BENGALURU CITY UNIVERSITY

SYLLABUS FOR MASTER OF SCIENCE
(Computer Science)

(SEMESTER SCHEME)

2021-22 onwards

BANGALORE CITY UNIVERISTY

Proceeding of the meeting of the Board of Studies in Computer Science, held in the Board Room of Canara Bank School of Management Studies, Central College Campus, Bangalore City University, Bangalore on 04-10-2021 at 11.00 am

The Following Members were present:

1. Dr. Susesha, Professor, PG Department of Computer Science, Mysore Univeristy
2. Dr. Chandrakanth Naikodi, Associate Professor, PG Department of Computer Science, Davanagere University
3. Dr. H.K. Gundurao, Associate Professor, Vijaya College, Bangalore
4. Dr. Prathibha V Kalburgi, Ramaiah College of Arts Science, and Commerce, Bangalore
5. Mrs. Amalorpavam, Sambram Academi of Management Studies, Bangalore
6. Dr. Muralidhara B L, Professor, Department of Computer Science, Bangalore University

The Following Member was present online

1. Dr. Guru D.S, Professor, PG Department of Computer Science, Mysore Univeristy

The Following member is diseased

1. Late. Malathi Palani. A

The Following Members did not attend the meeting:

1. Dr. Prabhakar C.J, Professor, Kuvempu University, Shimogga
2. Dr. Bhagyawana S Mudigowda, Associate Professor, Maharani Cluster University
3. Smt. Nagarathnamma S.M, Associate Professor, Maharani Cluster Univeristy

The Chairperson welcomed the members and briefed the members on the proposed syllabus. The Committee discussed the syllabus in detail and approved the following syllabus:

1. III and IV semester syllabus for the MCA CBCS Scheme
2. The syllabus for I to IV semesters syllabus for M.Sc (Computer Science) - CBCS Scheme
3. Syllabus Structure for the NEP BCA, and I, and II semester syllabus for the same
4. Syllabus Structure for the NEP B.Sc Computer Science, and I and II semester syllabus for the same
5. Electives for the CBCS BCA Syllabus

The Chairperson thanked all the members for their active participation.

(Dr. Susesha) (Dr. Chandrakanth Naikodi) (Dr. H.K. Gundurao)

(Mrs. Prathibha V Kalburgi) (Mrs. Amalorpavam)

04.10.2021

(Dr. Muralidhara B L)

Chairperson

MEMBERS OF THE BoS IN COMPUTER SCIENCE

1	Dr. Muralidhara B L Professor, Department of Computer Science Bangalore University	CHAIRPERSON
2	Dr. Guru D.S Professor PG Department of Computer Science Mysore Univeristy	Member
3	Dr. Susesha Professor, PG Department of Computer Science Mysore Univeristy	Member
4	Dr. Prabhakar C.J Professor Kuvempu University, Shimogga	Member
5	Dr. Chandrakanth Naikodi Associate Professor Department of Computer Science Davanagere University	Member
6	Dr. Prathibha V Kalburgi Ramaiah College of Arts Science, and Commerce Bangalore	Member
7	Mrs. Amalorpavam Sambram Academi of Management Studies Bangalore	Member
8	Dr. H.K. Gundurao Associate Professor Vijaya College, Bangalore	Member
9	Dr. Bhagyawana S Mudigowda Associate Professor Maharani Cluster University, Bangalore	Member
10	Smt. Nagarathnamma S.M Associate Professor Maharani Cluster Univeristy, Bangalore	Member

SCHEME OF STUDY AND SCHEDULE OF EXAMINATION

1. Title of the course: Computer Science, M.Sc.
2. Duration of the course : 2 years (4 semesters) 3.Eligibility:
    a) B.Sc. (Computer Science) or BCA with Mathematics as one of the subject and at least 50% aggregate marks of all optional subjects (throughout 3 years B.Sc. / BCA course), B.Sc. PCM with PG Diploma / Certificate in Computer Science of duration one year.
    b) The minimum requirement for SC / ST candidates are relaxed in accordance with University regulations.
4. Intake: 15 + supernumerary quota as per University regulations. Total number of students including payment seats not to exceed – 35. Payment seat fee is as per university guidelines.
5. Admission: A category wise merit list will be prepared with marks obtained in all optional in all the three years.
6. Attendance: As per regulations of the University for P.G. courses.
7. Medium of instruction: English.
8. Scheme of study: Each semester is of 4 months duration I to III semester: Theory papers 4, Practical's 2 in each semester. IV semester: Project, seminar and viva-voce, theory papers 4.
9. Scheme of examination: There shall be a University examination at the end of each semester.
    a) Appearance for the examination: As per regulations of the University for P.G. Courses.
    b) Provision for repeaters: As per regulations of the University for P.G. Courses.
    c) Dissertation and viva-voce examination: The period of dissertation work is on full semester (4th semester). A student has to select a guide from the department in consultation with the chairperson of the department.
10. Result declaration: As per regulations of the University for P.G. Courses.
11. Miscellaneous:
    a) It is recommended that tutorial work be provided for all theory and practical papers.
    b) Internal assessment: Attendance - 10
       Seminars and Assignments - 10
       Mid-semester exam - 10
    c) Lectures from experts in the field from R&D institutions are highly desirable.

Any other issue not envisaged above shall be resolved by the Vice-Chancellor in consultation with the appropriate bodies of the University, which shall be final and binding.

SCHEME OF STUDY AND EXAMINATION FOR MASTER OF SCIENCE IN COMPUTER SCIENCE (M Sc (CS)) Y2K21

Semester	Paper Code	Title of the paper	Hours / Week	Marks			Credits	
				IA	Exam	Total	Subject	Semester
I	MSC101T	Computer Architecture	4	30	70	100	4	27
	MSC102T	Operating Systems	4	30	70	100	4	
	MSC103T	Problem Solving Techniques	4	30	70	100	4	
	MSC104T	Data Structures	4	30	70	100	4	
	MSC105P	Problem Solving Lab	8	30	70	100	4	
	MSC106P	Data Structures Lab	8	30	70	100	4	
	MSC107T	Soft Core – Quantitative, Teaching and Research Aptitude	3	30	70	100	3	
II	MSC201T	Computer Networking	4	30	70	100	4	27
	MSC202T	Artificial Intelligence	4	30	70	100	4	
	MSC203T	Object Oriented Programming using Java	4	30	70	100	4	
	MSC204T	Database Management Systems	4	30	70	100	4	
	MSC205P	Java Lab	8	30	70	100	4	
	MSC206P	Database Management Systems Lab	8	30	70	100	4	
	MSC207T	Soft Core – Soft Skill and Personality Development	3	30	70	100	3	
III		Open Elective	3	30	70	100	3	23
	MSC301T	Elective I	4	30	70	100	4	
	MSC302T	Elective II	4	30	70	100	4	
	MSC303T	Design and Analysis of Algoriths	4	30	70	100	4	
	MSC304T	Web Programming	4	30	70	100	4	
	MSC305P	Design and Analysis of Algoriths lab	8	30	70	100	4	

	MSC306P	Web Programming Lab	8	30	70	100	4	
IV	MSC401T	Research Methodology	4	30	70	100	4	23
	MSC402T	Software Engineering	4	30	70	100	4	
	MSC403P	Research Project	16	50	150	200	15	

FIRST SEMESTER MSC

MSC101T :COMPUTER ARCHITECTURE

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [10Hours]

Number Systems: Binary, Octal, Hexa decimal numbers, base conversion, addition, subtraction of binary numbers, one's and two's complements, positive and negative numbers, character codes ASCII, EBCDIC etc .Digital Logic Circuits: Logic gates, Boolean algebra, Map Simplification. Combinational Circuits: Half Adder, Full Adder, flip-flops. Sequential Circuits: Shiftregisters,Counters,IntegratedCircuits,Mux,Demux,Encoder,Decoder.Data Representation: Fixed and Floating point, Error detection and correction codes.Computer Arithmetic: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations. Structure of Computers: Computer types, Functional units, Basic operational concepts, Von- Neumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer.

UNIT - II [10Hours]

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt.Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC v/s RISC.

UNIT - III [10Hours]

Register Transfer and Micro-operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.Micro-programmed Control: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit. Input Output: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. Instruction level parallelism: Instruction level parallelism (ILP)-over coming data hazards, limitations of ILP.

UNIT – IV [10 Hours]

Processors and Memory Hierarchy: Advanced processor technology - Super scalar and vector processors - Memory hierarchy technology - Virtual memory technology. Bus, Cache and Shared Memory: Bus System-Cache memory organizations-Shared memory organization-Sequential and weak consistency models.

UNIT – V [12 Hours]

Parallel Computer methods: Multiprocessor and multi computers – Shared-Memory multiprocessors, Distributed-Memory Multiprocessors. Multi-vector and SIMD computers. PRAM and VLSI models - Architectural development tracks - Multiple Processor Tracks, Multi- vector and SIMD Tracks, Multi-threaded and Dataflow Tracks. Thread level parallelism: Multi-threaded Architectures, Distributed Memory MIMD Architectures, Shared Memory Architectures.

Architecture of Multithreaded processors, Principles of multithreading, Issues and solutions.

TEXT BOOKS:

1. Mano M Morris, "Computer System Architecture", 3rd edition Pearson India(2019).
2. William Stallings, "Computer Organization and Architecture designing for performance", 10th edition, Pearson(2016)
3. Kai Hwang, "Advanced Computer Architecture – Parallelism, Scalability, Programmability", Tata McGraw-Hill, 2008.

Reference

1. Dezso Sima, Terence Fountain, Peter Kacsuk, "Advanced Computer Architectures – A Design Space approach", Pearson Education, 2009
2. Carl Hamacher, Zvonks Vranesic,SafeaZaky, "Computer Architecture And Organization", 5th edition McGraw Hill New Delhi,India(2002).

MSC102T: OPERATING SYSTEMS

Total Teaching Hours: 52 No. of Hours / Week:04

UNIT – I [10 Hours]

Introduction: Batch Systems, Concepts of Multiprogramming and Time Sharing, Parallel, Distributed and real time Systems, Operating System Structures, Components & Services, System calls, System programs, Virtual machines. Process Management: Process Concept, Process Scheduling, Co – Operating process, Threads, Inter process communication, CPU Scheduling Criteria, Scheduling algorithm, Multiple Processor Scheduling, Real time Scheduling, Algorithm evolution.

UNIT – II [10 Hours]

Process Synchronization and deadlocks: The Critical Section Problem, Synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, monitors, Dead locks – system model, Characterization, Dead lock prevention, avoidance and detection, Recovery from dead lock, Combined approach to deadlock handling.

UNIT – III [12 Hours]

Memory Management: Logical and Physical address space, Swapping, Contiguous allocation, Paging, Segmentation, Segmentation with paging in Mastics and Intel 386, Virtual memory-Demand paging and its performance, Page replacement algorithms, Allocation of frames, thrashing, page size and other considerations. Demand Segmentation.

UNIT – IV [10 Hours]

File management (Systems, Secondary Storage Structure): File Concepts, Access methods, Directory Structure, Protection and consistency, File system structure, Allocation methods, Free space management, Directory Implementation, Efficiency and Performance, Recovery. Disk Management (Structure, Disk Scheduling Methods): Disk Structure & Scheduling methods, Disk management, Swap – Space management.

UNIT – V [10 Hours]

Protection and Security: Goals of protection, Domain Protection, Access matrix, Security Problem, Authentication, One time password, program threats, System threats. Virtual Machines: Building Blocks, Types of VMs and their implementations. Distributed Systems: Advantages, Types of Network based OS, Robustness, Design Issues, Distributed File Systems. Case Study of Windows 10 and Linux Operating System.

TEXT BOOKS:

1. Abraham Silberschatz and Peter Baer Galvin, "Operating System Concepts", 7th Edition, Pearson Education, 2002.

Reference

2. H.M.Deitel, "Operating Systems", Pearson Learning Solutions, 3rd Edition, 2003.
3. William Stallings, "Operating Systems", 6th Edition, Pearson Education, 2010.
4. Stuart, "Operating systems: Principles, Design and Implementation", Cengage Learning India, 1st Edition 2008.

MSC103T: PROBLEM SOLVING TECHNIQUE

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [10 Hours]

Introduction: The Role of Algorithms in Computing, Algorithms as a technology, Analyzing algorithms, Designing algorithms, Growth of Functions, Asymptotic notation, Standard notations and common functions. Fundamental Algorithms: Exchanging the values of two variables, Counting, Summation of a set of numbers, Factorial Computation, Generating of the Fibonacci sequence, Reversing the digits of an integer, Base Conversion, Character to number conversion.

UNIT - II [12 Hours]

C Programming: Getting Started, Variables and Arithmetic expressions. Input and Output: Standard input and output, formatted output- printf, variable length argument list, formatted input scanf. Control Flow: Statements and Blocks, If-else, else-if, switch, loops: while loop, for loop, do while, break and continue, goto and labels. Pointers and Arrays: pointers and address, pointers and function arguments, multidimensional array, initialization of pointer arrays, command line arguments.

UNIT - III [10 Hours]

Factoring Methods: Finding the square root of a number, the smallest Divisor of an integer, the greatest common divisor of two integers, generating prime numbers, computing the prime factors of an integer, generation of pseudo random numbers, raising a number to a large power, computing the nth Fibonacci Number. Array Techniques: Array order Reversal, Array counting or Histogramming, Finding the maximum number in a set, removal of duplicates from an ordered array, partitioning an array, Finding the k^{th} smallest element, multiplication of two matrices.

UNIT - IV [10 Hours]

Merging: the two-way merge. Sorting: Sorting by selection, sorting by exchange, sorting by insertion, sorting by diminishing increment, sorting by partitioning. Searching: binary search, hash search.Text processing and Pattern searching: text line length adjustment, left and right justification of text, keyword searching in text, text line editing, linear pattern search, sub-linear pattern search.

UNIT - V [10 Hours]

Introduction to Python: Need of Python Programming, Applications, Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation. Basic elements, branching programs, control structures, Strings, Functions, Scoping, Abstraction, Structure types

TEXT BOOKS:

1. R.G.Dromey, "How to Solve it by Computer", Pearson Education India, 2008.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, The MIT Press Cambridge, Massachusetts London, England, 2009.
3. Brain M. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd edition, Princeton Hall Software Series, 2012.
4. Wesley J. Chun. "Core Python Programming - Second Edition", Prentice Hall

Reference:

1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India.
2. Introduction to PYTHON, Kenneth A.Lambert, Cengage. 3.Learning Python, Mark Lutz, O'Really.

MSC 104T: DATA STRUCTURES

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT-I [10Hours]

Introduction and Overview: Definition, Elementary data organization, Data Structures, dataStructures operations, Abstract data types, algorithms complexity, time-space trade off.Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms, asymptotic notations for complexity of algorithms.String Processing:Definition, Storing Strings, String as ADT, String operations, word/text processing, Pattern Matching algorithms.

UNIT-II [12Hours]

Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory,

Traversing Linear arrays, Inserting and deleting, Multi-dimensional arrays, Matrices and Sparse matrices. Linked list: Definition, Representation of Singly Linked List in memory, Traversing a Singly linked list, Searching in a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly linked list; Doubly linked list, Header linked list, Circular linked list.

UNIT-III [10Hours]

Stacks: Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Conversion of infix expression to postfix expression, Evaluation of Post fix expression, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack. Queues: Definition, Array representation of queue, Linked list representation of queues. Types of queue: Simple queue, Circular queue, Double-ended queue, Priority queue, Operations on Queues, Applications of queues.

UNIT-IV [10Hours]

Binary Trees: Definitions, Tree Search, Traversal of Binary Tree, Tree Sort, Building a Binary Search Tree, Height Balance: AVL Trees, Contiguous Representation of Binary Trees: Heaps, Lexicographic Search Trees: Tries, External Searching: m-array tree, B-Trees, B+ Tree, B* Tree, Applications of Trees.Graphs: Mathematical Back ground, Computer Representation, Graph Traversal, Topological Sorting, Greedy Algorithm, Graphs as Data Structure.

UNIT-V [10Hours]

Searching: Introduction and Notation, Sequential Search, Binary Search, Comparison of Methods. Sorting: Introduction and Notation, Insertion Sort, Selection Sort, Shell Sort, Divide And Conquer, Merge sort for Linked List, Quick sort for Contiguous List. Hashing: Sparse Tables, Choosing a Hash function, Collision Resolution with Open Addressing, Collision Resolution by Chaining.

Text Books:

1. Seymour Lipschutz, "Data Structures with C", Schaum's outLines, Tata Mc Graw Hill, 2011.
2. Robert Kruse, C.L.Tondo, Bruce Leung,Shashi Mogalla,"Data Structures and Program Design using C", Pearson Education, 2009.

Reference Books:

1. Mark Allen Weiss," Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education,2013.

MSC105P: PROBLEM SOLVING TECHNIQUE LAB

1. Write a program to demonstrate different number data types in python.
2. Write a program to perform different arithmetic operations on numbers in python.
3. Write a program to create, concatenate and print a string and accessing substring from a given string.
4. Write a python script to print the current date in following format "Sun May 29 02:26:23 IST 2017".
5. Write a python program to create, append and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find largest of three numbers.
9. Write a python program to convert temperature to and from Celsius to Fahrenheit.
10. Write a python program to construct the following pattern using nested for loop

```
*
**
***
****
*****
*****
****
***
**
*
```

11. Write a python program to print prime numbers less than 20.
12. Write a python program to find factorial of a number using recursion.
13. Write a python program to that accepts length of three sides of a triangle as inputs. The program should indicate whether or not the triangle is a right angled triangle (use Pythagorean theorem).
14. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
15. Write a Python class to reverse a string word by word.

MSC106P: DATA STRUCTURES LAB

For all the programs write the output, flowchart and number of basic operations performed.

1. Given {4,7,3,2,1,7,9,0, find the location of 7 using Binary search and also display its first occurrence.
2. Given {5,3,1,6,0,2,4} order the numbers in ascending order using Quick Sort.
3. Perform the Merge sort on the input {75,8,1,16,48,3,7,0} and display the output in descending order.
4. Write a program to insert the elements 61,16,8,27 into singly linked list and delete 8,61,27 from the list. Display your list after each insertion and deletion.
5. Write a program to add 6x3+10x2+0x+5 and 4x2+2x+1 using linked list.
6. Write a program to push 5,9,34,17,32 into stack and pop 3 times from the stack, also display the popped numbers.
7. Write a recursive program to find GCD of 4,6,8.
8. Write a program to inert the elements {5,7,0,6,3,9} into circular queue and delete 6,9&5 from it(using linked list implementation).
9. Given S1={"Flowers"} ; S2={"are beautiful"} ,

a) Find the length of S1.
b) Concatenate S1 and S2.
c) Extract the substring "low" from S1.
d) Find "are" in S2 and replace it with "is".

10. Write a program to convert an infix expression x^y/(5*z)+2 to its postfix expression.
11. Write a program to evaluate a postfix expression 5 3+8 2 - *.
12. Write a program to create a binary tree with the elements 18,15,40,50,30,17,41 after creation insert 45 and 19 into tree and delete 15,17 and 41 from tree. Display the tree on each insertion and deletion operation.
13. Write a program to create binary search tree with the elements {2,5,1,3,9,0,6} and perform inorder, preorder and post order traversal.
14. Write a program to Sort the following elements using heap sort {9.16,32,8,4,1,5,8,0}.

MSC 107T: QUANTITATIVE, TEACHING AND RESEARCH APTITUDE

Total Teaching Hours: 36 No. of Hours / Week: 03

UNIT – I [8 Hours]

Numbers Property – Simplification – Divisibility – HCF and LCM – Decimal Fractions –Square roots and Cube Roots – Logarithms – Antilogarithms - Surds and indices - Permutation and Combination – Probability – Odd man out series - Number series - letter series – codes – Relationships – classification.

UNIT – II [7 Hours]

Time and work – Problems on Ages – Calendar – Clock – Pipes and Cistern – Time and Distance – Problems of Train – Boats and Streams. Area – Volume and surface Areas – Heights and Distances – Data Interpretation: Tabulation – Bar Graphs – Pie Charts – Line Graphs. Data Interpretation - Sources, acquisition and interpretation of data; Quantitative and qualitative data; Graphical representation and mapping of data.

UNIT – III [7 Hours]

Simple Interest – Compound Interest – Stocks and Shares – True Discount – Banker's discount. Averages – Percentage – Profit and Loss - Ratio and Proposition – Partnership – Allegation and mixture – Chain rule. Understanding the structure of arguments; Evaluating and distinguishing deductive and inductive reasoning; Verbal analogies: Word analogy Applied analogy; Verbal classification; Reasoning Logical Diagrams: Simple diagrammatic relationship, multi diagrammatic relationship; Venn diagram; Analytical Reasoning.

UNIT – IV [7 Hours]

Teaching: Nature, objectives, characteristics and basic requirements; Learner's characteristics; Factors affecting teaching; Methods of teaching; Teaching aids; Evaluation systems. Research Aptitude: Meaning, characteristics and types; Steps of research; Methods of research; Research Ethics; Paper, article, workshop, seminar, conference and symposium; Thesis writing: its characteristics and format. Reading Comprehension: A passage to be set with questions to be answered. Communication: Nature, characteristics, types, barriers and effective classroom communication.

UNIT – V [7 Hours]

Higher Education System: Governance, Polity and Administration; Structure of the institutions for higher learning and research in India; formal and distance education; professional/technical and general education; value education: governance, polity and administration; concept, institutions

Reference

1.R.S. Aggarwal, Quantitative Aptitude, S. Chand & Company, New Delhi, 2012

2. Govind Prasad Singh and Rakesh Kumar, Text Book of Quickest Mathematics (for all Competitive Examinations), Kiran Prakashan, 2012.

3. R.S. Aggarwal, Objective Arithmetic, S. Chand & Company, New Delhi, 2005.

4. Dr. Lal,Jain,Dr. K. C. Vashistha, "U.G.C.- NET/JRF/SET Teaching & Research Aptitude", Upkar Prakashan, 2010.
5. "UGC NET/SLET: Teaching & Research Aptitude", Bright Publications, 2010.

SECOND SEMESTER MSC

MSC201T- COMPUTER NETWORKS

Total Teaching Hours: 52 No. of Hours / Week:04

UNIT-I [12 Hours]

Introduction: Data Communications, Networks, Network hardware, Network software, Network Types, Internet History, Network Models: Protocol Layering, The OSI Model, TCP/IP Protocol Suite

UNIT II [10 hours]

Introduction to Physical Layer: Data and signals, Analog and digital transmission, Transmission media, Data Rate Limits, Performance, Introduction to Data-Link- Layer: Link-Layer Addressing, Error Detection and Correction: Bit stuffing, Block Coding, CRC, Checksum,

UNIT-III [10 Hours]

Data Link Control: Data-Link Layer Protocols, HDLC, Point-To-Point (PPP), Media Access Control (MAC): ALOHA,pure ALOHA, slotted ALOHA, CSMA, CSMA/CD, CSMA/CA, Reservation, Polling, Token Passing, FDMA, TDMA, CDMA

UNIT-IV [10 Hours]

Introduction to Network Layer: Network-Layer Services, Packet Switching, Network-Layer Performance, IPV4 Addresses, Network Layer Protocols: Internet Protocol (IP), ICMPv4, Mobile IP, Unicast Routing: Routing Algorithms, Unicast Routing Protocols, Next Generation IP: IPv6 Addressing, The IPv6 Protocol.

UNIT-V [10 Hours]

Introduction to Transport Layer: Introduction, Transport-Layer Protocols, Transport-Layer Protocols: User Datagram Protocol, Transmission Control Protocol: TCP Services, TCP Features, Segment, A TCP Connection, TCP Congestion Control, Flow Control, Error Control, Application Layer: WWW, E-MAIL, Domain Name System (DNS), Quality of Service: Flow Control To Improves QoS, Integrated Services, Cryptography and Network Security: Introduction, Confidentiality, Other Aspects of Security.

Text Books:

1. Behrouz A. Forouzan, "Data Communications and Networking", 5th Edition, McGraw Hill Education, 2013.

Reference Books:

1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks", 5th Edition, Prentice Hall, 2011.
2. Larry L. Peterson and Bruce S. Davie, "Computer Networks A System Approach", 5th Edition, MKP, 2012.
3. James F. Kurose , Keith W. Ross, " Computer Networking, A Top-Down Approach", 5th Edition, Pearson,2012.

Web Resources:

1. https://www.geeksforgeeks.org/computer-network-tutorials/
2. https://codescracker.com/networking/https://youtube.com/playlist?list=PLxCzCOWd7aiGFBD2-2joCpWOLUrDLvVV_

MSC202T : ARTIFICIAL INTELLIGENCE

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT-I [12 Hours]

Introduction to Artificial Intelligence: Definition. AI Applications, AI representation. Properties of internal Representation, Heuristic search techniques. Best first search, mean and end analysis, A* and AO* Algorithm. Minimize search procedure, Alpha beta cutoffs, waiting for Quiscence, Secondary search.

UNIT-II [10 Hours]

Knowledge representation using predicate logic: predicate calculus, Predicate and arguments, ISA hierarchy, frame notation, resolution, Natural deduction. Knowledge representation using non monotonic logic: TMS (Truth maintenance system), statistical and probabilistic reasoning, fuzzy logic, structure knowledge representation, semantic net, Frames, Script, Conceptual dependency.

UNIT-III [10 Hours]

Planning: block world, strips, Implementation using goal stack, Non linear planning with goal stacks, Hierarchical planning, list commitment strategy.Perception: Action, Robot Architecture, Vision, Texture and images, representing and recognizing scenes, waltz algorithm, Constraint determination, Trihedral and non trihedral figures labeling.

UNIT-IV [10 Hours]

Learning: Learning as induction matching algorithms. Failure driver learning, learning in general problem solving concept learning. Neural Networks: Introduction to neural networks and perception-qualitative Analysis only, neural net architecture and applications.
Machine Learning, Deep Learning.

UNIT-V [10 Hours]

Natural language processing and understanding and pragmatic, syntactic, semantic, analysis, RTN, ATN, understanding sentences. Expert system: Utilization and functionality, architecture of expert system, knowledge representation, two case studies on expert systems.

TEXT BOOKS:

1. Stuart Russel, Peter Norvig, "Artificial Intelligence A Modern Approach", 4th Edition, Pearson Education, 2020.
2. Ela Kumar, "Artificial Intelligence", I.K.International Publishing House Pvt.Ltd, 2008.

Reference

1. E. Charnaik and D. McDermott," Introduction to artificial Intelligence", Pearson Education, 1992.
2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI, 2003.
3. E. Rich and K. Knight," Artificial Intelligence", Tata McGraw Hill, 2003.
4. Nils J. Nilson, "Principles of Artificial Intelligence", Narosa Publishing Co. 2002.

MSC203T OBJECT ORIENTED PROGRAMMING USING JAVA

Unit I : [15 hrs]

The Salient Features of the JAVA Language, The Java Byte Code and the JVM, Structure of a Java Program, Selection Structures, Switch Statement, Looping, The Break and the Continue Statement. Data Types, Operators, Classes, Inheritance, Packages and Interfaces, Exception Handling, String handling.

Unit II : [13 hrs]

Threads -Extending the Thread Class, Implementing the Runnable Interface, Thread Priorities, Concurrency and Multithreaded programming, Thread synchronization, Deadlock. Applets - The Life Cycle of an Applet, Creating and Executing Applets, The Attributes in the <applet> tag, Passing Parameters to Applets, working with Graphics, Event Handling: Event Classes, Event Listener Interfaces.

Unit III : [10 hrs]

Java Design patterns: Singleton, Observer, Adaptor, Proxy, Decorator, Factory, AbstractFactory, Fascade, Command, Template Method patterns, MVC .

Unit IV : [14 hrs]

Java Networking - Networking Classes and Interfaces, TCP/IP Sockets, Datagrams, Server side programming - Java Servlets, JSP, Java XML library - JAXP,Spring and Hibernate framework, Spring Flow, Hibernate Flow. XML Parsing - DOM, SAX, Stax. Java Web Services - RESTful Web Services, SOAP Web Services

Textbooks:

1. E. Balagurusamy, Programming with JAVA, McGraw Hill, New Delhi, 2007

Reference Books:

1. Raj Kumar Buyya, Object Oriented Programming with JAVA, McGraw Hill, 2009

2. Herbert Schildt, Java A Beginner's Guide – Create, Compile, and Run Java Programs Today, Sixth Edition, Oracle Press, 2014
3. Ken Arnold, James Gosling, "The Java Programming Language, Fourth Edition, Addison Wisely, 2005
4. Herbert Schildt, 'The Complete Reference Java, 7th Edition, McGraw Hill, 2007.

Web Resources

1. https://docs.oracle.com/javase/tutorial/
2. https://javabeginnerstutorial.com/core-java-tutorial/

MSC204T DATABASE MANAGEMENT SYSTEMS

Total Teaching Hours: 52 No. of Hours / Week:04

UNIT-1 [10Hours]

Databases and Database Users: Introduction, An example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using DBMS Approach, A Brief History of Database Applications, When Not to Use a DBMS. Database System Concepts and Architecture: Data Models, Schemas, and Instances, Three-schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client-Server Architectures, Classification of Database Management Systems.

UNIT-2 [12 Hours]

Data Modeling Using Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design, An Example Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, Refining the ER Design Company Database Diagrams, Naming Conventions and Design. Issues, File organization and storage, secondary storage devices, operations in file, heap files and sorted files, hashing techniques, type of single level ordered index, multi-level indexes, indexes on multiple keys, other types of indexes.

UNIT– 3 [10 Hours]

Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from SET Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra.

UNIT– 4 [10 Hours]

Relational Database Design: Anomalies in a database, functional dependency, normal forms, lossless join and dependency, BCNF, normalization through synthesis, higher order normal forms. SQL- SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and

Update Statements in SQL, Specifying Constraints as Assertion and Trigger, Views(Virtual Tables) in SQL, Embedded SQL, Dynamic SQL,

UNIT– 5 [10 Hours]

Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, transaction support in SQL.Concurrency control techniques: two-phase locking techniques, concurrency control based on timestamp ordering, multi-version concurrency control techniques, validation concurrency control techniques. Recovery techniques: recovery concepts, recovery in multi-database systems, database backup and recovery from catastrophic failures.

Text Books:

1. Elmasri and Navathe: Fundamentals of Database Systems, 7th Edition, Addison -Wesley, 2016.
2. Silberschatz, Korth and Sudharshan Data base System Concepts, 7th Edition, Tata McGraw Hill, 2019.

References:

1. C.J. Date, A. Kannan, S. Swamynatham: An Introduction to Database Systems, 8th Edition, Pearson education,2009
2. Database Management Systems :Raghu Ramakrishnan and Johannes Gehrke: , 3rd Edition, McGraw-Hill,2003

MSC205P: JAVA LAB

1. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.
2. Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.
3. Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No light is on when the program starts
4. Write a Java Program to execute select query using JDBC
5. Write a JAVA program to demonstrate the life cycle of applet.
6. Write a Java Program to Implement Producer and Consumer problem using Threads.
7. Write a Java Program to Implement DOM parser.
8. Write a Java Program to Implement SAX parser.
9. Write a Java Program to Implement Singleton design pattern using java.
10. Write a Java Program to Implement Factory and Abstract Factory design pattern using java.
11. Write a Java Program to Implement Observer Design pattern method using java.
12. Write a Java Program to Implement Adapter design design pattern using java
13. Write a Java Program to Implement proxy design pattern using java
14. Write a Java Program to Implement Helloworld program using servlets.
15. Write a JSP Program using Expression, Scriplet and Directive.

MSC206P: DATABASE MANAGEMENT SYSTEMS LAB

PART A

1. Draw E-R diagram and convert entities and relationships to relation table for a given scenario.

a. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college).

Consider the Company database with following Schema

EMPLOYEE(FNAME, MINIT, LNAME, SSN, BDATE, ADDRESS,SEX,SALARY,SUPERSSN,DNO)

DEPARTMENT(DNAME,DNUMBER,MGRSSN,MSRSTARTDATE)

DEPT_LOCATIONS(DNUMBER,DLOCATION)

PROJECT(PNAME,PNUMBER,PLOCATION,DNUM)

WORKS_ON(ESSN,PNO<HOURS)

DEPENDENT(ESSN,DEPENDENT_NAME,SEX,BDATE,RELATIONSHIP)

2. Perform the following:

a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)

3. Perform the following:

a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.

4. For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause),

5. Execute the fallowing queries

a. How the resulting salaries if every employee working on the 'Research' Departments is given a 10 percent raise

b. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department

6. Execute the fallowing queries

a. Retrieve the name of each employee Controlled by department number 5 (use EXISTS operator).

b. Retrieve the name of each dept and number of employees working in each department which has at least 2 employees

7. Execute the fallowing queries

a .For each project, retrieve the project number, the project name, and the number of employee who work on that project.(use GROUP BY)

b. Retrieve the name of employees who born in the year 1990's

8. For each department that has more than five employees, retrieve the department number and number of employees who are making salary more than 40000.

9. For each project on which more than two employees work, retrieve the project number , project name and the number of employee who work on that project.

10. For a given set of relation tables perform the following
a. Creating Views (with and without check option), Dropping views, Selecting from a view.

PART B

Create the following tables with properly specifying Primary keys, Foreign keys and solve the following queries.
BRANCH (Branchid, Branchname, HOD)
STUDENT (USN, Name, Address, Branchid, sem)
BOOK (Bookid, Bookname, Authorid, Publisher, Branchid)
AUTHOR (Authorid, Authorname, Country, age)
BORROW (USN, Bookid, Borrowed_Date)

1. Perform the following**:**
a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)
Execute the following Queries:
2.a. List the details of Students who are all studying in 2nd sem MCA.

b.List the students who are not borrowed any books.

3 .a**.**Display the USN, Student name, Branch_name, Book_name, Author_name, Books_Borrowed_Date of 2nd sem MCA Students who borrowed books.
b. Display the number of books written by each Author.

4. a. Display the student details who borrowed more than two books.
b.Display the student details who borrowed books of more than one Author.

5. a.Display the Book names in descending order of their names.
b**.**List the details of students who borrowed the books which are all published by the same publisher.

.Consider the following schema:

STUDENT (USN, name, date_of_birth, branch, mark1, mark2, mark3, total, GPA)

6.Perform the following:
a.Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)

7. Execute the following queries:
a. Find the GPA score of all the students.
b. Find the students who born on a particular year of birth from the date_of_birth column.

8. a. List the students who are studying in a particular branch of study.
b. Find the maximum GPA score of the student branch-wise.

9. a. Find the students whose name starts with the alphabet "S".
b. Update the column total by adding the columns mark1, mark2, mark3.

10. Execute the following queries:
a. Find the students whose name ends with the alphabets "AR".
b. Delete the student details whose USN is given as 1001.

MSC 207T: SOFT SKILLS AND PERSONALITY DEVELOPMENT

Total Teaching Hours: 36 No. of Hours / Week: 03

UNIT – I [8 Hours]

Introduction to Soft Skills and Hard Skills, Break the ice berg –FEAR, Self Development - Etiquette and Manners. The Self Concept: Attitude, The process of attitude formation, positive attitude, How to build a success attitude, You are the chief architecture of yourself. Self Management Techniques. Believe in yourself: Self Image and Self Esteem, Building Self Confidence, Environment we mix with, How to build self-image.

UNIT - II [7 Hours]

Meaning and definition of personality, Personal Planning and Success Attitude: Prioritizing, Creating the master plan, Active positive visualization and Spot analysis. Self-Motivation and Communication: Levels of motivation, power of irresistible enthusiasm, etiquettes and manners in a group, public speaking, Importance of listening and responding.

UNIT - III [7 Hours]

Motivation Skills & Personality Development, Goal Setting, Career Planning, Resume Building, Psychometric Test, Priority Management & Time Management, Positive Attitude and Self Confidence. Verbal Communication includes Planning, Preparation Delivery, Feedback and assessment of activities like: Public speaking, Group Discussion, Oral Presentation skills, Perfect Interview, Listening and observation skills, body language and use of Presentation aids.

UNIT - IV [7 Hours]

Written communication that includes project proposals, brochures, newsletters, articles. Etiquettes that include: etiquettes in social as well as office settings, email etiquettes, telephone etiquettes. Improving Personal Memory, study skills that include rapid reading, notes taking and creativity.

UNIT - V [7 Hours]

Problem Solving and Decision Making Skills, Perceptive, Conceptual, Creative, Analytical and Decisive. Leadership as a process: co-ordination while working in a team, Leadership styles, Leader and Team player, Management of conflict, Profiles of great and successful personalities, Role of career planning in personality development, negotiation, Motivating.

Reference

1. Wallace: "Personality Development", 1st Edition, 2008 Cengage Learning India.
2. Richard Denny, "Succeed for your self", Kogan page India, 3rd Edition. www.vivagroupindia.com.
3. John Hoover & Angelo Valenti, "Unleashing Leadership", Jaico publishing House – WWW.JAICOBOOKS.COM
4. Kundu, C.L – "Personality development", Sterling Bangalore.
5. Sandra D. Collins, "Listening and Responding", Cengage Learning India, 2nd Edition, 2008.
6. David E. Rye, "1,001 ways to inspire your organization, your team and yourself", Jaico publishing house, Career Press, 1998.

MSC THIRD SEMESTER

MSC303T: THE DESIGN AND ANALYSIS OF ALGORITHM

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [10 Hours]

Introduction: Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Fundamental Data Structures.Fundamentals of the Analysis of Algorithm Efficiency: The Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non-recursive and Recursive Algorithms, Empirical Analysis of Algorithms, Algorithm Visualization.

UNIT - II [10 Hours]

Brute Force Method: Selection Sort and Bubble Sort, Sequential Search, Brute-Force String Matching, Exhaustive Search, Depth-First Search and Breadth-First Search. Decrease and Conquer: Insertion Sort, Topological Sorting, Algorithms for Generating Combinatorial Objects, Decrease-by-a-Constant-Factor Algorithms. Divide and Conquer: Merge Sort, Quick Sort, Binary Tree Traversals and Related Properties, Strassen's Matrix Multiplication.

UNIT - III [10 Hours]

Space and Time Tradeoffs: Sorting by Counting, Input Enhancement in String Matching, Hashing.Dynamic programming: Binomial Coefficient, Principle of Optimality, Optimal Binary

Search Trees, Knapsack Problem and Memory Functions, Warshall's and Floyd's Algorithms. Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees.

UNIT - IV [10 Hours]

Limitations of Algorithm Power: Lower-Bound Arguments, Decision Trees, P, NP and NPComplete Problems .Coping with the Limitations of Algorithm Power: Back Tracking: n-Queensproblem, Hamiltonian Circuit Problem, Subset-Sum Problem. Branch-and-Bound: Assignment Problem, Knapsack Problem, Traveling Salesman Problem.

UNIT – V [12 Hours]

Parallel Algorithms: Introduction, Models, speedup and efficiency, Some basic techniques, Examples from graph theory, sorting, Parallel sorting networks. Parallel algorithms and their parallel time and processors complexity.Probabilistic Algorithms & Randomized Algorithms: Numerical probabilistic algorithms, Las Vegas and Monte Carlo algorithms, Game-theoretic techniques, Applications on graph problems

Text Books:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson, 2012.
2. Horowitz, Sahni, Rajasekaran, "Fundamentals of Computer Algorithms", 2/e, Universities Press, 2007.

Reference Books:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, The MIT Press, 2009.
2. A.V. Aho, J.E. Hopcroft, J.D. Ullmann, "The design and analysis of Computer Algorithms", Addison Wesley Boston, 1983.
3. Jon Kleinberg, Eva Tardos, "Algorithm Design", Pearson Education, 2006.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc20_cs27/preview
2. https://web.stanford.edu/class/archive/cs/cs161/cs161.1138/

MSC304T : WEB PROGRAMMING

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT – I [12 Hours]

Web Essentials: Clients, Servers and Communication – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements –Semantic elements – Drag and Drop – Audio – Video controls – CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images –Colors – Shadows – Text – Transformations – Transitions – Animations.Perl, CGI Programming: Origins and uses of Perl; The Common Gateway Interface; CGI linkage.

UNIT – II [10 Hours]

Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event HandlingDHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request. Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actionsSession Handling- Understanding Cookies. PHP: Origins and uses of PHP; Overview of PHP; General syntactic characteristics; Primitives, operations and expressions; Output; Control statements; Arrays; Functions; Pattern matching; Form handling; Files; Cookies; Session tracking.

UNIT – III [10 Hours]

Database Access through the Web: Relational Databases; An introduction to SQL; Architectures for Database access; The MySQL Database system; Database access with PERL and MySQL; Database access with PHP and MySQL; Database access with JDBC and MySQL.

UNIT- IV [10 Hours]

Introduction to Ruby, Rails: Origins and uses of Ruby; Scalar types and their operations; Simple input and output; Control statements; Fundamentals of arrays; Hashes; Methods; Classes; Code blocks and iterators; Pattern matching. Overview of Rails; Document requests; Processing forms; Rails applications with Databases; Layouts.

UNIT –V [10 Hours]

Introduction to Ajax: Overview of Ajax; The basics of Ajax; Rails with Ajax.

Reference

1. Robert W. Sebesta: "Programming the World Wide Web", 4th Edition, Pearson Education, 2012.
2. M. Deitel, P.J. Deitel, A. B. Goldberg: "Internet & World Wide Web How to program", 3rd Edition, Pearson Education, 4th edition, PHI, 2011.
3. Chris Bates: "Web Programming Building Internet Applications", 3rd Edition, Wiley India, 2011.
4. Joyce Farrell, Xue Bai, Michael Ekedahl: "The Web Warrior Guide to Web Programming", 1st edition, Thomson, 2010.

MSC305P: Algorithms Lab

1. Write a Program to Implement recursive binary search and linear search and determine the time required to search an element. Repeat the experiment for different values of n, the number of elements in the list to be searched and plot a graph of the time taken versus n.
2. Write a Program to Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3. Write a Program to Sort a given set of elements using heap sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n.
4. Write a Program to Implement 0/1 Knapsack problem using Dynamic Programming.
5. Write a Program to From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
6. Write a Program to obtain the Topological ordering of vertices in a given digraph. Compute the transitive closure of a given directed graph using Warshall's algorithm.
7. Write a Program to Find a subset of a given set S = {s1,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions {1,2,6} and {1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.
8. Write a Program to solve the string matching problem using Boyer-Moore approach.
9. Write a Program to solve the string matching problem using naïve approach and the KMP algorithm and compare their Performances
10. Write a Program to Implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator (use OpenMP)
11. Write a Program to Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using OpenMP and determine the speed-up achieved.
12. Write a to implement a Monte Carlo algorithm to test the primality of a given integer and determine its performance

MSC306P: WEB Programming Lab

1. Develop and demonstrate a XHTML file that includes Javascript script to generate first n Fibonacci numbers.
2. Develop and demonstrate the usage of inline and external style sheet using CSS
3. Develop and demonstrate, using Javascript script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.
4. Develop and demonstrate, using Javascript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.
5. Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
6. Write a Perl program to display a digital clock which displays the current time ofthe server.
7. Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.
8. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.
9. Write a PHP program to read student data from an XML file and store into the MYSQL database. Retrieve and display.
10. Write a Perl program to keep track of the number ofvisitors visiting the web page and to display this count of visitors, with proper headings.
11. Write a CGI-Perl program to use a cookie to remember the day of the last login from a user and display it when run.
12. Write a Perl program to display various Server informations like Server Name, Server Software, Server protocol, CGI Revision etc.
13. Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name.
14. Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.

MACHINE LEARNING (ELECTIVE)

Total Teaching Hours: 52 No. of Hours / Week: 04

Module 1 : Introduction to Machine Learning [12 Hours]

Introduction, Perspectives & Issues in ML, designing learning systems, Concepts of hypotheses, Version space, inductive bias, Performance metrics-accuracy, precision, recall, sensitivity, specificity, AUC, RoC, Bias Variance decomposition. Decision Trees Learning: Basic algorithm (ID3), Hypothesis search and Inductive bias, Issues in Decision Tree Learning – Overfitting, Solutions to overfitting, dealing with continuous values.

Module 2: Supervised Learning with KNN, ANN, SVM [10 Hours]

Instance-based learning: k-nearest neighbour learning, Artificial Neural networks: Introduction, Perceptrons, Multi-layer networks and back-propagation, Activation Units, Support Vector Machines – margin and maximization, SVM - The primal problem, the Lagrangian dual, SVM – Solution to the Lagrangian dual.

Module 3: Probabilistic and Stochastic Models: [10 Hours]

Bayesian Learning – Bayes theorem, Concept learning, Maximum likelihood, Bayes optimal classifier, Gibbs algorithm, Naive Bayes classifier, Expectation maximization and Gaussian Mixture Models, Hidden Markov models

Module 4: Unsupervised Learning and Association Mining [10 Hours]

Hierarchical vs non-hierarchical clustering, Agglomerative and divisive clustering, K-meansclustering, Bisecting k-means, K-Means as special case of Expectation, Maximization, K-medoid clustering, Association Mining: Apriori algorithm. Finding frequent itemsets, mining association rules, FP-growth – FP trees, Mining frequent items from an FP-Tree, Dimensionality reduction techniques – PCA, SVD.

Module 5: Genetic Algorithms [10 Hours]

Genetic Algorithms – Representing hypothesis, Genetic operators and Fitness function and selection, Simple applications of the Genetic Algorithm, application of GA in Decision tree, Genetic Algorithm based clustering, Single Objective and Bi-objective optimization problems using GA, using GA to emulate Gradient descent/ascent.

Reference Books:

1. Ethem Alpaydin,"Introduction to Machine Learning", MIT Press, Prentice Hall of India, Third Edition 2014
2. Jiawei Han and Micheline Kambers and Jian Pei, "Data Mining –Concepts and Techniques", 3rd edition, Morgan Kaufman Pub

3. Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC Press, 2014.

4. Charu C. Aggarwal, "DATA CLUSTERING Algorithms and Applications", CRC Press, 2014.

5. "Machine Learning", Tom Mitchell, McGraw Hill Education (India), 2013.

BIG DATA & ANALYTICS (ELECTIVE)

Total Teaching Hours: 52 No. of Hours / Week: 04

Unit I [10 Hours]

Introduction to Big Data, Big data definition, enterprise / structured data, social / unstructured data, unstructured data needs for analytics, what is Big Data, Big Deal about Big Data, Big Data Sources, Industries using Big Data, Big Data challenges.

Unit II [10 Hours]

Data Pre-processing, why to pre-process data? Data cleaning: Missing Values, Noisy Data, Data Integration and transformation, Data Reduction: Data cube aggregation, Dimensionality Reduction, Data Compression, Numerosity Reduction, Data Mining Primitives, Languages and System Architectures: Task relevant data, Kind of Knowledge to be mined, Discretization and Concept Hierarchy

Unit III [10 Hours]

Introduction to Classification and Prediction, Issues regarding Classification, Classification using Decision trees, Bayesian Classification, Classification by Backpropagation, Prediction Classification Accuracy, Introduction of Clustering, Spatial mining, Web mining, Text mining

Unit III [10 Hours]

Introduction of Big data programming-Hadoop, History of Hadoop, The ecosystem and stack, Components of Hadoop, Hadoop Distributed File System (HDFS), Design of HDFS, Java interfaces to HDFS, Architecture overview, Development Environment, Hadoop distribution and-basic commands, Eclipse development.

Unit V [12 Hours]

Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.

Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.

Hbase: HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL

Data Analytics with R Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering.

Case Study: Implement your leanings to find sectors in which different companies ought to inves

Reference

1. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.
2. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
3. Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph. By David Loshin, Elsevier, August 23, 2013.
4. White, T. (2012). Hadoop: The definitive guide. " O'Reilly Media, Inc."Smolan, R. (2013). The human face of big data.
5. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/ Osborne Media (2013), Oracle press.
6. Mayer-Schönberger, V., & Cukier, K. (2013). Big data: A revolution that will transform how we live, work, and think. Houghton Mifflin Harcourt. Holmes, A. (2012). Hadoop in practice. Manning Publications Co..
7. Simon, P. (2013). Too big to ignore: the business case for big data (Vol. 72). John Wiley & Sons.
8. Robert D. Schneider , Hadoop for Dummies, Wiley India.

CRYPTOGRAPHY AND NETWORK SECURITY (ELECTIVE)

Total Teaching Hours: 52 No. of Hours / Week: 04

Unit I [12 Hours]

Security Trends, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Symmetric Ciphers, Classical Encryption Techniques, Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography

Unit II [10 Hours]

Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design The AES Polynomials with Coefficients in GF(28), Simplified AES, Multiple Encryption and Triple DES, Block Cipher Modes of Operation, Stream Ciphers and RC4

Unit III [10 Hours]

Fermat's and Euler's Theorem, The Chinese Remainder Theorem, The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography, Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and Macs

Unit IV [10 Hours]

Digital Signatures, Authentication Protocols, Digital Signature Standard, Kerberos, X.509 Authentication Service, Public-Key Infrastructure, IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management

Unit V [10 Hours]

Web Security, Secure Socket Layer and Transport Layer Security, Intruders, Intrusion Detection, Password Management, Malicious Software, Firewalls

References

1. William Stallings, Cryptography and Network Security: Principles and Practice, 7th Edition, Pearson

CLOUD COMPUTING (ELECTIVE)

Total Teaching Hours: 52 No. of Hours / Week: 04

Unit I [10 Hours]

Introduction of Cloud Computing: What is Cloud Computing, How it works, Types of Cloud, Goals & Challenges, Leveraging Cloud Computing, Cloud Economics and Total Cost of Ownership Cloud Service Models.

Unit II [12 Hours]

Software as a Service (SaaS): Overview of the Cloud application development lifecycle, Challenges in SaaS Model, SaaS Integration Services, Advantages and Disadvantages. Infrastructure as a Services (IaaS): Evolution of infrastructure migration approaches, Virtual Machines, VM Migration Services, Cloud Infrastructure services, Advantages and Disadvantages.

Unit III [10 Hours]

Platform as a service (PaaS): Evolution of computing paradigms and related components (distributed computing, utility computing, Cloud computing, grid computing, etc.), Cloud platform services, Integration of Private and Public Cloud, Advantages and Disadvantages.

Unit IV [10 Hours]

Programming Model: Parallel and Distributed Programming Paradigms, MapReduce, Twister and Iterative MapReduce, Hadoop Library from Apache, Mapping Applications, Programming Support Google App Engine, Amazon AWS, Cloud Software Environments, Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim.

Unit V [10 Hours]

Cloud Security Tools and technologies: Infrastructure Security, Network level security, Host level security, Application level security, Data privacy and security Issues, Access Control and Authentication in cloud computing, the data security in Private and Public Cloud Architecture, Legal issues and Aspects, Multi-tenancy issues

References:

1. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'Reilly Gautam Shroff, Enterprise Cloud Computing, Cambridge University Press,2011
2. Judith Hurwitz, R Bloor, M.Kanfman, F.Halper "Cloud Computing for Dummies", Wiley India Edition, First Edition
3. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing : Principles and Paradigms", Wiley Publication,2011
4. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From ParallelProcessing to the Internet of Things", Morgan Kaufmann Publishers, 2012
5. RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, 'Mastering Cloud Computing", TMGH,2013

WEB PROGRAMMING (ELECTIVE)

Total Teaching Hours: 52 No. of Hours / Week: 04

Unit I [12 Hours]

HTML5 and JavaScript: Local Storage, Web Workers, Drag and Drop, Introduction to Client-Side Scripting, JavaScript Basics, Functions, Objects, Hoisting, Arrays, JavaScript Objects

Unit II [10 Hours]

DOM and DOM Events: Accessing and modifying DOM, Events and Event Handlers - Load, Mouse, Synthetic Events, Key and Form Related Events, Event Bubbling, Cookies

Unit III [10 Hours]

Apache: MIME, http, httpd Server, Request Response Formats Basics, Configuration, Debugging, .htaccess

Unit IV [10 Hours]

AJAX: File Handling and System Calls, Strings and Regular Expressions, Arrays, Cookies, Sessions, Functions, Classes, Database Access AJAX: Asynchronous GET/POST using XMLHttpRequest

Unit V [10 Hours]

AJAX Advanced: JS objects, prototype inheritance, Dynamic Script Loading, XMLHttpRequest, Image- Based AJAX, Cross-Domain Access (CORS), Introduction to XML, Parsers, Styling RSS / Atom Feeds, JSON and XML, JSON vs XML.

Reference Book(s):

1. "JavaScript Absolute Beginner's Guide", Kirupa Chinnathambi, Que Publishing, 1st Edition, 2017.
2. "Programming the World Wide Web", Robert W Sebesta, Pearson, 7th Edition, 2013. 3. "HTML5 Up and Running", Mark Pilgrim, O'Reilly, 1st Edition, 2015
3. "AJAX: The Complete Reference", Thomas A Powell, McGraw Hill, 2008.

FOURTH SEMESTER MSC

MSC401 T: RESEARCH METHODOLOGY

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT – I [12 Hours]

Introduction: Definition and objectives of Research – Types of research, Various Steps in Research process, Mathematical tools for analysis, Developing a research questionChoice of a problem Literature review, Surveying, synthesizing, critical analysis, reading materials, reviewing, rethinking, critical evaluation, interpretation, Research Purposes, Ethics in research – APA Ethics code.

UNIT – II [10 Hours]

Quantitative Methods for problem solving: Statistical Modeling and Analysis, Time Series Analysis Probability Distributions, Fundamentals of Statistical Analysis and Inference, Multivariate methods, Concepts of Correlation and Regression, Fundamentals of Time Series Analysis and Spectral Analysis, Error Analysis, Applications of Spectral Analysis.

UNIT – III [10 Hours]

Tabular and graphical description of data: Tables and graphs of frequency data of one variable, Tables and graphs that show the relationship between two variables , Relation between frequency distributions and other graphs, preparing data for analysis

UNIT - IV [10 Hours]

Soft Computing: Computer and its role in research, Use of statistical software SPSS, GRETL etc in research. Introduction to evolutionary algorithms - Fundamentals of Genetic algorithms, Simulated Annealing, Neural Network based optimization, Optimization of fuzzy systems.

UNIT - V [10 Hours]

Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report, referencing in academic writing.

Reference

1. C.R. Kothari, Research Methodology Methods and Techniques, 2/e, Vishwa Prakashan, 2006.
2. Donald H.McBurney, Research Methods, 5th Edition, Thomson Learning, ISBN:81-315-0047- 0,2006.
3. Donald R. Cooper, Pamela S. Schindler, Business Research Methods, 8/e, Tata McGraw-Hill Co. Ltd., 2006.
4. Fuzzy Logic with Engg Applications, Timothy J.Ross, Wiley Publications, 2nd Edition, 2004.
5. Simulated Annealing: Theory and Applications (Mathematics and Its Applications, by P.J. van Laarhoven & E.H. Aarts[e], 19.

6. Genetic Algorithms in Search, Optimization, and Machine Learning by David E. publisher

MSC402T: SOFTWARE ENGINEERING

Total Teaching Hours: 52 No. of Hours / Week: 04

UNIT - I [10 Hours]

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. Process models: The waterfall model, incremental process models, evolutionary process models, the unified process. System models: Context models, behavioral models, data models, object models, structured methods

UNIT - II [10 Hours]

Agile development: Agile, Agility and cost of change; Agile Process, Extreme programming; Other agile process models. Web Application Design: Web application design quality; Design quality and design pyramid; Interface design; Aesthetic design; Content design; Architecture design; Navigation design; Component-level design; Object-oriented hypermedia design method.

UNIT - III [12 Hours]

Formal Modeling and verification: The clean-room strategy; Functional specification; Cleanroom design; Clean-room testing; Formal methods: Concepts; Applying mathematical notation for formal specification; Formal specification languages. Software Project Management: The management spectrum; The management of people, product, process and project; The W5HH Principle; Critical practices. Estimation for Software Projects: Software project estimation; Decomposition techniques, Examples; Empirical estimation models; Estimation for Object-Oriented projects; Specialized estimation techniques; The make / buy decision.

UNIT - IV [10 Hours]

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT - V [10 Hours]

Metrics for Process and Products: Software measurement, metrics for software quality. Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Text Books:

1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", Alternate Edition, 7th Edition, McGraw Hill, 2010.
2. Ian Sommerville, "Software Engineering", 8th Edition, Pearson, 2012.Orit Hazzan and Yael Dubinsky, Agile Software Engineering, Springer, 2009

Reference

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies