IV th sem
CSE/IT

DESIGN AND ANALYSIS OF ALGORITHM

(3-CREDIT)(L-T-P/3-0-0)

Course Outcome:

1. Ability to analyze the performance of algorithms.
2. Ability to choose appropriate algorithm design techniques for solving problems.
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.

MODULE-I

INTRODUCTION & ANALYSIS: -

Analyzing algorithms, Recurrence Equations, Growth function: Asymptotic notation, Standard notation & common functions, Recurrence relation, different methods of solution of recurrence equations with examples.

MODULE-II-

DIVIDE AND CONQUER & BACKTRACKING PARADIGM: -

Introduction to Divide and Conquer paradigm, Quick and merge sorting techniques, Linear time selection algorithm, the basic divide and conquer algorithm for matrix multiplication, Backtracking & Recursive backtracking, Applications of backtracking paradigm. Heaps.

MODULE-III-

GREEDY PARADIGM & DYNAMIC PROGRAMMING: -

Greedy Paradigm: The basic greedy strategy & computing minimum spanning trees, Algorithms of Kruskal and Prim, Union to Find Algorithm & their applications, Disjoint Set, The relationship in Dijkstra's and Prim's algorithms, Use of greedy strategy in algorithms for the Knapsack problem and Huffman trees. The basic dynamic programming paradigm, Dynamic programming solution to the optimal matrix chain multiplication and the longest common subsequence problems.

MODULE-IV-

GRAPH ALGORITHMS & STRING MATCHING ALGORITHMS: -

Representational issues in graphs, Depth first search & Breath first search on graphs, Computation of bi-connected components and strongly connected components using DFS, Topological sorting & applications, Shortest Path Algorithms on Graphs: Bellman-Ford algorithm, Dijkstra's algorithm & Analysis of Dijkstra's algorithm using heaps, Floyd-Warshall's all pairs shortest path algorithm and its refinement for computing the transitive closure of a graph. The general string problem as a finite automata, Knuth Morris and Pratt algorithms.

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MODULE-V-

NP-COMPLETE PROBLEMS:-

Solvable problems, Types of problems, The notion of a non deterministic algorithm and its basic relationship to backtracking. Polynomial time non deterministic algorithms for problems like satisfiability, clique problem, Hamiltonian path problems etc., The definition of NP-hardness and NP-completeness, The statement of Cook's theorem and a discussion of its implications, The notion of polynomial transformation, vertex cover, subset sum and Hamiltonian cycle problems are NP-complete, Other models for computations.

Text Books:

1. Introduction to Algorithms (Second Edition); Cormen, Leiserson, Rivert; PHI.

2. Fundamentals of Algorithms, Sahni & Horowitz; Galgotia.

Reference Books:

1. The Design & Analysis of Computer Algorithms, Hopcroft – Aho – Ullman, AWL.

2. Handbook of Algorithms & Data Structures, G.H.Gonnet, AWL.

3. Introduction to Design & Analysis of Algorithms, Levitin, PE-LPE.

OBJECT ORIENTED ROGRAMMING

(3-CREDITS)(L-T-P/3-0-0)

Course Outcome:-

1. To be able to apply an object oriented approach to programming and identify potential benefits of object oriented programming over other approaches.
2. To be able to reuse the code and write the classes which work like built in types.
3. To be able to design applications which are easier to debug, maintain and extend.
4. To be able to apply object – oriented concepts in real world applications
5. To be able to develop applications using multi-threading.
6. To be able to handle exceptions in any application.

Module – I 12 Hrs

Introduction to Java and Java programming Environment. Object Oriented Programming. Fundamental Programming Structure: Data Types, variable, Typecasting Arrays, Operators and their precedence. Control Flow: Java's Selection statements (if, switch, iteration, statement, while, do while, for, Nested loop). Concept of Objects and Classes, Using Exiting Classes building your own classes, constructor overloading, static , final, this keyword . Inheritance: Using Super to Call Super class constructor, Method overriding, Dynamic method Dispatch, Using Abstract Classes, Using final with inheritance. The Object Class. Packages & Interfaces : Packages, Access Protection, Importing package, Interface, Implementing Interfaces, variables in Interfaces, Interfaces can be extended. Exception Handling: Fundamentals, Types Checked , Unchecked exceptions, Using try & catch, Multiple catch, throw , throws, finally, Java's Built in exceptions, user defined exception.

Module - II 12 Hrs

Multi Threading: Java Thread Model, Thread Priorities, Synchronization, Creating a thread, Creating Multiple threads, Using isAlive ( ) and join ( ), wait () & notify ( ). String Handling: String constructors, String length, Character Extraction, String Comparison, Modifying a string. Java I/O: Classes & Interfaces, Stream classes, Byte streams, Character streams, Serialization. JDBC: Fundamentals, Type I, Type II, Type III, Type IV drivers. Networking: Basics, Socket overview, Networking classes, & interfaces, TCP/IP client sockets, whois, URL format, URL connection, TCP/IP Server Sockets.

Module - III 12 Hrs

Applets: Basics, Architecture, Skeleton, The HTML APPLET Tag, Passing Parameters to Applets, Applet context and show documents (). Event Handing: Delegation Event model, Event Classes, Event Listener Interfaces, Adapter classes. AWT: AWT Classes window fundamentals, component, container, panel, Window, Frame , Canvas, Creating a frame window in an Applet , working with Graphics , Control Fundamentals , Layout managers, Handling Events by Extending AWT

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components. Core java API package, reflection, Remote method Invocation (RMI) Swing: Japplet, Icons & Labels, Text fields, Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees, Tables. Exploring Java-lang: Simple type wrappers, Runtime memory management, object (using clone () and the cloneable interface), Thread, Thread Group, Runnable.

Text Books:

1. Introduction to Java Programming: Liang, Pearson Education, 7th Edition.

2. Java The complete reference: Herbert Schildt, TMH, 5th Edition.

Reference Books:

1. Balguruswamy, Programming with JAVA, TMH.

2. Programming with Java: Bhave &. Patekar, Pearson Education.

3. Big Java: Horstman, Willey India, 2nd Edition.

4. Java Programming Advanced Topics: Wigglesworth, Cengage Learning.

Mathematics IV

L-T-P C

Numerical and Statistical Methods- 4- 0- 0 04

Numerical Methods: Solution of algebraic and transcendental equation by bisection, iteration, false position and Newton-Raphson methods. Solution of a system of linear simultaneous equations by Gauss elimination, Gauss-Jordan, Crout's trangularisation, Jacobi and Gauss-Seidel methods. Finite difference, Symbolic relations, Interpolation and Extrapolation, Newton-Gregory forward and backward, Gauss forward and backward, Lagrange's formulae, Inverse interpolation by Lagrange methods, Numerical differentiation and integration: Trapezoidal, Simpson's $1/3^{rd}$, Simpson's $3/8^{th}$ and Weddle quadrature formulae. Numerical solution of first order ordinary differential equations by Taylor's series, Picard's, Euler's, Modified Euler's, Runge-Kutta methods. (20 hours)

Statistical Methods: Moments, skewness and kurtosis. Probability: Various approaches of probability, two theorems (without proof), conditional probability, Bayes theorem. Random variable: Definition, probability mass & density functions, distribution function, mathematical expectation and moment generating function. Probability distributions: Bernoulli, binomial, Poisson and normal distributions. Theory of least squares and curve fitting. Correlation and Regression: Simple, multiple & partial correlation coefficients, regression lines, regression coefficients and their properties. Test of significance: Normal test, t-test, chi square test and F test.

(20 hours)

2/7/18.
(M.K. Singh)
R.V.
Ranchi

02/07/18
(M.K. Singh)
IIT(ISM) Dhanbad

02/07/18
C R. Sharma.
H-O-D. Math
B.I.T. Sindri)

BIT, Sindri
Department of Humanities
COURSE STRUCTURE

Course Code	HU1101			
Category	Humanities			
Course Title	Advanced Communication Skills Lab.			
Semester	IV			
Branch	B.Tech. all branches			
Scheme and Credits	L	T	P	Credits
	0	0	2	1
Pre-requisites (if any)				

1. Communication Skills (oral and written)
2. Art of Presentation
3. Writing Skills (CV, resume, SOP, comprehension, technical report writing etc.)
4. Soft Skills (negotiation skills, gestures, manners and etiquettes, cultural barriers to effective communication etc.)
5. Developing Reading Skills and Vocabulary Enrichment
6. Multicultural Communication
7. Industry Specific Communication Skills (agenda, minutes, letters etc.)
8. Personality Development
9. Team Management, Ability to Multi-Task and Emotional Intelligence
10. Humanistic Values and Social Responsibility

III th sem CSE/IT.

DISCRETE MATHEMATICS

(3-CREDIT)
(L-T-P/3-0-0)

MODULE - I

Mathematical logic:

Introduction, Statements and Notation, Connectives, Normal Forms,Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

MODLE - II

Set theory:

Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions.

Algebraic Structures:
Introduction, Algebraic Systems, Semi groups and Monoids, Groups, Lattices as Partially Ordered Sets, Boolean algebra.

MODULE - III

Elementary Combinatorics:
Basics of Counting, Combinations and Permutations,Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems, The Principle of Inclusion-Exclusion.

MODULE - IV

Recurrence Relations:

Generating Functions of Sequences, Calculating Coefficients of generating functions, Recurrence relations, Solving recurrence relations by substitution and Generating functions, The method of Characteristic roots, Solutions of Inhomogeneous Recurrence Relations.

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MODULE- V

Graphs and Trees:
Basic Concepts, Isomorphisms and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay, R. Manohar, McGraw Hill education (India) Private Limited. **(UNITS - I, II)**
2. Discrete Mathematics for Computer Scientists & Mathematicians, Joe L. Mott, Abraham Kandel, Theodore P. Baker, Pearson . 2nd ed. **(Units - III, IV, V)**

REFERENCE BOOKS:

1. Discrete Mathematics and its Applications, Kenneth H. Rosen, 7th Edition, McGraw Hill education (India) Private Limited.
2. Discrete Mathematics, D.S. Malik & M.K. Sen, Revised edition Cengage Learning.
3. Elements of Discrete Mathematics, C. L. Liu and D. P. Mohapatra, 4th edition, McGraw Hill education (India) Private Limited.
4. Discrete Mathematics with Applications, Thomas Koshy, Elsevier.
5. Discrete and Combinatorial Mathematics, R. P. Grimaldi, Pearson.
6. Discrete mathematical structures, by Bernard kolman, Robert C. Busby and Sharon Cutler Ross, Pearson Education.

IV th sem CSE/IT

Computer Organization and Architecture

(3-CREDIT)(L-T-P/3-0-0)

Course Outcomes:

- Able to understand the basic components and the design of CPU, ALU and Control Unit.
- Ability to understand memory hierarchy and its impact on computer cost/performance.
- Ability to understand the advantage of instruction level parallelism and pipelining for high performance Processor design.
- Ability to understand the instruction set, instruction formats and addressing modes of
- 8086.
- Ability to write assembly language programs to solve problems.

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.
Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt, Complete Computer Description.
Micro Programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

UNIT – II

Central Processing Unit: The 8086 Processor Architecture, Register organization, Physical memory organization, General Bus Operation, I/O Addressing Capability, Special Processor Activities. Minimum and Maximum mode system and timings. 8086 Instruction Set and Assembler Directives-Machine language instruction formats, Addressing modes, Instruction set of 8086, Assembler directives and operators.

UNIT – III

Assembly Language Programming with 8086- Machine level programs, Machine coding the programs, Programming with an assembler, Assembly Language example programs. Stack structure of 8086, Interrupts and Interrupt service routines, Interrupt cycle of 8086, Interrupt programming. Passing parameters to procedures, Macros, Timings and Delays.

UNIT – IV

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating - point Arithmetic operations.
Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP),Intel 8089 IOP.

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UNIT – V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.
Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.
Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, Inter processor arbitration, Inter processor communication, and synchronization.

TEXT BOOKS:

1. Computer System Architecture, M. Moris Mano, Third Edition, Pearson. **(UNIST-I, IV , V)**
2. Advanced Microprocessors and Peripherals, K M Bhurchandi, A.K Ray ,3rd edition, McGraw Hill India Education Private Ltd. **(UNITS - II, III).**

REFERENCE:

1. Microprocessors and Interfacing, D V Hall, SSSP Rao, 3rd edition, McGraw Hill India Education Private Ltd.
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky: Computer Organization, 5thEdition, Tata McGraw Hill, 2002
3. Computer Organization and Architecture, William Stallings, 9th Edition, Pearson.
4. David A. Patterson, John L. Hennessy: Computer Organization and Design – The Hardware/ Software Interface ARM Edition, 4th Edition, Elsevier, 2009.

ENVIRONMENTAL SCIENCE

1. Concept and scope of Environmental science, components of environment, environmental segments and their importance.

2. Ecology: Ecosystem and its characteristics features, structure and function of Forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem, ecological balance and consequences of imbalance.

3. Atmosphere: Atmospheric composition, energy balance, climate, weather, depletion of ozone layer, green house effect, acid rain, particles, ions and radicals in the atmosphere, chemical and photochemical reactions in the atmosphere.

4. Air pollution and control: Air pollutants, sources and effect of air pollutants, primary and secondary pollutants, photochemical smog, fly ash, inorganic and organic particulate matter. Air quality standards, sampling, monitoring and control measures for pollutants.

5. Water pollution and control: Aquatic environment, water pollution, sources and their effect, river, lake and ground water pollution, eutrophication, water quality standard and water pollution control measures, waste water treatment.

6. Land pollution ; Lithosphere, composition of soil, acid base and ion exchange reactions in soil, soil erosion, landslides, desertification, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes), origin and effects, collection and disposal of solid wastes, recovery and conversion methods.

7. Noise pollution: Noise classification and its sources, effects and measurement, noise pollution hazards, standards and noise pollution control.

Books and References:

1. Master, G.M., Introduction to environmental engineering and science, Pearson Education.
2. Nebel, B.J. , Environmental science, Prentice Hall Inc.
3. Odum, E.P. Ecology: The link between the natural and social sciences.
IBH Publishing Company, Delhi.
4. De, A.K., Environmental Chemistry, New Age International Publication, 5th edition
5. Sharma, B.K., Environmental Chemistry; Krishna Prakashan Media, Merrut.
6. Kausik, A. and Kausik, C.P., Perspectives in Environmental studies, New Age International Publication.
7. Menon, S.E., Environmental Chemistry.