PaaS and SaaS .

UNIT-III

Data Center: Classic Data Center, Virtualized Data Center (Compute, Storage, Networking and Application), Business Continuity in VDC.

Virtualization: Virtualization, Advantages and disadvantages of Virtualization, Types of Virtualization: Resource Virtualization i.e. Server, Storage and Network virtualization, Migration of processes, VMware vCloud – IaaS

UNIT-IV

Cloud based Data Storage: Introduction No-SQL databases, Map-Reduce framework for Simplified data processing on Large clusters using Hadoop, Design of data applications based on Map Reduce in Apache Hadoop, Task Partitioning, Data partitioning, Data Synchronization, Distributed File system, Data Replication , Shared access to weakly consistent to data stores

UNIT-V

Classification of Cloud Implementations: Amazon Web Services, The Elastic Compute Cloud (EC2), The Simple Storage Service (S3), The Simple Queuing Services (SQS), Google AppEngine - PaaS, Windows Azure, Aneka, Hadoop, Microsoft Dynamics CRM, A Comparison of Cloud Computing Platforms.

TEXT BOOKS:

1. Raj Kumar Buyya, James Broberg, Andrezej M. Goscinski, Cloud Computing: Principles and paradigms, MIT Press (2011). (Units 1,2)
2. Cloud Computing: A practical Approach Anthony Velte, Toby Velte and Robert Elsenpeter by Tata McGrawHill (2009). (Unit 5)
3. Michael Miller, Cloud Computing, Que Publishing (2008). (Unit 3,4)

REFERENCES:

1. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen Vecchiola, S Tammaraiselvi, TMH
2. Judith Hurwitz, Robin Bllor, Marcia Kaufman, F Halper, Cloud Computing for dummies (2009).
3. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier



4. Hwang, Kai, Jack Dongarra, and Geoffrey C. Fox. Distributed and cloud computing: from parallel processing to the internet of things. Morgan Kaufmann, 2013.



(Elective II)

HUMAN COMPUTER INTERACTION

V Semester MCA

18MC5T06

Lecture : 3

Practical : 0

Internal Marks:40

Credits : 3

Tutorial : 0

External Marks:60

COURSE OBJECTIVES:

- Explain the capabilities of both humans and computers from the viewpoint of human information processing.
- To make the student think constructively and analytically about how to design and evaluate interactive technologies.

COURSE OUTCOMES:

- 1) Describe typical human-computer interaction (HCI) models, styles, and various historic HCI paradigms.
- 2) Apply an interactive design process and universal design principles to designing HCI systems.
- 3) Understand the importance of Natural Languages in computing interactions.
- 4) Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
- 5) Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.

SYLLABUS

UNIT-I

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession.

Managing Design Processes: Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues.

UNIT-II

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization, Single menus,



Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

UNIT-III

Command and Natural Languages: Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large

UNIT-IV

Quality of Service: Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences Balancing Function and Fashion: Introduction, Error Messages, Nonanthropomorphic Design, Display Design, Web Page Design, Window Design, Color

UNIT-V

User Documentation and Online Help: Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process.

TEXT BOOKS:

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson (Units 1, 2, 3, 4)
2. The Essential guide to user interface design, 2/e, Wilbert O Galitz, Wiley DreamaTech. (Unit 5)

REFERENCE BOOKS:

1. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, Soren Lauesen , PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley.



(Elective III)

INTERNET OF THINGS

V Semester MCA

18MC5T07

Lecture : 3

Practical : 0

Internal Marks:40

Credits : 3

Tutorial : 0

External Marks:60

COURSE OBJECTIVES:

- 1) Understand the architecture of Internet of Things and connected world.
- 2) Explore on use of various hardware, communication and sensing technologies to build IoT applications.
- 3) Develop the real time IoT applications to make smart world.
- 4) Understand challenges and future trends in IoT.

COURSE OUTCOMES:

- 1) Design and Deployment of IoT.
- 2) Design and comparing M2M with IoT
- 3) Understand Platform design and modeling of IoT
- 4) Apply IoT in different devices using Python
- 5) Implement IoT and cloud platforms

SYLLABUS

UNIT-I

INTRODUCTION TO INTERNET OF THINGS (IoT): Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT Enabling Technologies, IoT levels and deployment, domains Specific IoTs.

UNIT-II

IoT AND M2M : Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.

UNIT-III

IoT PLATFORMS DESIGN METHODOLOGY: IoT Architecture: State of the art introduction, state of the art; Architecture reference model: Introduction, reference model and architecture, IoT reference model. Logical design using



Python: Installing Python, Python data types and data Structures, control flow, functions, modules, packages, file handling.

IoT Physical Devices and Endpoints: Introduction to Raspberry Pi interfaces (Serial, SPI, I2C), programming Raspberry PI with Python, other IoT devices.

UNIT-IV

IoT Protocols: Messaging Protocols- MQ Telemetry Transport (MQTT), Constrained Application Protocol (CoAP)
Transport Protocols-Light Fidelity(Li-Fi), Bluetooth Low Energy(BLE)

IoT Protocols: Addressing and Identification: Internet Protocol Version 4(IPV4), Internet Protocol Version 6(IPV6),
Uniform Resource Identifier (URI)

UNIT-V

IoT Physical Servers And Cloud Offerings: Introduction to cloud storage models and communication APIs, WAMP
–AutoBahn for IoT, Xively cloud for IoT, case studies illustrating IoT design –home automation, smart cities, smart environment.

TEXT BOOKS:

- 1) ArshdeepBahga, Vijay Madiseti, “Internet of Things: A Hands-on-Approach”, VPT, 1stEdition, 2014.(Units 1,2,3,5)
- 2) Matt Richardson, Shawn Wallace, “Getting Started with Raspberry Pi”, O’Reilly (SPD), 3rdEdition, 2014.(Unit 3)
- 3) Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram “ Internet of Things” Wiley(Unit 4)

REFERENCE BOOKS:

- 1) Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw HillHigher Education
- 2) Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, John Wiley andSons2014.



(Elective III)

SOFTWARE PROJECT MANAGEMENT

V Semester MCA

18MC5T08

Lecture : 3

Practical : 0

Internal Marks:40

Credits : 3

Tutorial : 0

External Marks:60

COURSE OBJECTIVES:

- 1) To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
- 2) To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- 3) To understand successful software projects that support organization's strategic goals

COURSE OUTCOMES:

- 1) Understand the basic concepts and issues of software project management
- 2) Gain knowledge on effective planning and estimation of software projects.
- 3) Understand the importance of Risk Management in software Projects.
- 4) Select and employ mechanisms for tracking the software projects
- 5) Understand Process and Product Quality metrics

SYLLABUS

UNIT-I

Introduction: Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

UNIT-II

Project Approach: Software Lifecycle models, Lifecycle phases

Effort estimation: Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation

UNIT-III

Activity Planning: Activity Identification Approaches, Network planning models, Critical path analysis. **Risk**



Management: Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

UNIT-IV

Project Monitoring & Control, Resource Allocation: Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

Managing People & Organizing Teams: Oldham-Hackman Job characteristics model, Influence of culture

UNIT-V

Software Quality: Planning Quality, Defining Quality - ISO 9126, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality, Quality plan of ACIC project.

TEXT BOOKS:

1. Software Project Management in practice, Pankaj Jalote, Pearson. (Units 1, 2, 3, 4, 5)
2. Software Project Management, Walker Royce: Pearson Education (Units 4, 5)

REFERENCE BOOKS:

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA McGraw-Hill
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Quality, Ben-Menachem ,Marliss



(Elective III)

DATA ANALYTICS

V Semester MCA

18MC5T09

Lecture : 3

Practical : 0

Internal Marks:40

Credits : 3

Tutorial : 0

External Marks:60

COURSE OBJECTIVES:

1. To understand Data Analytics lifecycle and Business Challenges.
2. To understand Analytical Techniques
3. To understand various tools and technologies to handle big data

COURSE OUTCOMES:

1. Understand big data and data analytics life cycle.
2. Explore various supervised learning methods.
3. Explore various unsupervised learning methods.
4. Understand and apply ARIMA model on time series data.
5. Learn various technology and tools in big data analytics.

SYLLABUS

UNIT-I

Introduction to Big Data Analytics: Big Data Overview, State of the Practice in Analytics, Key Roles for the new big data Ecosystem, Examples of Big Data Analytics.

Data Analytics Life Cycle: Data Analytics life cycle Overview, Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize, Case Study.

UNIT-II

Supervised Learning: Decision Trees – Overview of Decision Trees, The General Algorithm, Decision Tree Algorithms, Evaluating a Decision Tree. **Naïve Bayes:** Baye's Theorem, Naïve Baye's Classifier, Diagnostics of Classifiers.



Regression –Linear Regression, Logistic Regression.

UNIT-III

Unsupervised Learning: Association Rule Mining–Overview, Apriori Algorithm, Evaluation of Candidate Rules, Applications of Association Rules.

Cluster Analysis –Overview of Clustering, k-means

UNIT IV

Time Series Analysis: Overview of Time Series Analysis, ARIMA Model

Text Analysis: Text Analysis Steps, Example, Collecting Raw Data, Representing Text, TFIDF, Categorizing Documents by Topics, Determining Sentiments, Gaining Insights.

UNIT-V

Technology and Tools:MapReduce and Hadoop- Analytics for Unstructured Data, The Hadoop Ecosystem

In-DataBase Analytics: SQL Essentials, In-Database Text Analysis, Advanced SQL.

TEXT BOOKS:

1. David Dietrich, Barry Hiller, “Data Science and Big Data Analytics”, EMC education services, Wiley publications, 2012.

REFERENCE BOOKS:

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analytics, John Wiley & sons, 2012.
2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O’ Reilly, 2011.
3. Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier, Reprinted 2008.



BIG DATA & HADOOP LAB

V Semester MCA

18MC5L10

Lecture : 0

Practical : 4

Internal Marks:40

Credits : 2

Tutorial : 0

External Marks:60

COURSE OUTCOMES:

- 1) Preparing for data summarization, query and analysis.
- 2) Applying data modeling techniques to large data sets.
- 3) Creating applications for Big data Analytics.
- 4) Building a complete business data analytic solution.

LIST OF LAB EXPERIMENTS

Week 1, 2:

1. Implement the following Data structures in Java

- a) Linked Lists b) Stacks c) Queues d) Set e) Map

Week 3, 4:

2. (i) Perform setting up and Installing Hadoop in its three operating modes:

- Standalone,
- Pseudo distributed,
- Fully distributed
- (ii)Use web based tools to monitor your Hadoop setup.

Week 5:

3. Implement the following file management tasks in Hadoop:

- Adding files and directories
- Retrieving files
- Deleting files
- Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.



Week 6:

4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Week 7:

5. Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.

Week 8:

6. Implement Matrix Multiplication with Hadoop Map Reduce

Week 9, 10:

7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

Week 11, 12:

8. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes



MOBILE APPLICATION DEVELOPMENT LAB

V Semester MCA

18MC5L11

Lecture : 0

Practical : 4

Internal Marks:40

Credits : 2

Tutorial : 0

External Marks:60

COURSE OBJECTIVES:

- 1. Design and develop a mobile client Server System using a standard Java and J2ME platform.**
- 2 Design implement a system that consists of a mobile client (MC) and a Proxy Server (PS).**

COURSE OUTCOMES:

- 1) Develop user interfaces for mobiles.
- 2) Develop simple mobile applications
- 3) Develop mobile application to provide database interactions
- 4) Develop mobile application to support multi-tier architectures

System/Software Requirements:

.Intel based desktop PC

.Java Wireless Toolkit 2.5.2_01

PROGRAMS LIST:

1. Write a J2ME program to show how to change the font size and colour.
2. Write a J2ME program which creates the following kind of menu.
 - * cut
 - * copy
 - * past
 - * delete
 - * select all
 - * unselect all
3. Create a J2ME menu which has the following options (Event Handling):
 - *cut - can be on/off



*copy - can be on/off

*paste - can be on/off

*delete - can be on/off

*select all - put all 4 options on

*unselect all - put all

4. Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array. You can enter four data (integer) values to the input text field.

5. Create an MIDP application which examine, that a phone number, which a user has entered is in the given format (Input checking):

* Area code should be one of the following: 040, 041, 050, 0400, 044

* There should 6-8 numbers in telephone number (+ area code)

6. Write a sample program to show how to make a SOCKET Connection from J2ME phone. This J2MEsample program shows how to how to make a SOCKET Connection from a J2ME Phone. Many a times there is a need to connect backend HTTP server from the J2ME application. Show how to make a SOCKET connection from the phone to port 80.

7. Login to HTTP Server from a J2ME Program. This J2ME sample program shows how to display a simple LOGIN SCREEN on the J2ME phone and how to authenticate to a HTTP server. Many J2ME applications for security reasons require the authentication of the user. This free J2ME sample program, shows how a J2ME application can do authentication to the backend server. Note: Use Apache Tomcat Server as Webserver and MySQL as Database Server.

8. The following should be carried out with respect to the given set of application domains: (Assume that the Server is connected to the well-maintained database of the given domain. Mobile Client is to be connected to the Server and fetch the required data value/information)

- Students Marks Enquiry
- Town/City Movie Enquiry
- Railway/Road/Air (For example PNR) Enquiry/Status
- Sports (say, Cricket) Update
- Town/City Weather Update
- Public Exams (say Intermediate or SSC)/ Entrance (Say EAMCET) Results Enquiry

Divide Student into Batches and suggest them to design database according to their domains and render



information according to the requests.

9. Write an Android application program that displays Hello World using Terminal.

10. Write an Android application program that displays Hello World using Eclipse.

11. Write an Android application program that accepts a name from the user and displays the hello name to the user in response as output using Eclipse.

12. Write an Android application program that demonstrates the following:

(i) Linear Layout

(ii) Relative Layout

(iii) Table Layout

(iv) Grid View layout

13. Write an Android application program that converts the temperature in Celsius to Fahrenheit.

14. Write an Android application program that demonstrates intent in mobile application development.



PROJECT- I

18MC5L12

Lecture : 0

Practical : 4

Internal Marks:100

Credits : 2

Tutorial : 0

External Marks:

- The students are expected to take up an internship program with prior approval from the Department committee after their IV semester during the summer break which will be evaluated in the V Semester.
- If the student was unable to take up in the internship program he/she has to take up a project work and will be evaluated here by the Department Internal Evaluation Committee
- Continues Internal evaluation will be done for 40 Marks
- Final evaluation will be done for 60 Marks
- A detailed report on the progress project work is to be submitted in each review.



MCA VI semester



TECHNICAL SEMINAR

18MC6L01

Lecture : 0

Practical : 0

Internal Marks:100

Credits : 3

Tutorial : 3

External Marks:

- Student has to give a detailed presentation on a topic of his interest for 30 Minutes which will be evaluated by the internal committee



PROJECT-II

18MC6L02

Lecture : 0

Practical : 32

Internal Marks: 40

Credits : 16

Tutorial : 3

External Marks: 60

- The student has to take up the project work in the VI semester which will be evaluated both by the internal committee and external committee.
- The student is expected to demonstrate his research skills and propose a solution to the research problems identified.
- Continues Internal evaluation shall be done for 40 Marks
- Final evaluation shall be done by an external examiner for 60 Marks
- The student shall submit a detailed report on the project work at the time of evaluation.