

Shri Rawatpura Sarkar University, Raipur



Examination Scheme & Syllabus

For

Master of Technology (Computer Science Engineering)

Semester- I

(Effective from the session: 2021-22)

Department of Computer Science & Engineering



Faculty of Engineering
Shri Rawatpura Sarkar University, Raipur
Master of Technology (Computer Science & Engineering)
Semester-I
Examination Scheme
(Effective from the session: 2021-22)

S. No	Course Code	Th/Pr	Subject	Type of Course	Teaching hours per week			TC	Examination Scheme				Total Marks
					L	T	P		Theory		Practical		
									EX	IN	EX	IN	
1	EMT04101	Th	Advanced Computational Methodology	Core	4	-	-	4	70	30	-	-	100
2	EMT04102	Th	Advanced Operating System	Core	4	-	-	4	70	30	-	-	100
3	EMT04103	Th	Information Security Systems	Core	4	-	-	4	70	30	-	-	100
4	EMT04104	Th	Advanced data structure and Algorithm Analysis	Core	4	-	-	4	70	30	-	-	100
5	EMT04105	Th	High Speed Computer Network	Core	4	-	-	4	70	30	-	-	100
6	EMT04191	Pr	Advanced Operating System Lab	Core	-	-	4	2	-	-	35	15	50
7	EMT04192	Pr	Advance Data Structures and Analysis of Algorithms Lab	Core	-	-	4	2	-	-	35	15	50
Total Contact hr. per week: 26			Total Credit: 24					Grand Total Marks:				600	



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Course Title	ADVANCED COMPUTATIONAL METHODOLOGY				
Course Code	EMT04101				
Course Credits	L	T	P	TC	
	4	-	-	4	
Prerequisites	Basic knowledge about mathematics.				
Course Objectives	<ul style="list-style-type: none"> • To represent the problems mathematically and optimize the solution. • To analyze the result numerically and linguistically by fuzzy theory. 				
Course Contents	<p>UNIT – I</p> <p>Graph theory and its application: - Basic Terminology. Simple graph. Multi graph. Types of graph Path, Cycles, Eulerian and Hamiltonian graph. Shortest path problem Representation of graph. Trees and their properties. Spanning Tree. Binary Tree. Tree traversal.</p> <p>UNIT – II</p> <p>Fuzzy sets and its Application: - Fuzzy sets-Basic definitions, α-level sets. Convex fuzzy sets. Basic operations on fuzzy sets. Types of fuzzy sets. Cartesian products, Algebraic products. Bounded sum and difference, t-norms and t-conforms. The Extension Principle The Zadeh's extension principle. Image and inverse image of fuzzy sets. Fuzzy numbers. Elements of fuzzy arithmetic.</p> <p>UNIT – III</p> <p>Cryptography and its application: -Introduction to the Concepts of Security: The need for security, Security Approaches, Principles of Security, &Types of Attacks. Cryptographic Techniques: Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption & Decryption, Symmetric & Asymmetric Key Cryptography, Steganography, Key Range, Key Size, Possible Types of Attacks. DES, RSA, Digital Signature.</p> <p>UNIT – IV</p> <p>Statistical Analysis: -Expectation and variance of random variable. Sampling Distribution. Testing a Hypothesis. Level of significance. Confidence limits. Test of significance for large sample. Central limit theorem. Test of significance for means of two large samples. Sampling Variables-small samples. Student t-distribution, Chi-square test.</p> <p>UNIT – V</p> <p>Optimization Techniques: -Dynamic Programming - Deterministic and Probabilistic Dynamic programming. Inventory- Basic characteristics of an inventory system. The Economic order quantity. Deterministic models. Network analysis (PERT/ CPM).</p>				



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Course Outcomes	<ul style="list-style-type: none">• This is the foundation of research & development in the computational domain of engineering and technology.• As the prerequisite, this will be traced the thought & ideas to design the behavioral tools over the engineering range.
Text Books	<ol style="list-style-type: none">1. Jain R.K, Iyengar. S.R.K. - Advanced Engineering Mathematics, Narosa publications.2. Grewal, B.S-Numerical Methods in Science and Engineering, Kanna Publications.
Reference Books	<ol style="list-style-type: none">1. Kandasamy.P, Thilagavathy. Kand Gunavathy, K-Numerical Methods, S.Chandand Co., Ltd., New Delhi, S. P. Gupta. Statistical Method. Sultan Chand & Sons. 2011.2. Prem Kumar Gupta & D. S Hira. Operation Research. S. Chand Publishing. New Delhi.



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Course Title	ADVANCED OPERATING SYSTEM				
Course Code	EMT04102				
Course Credits	L	T	P	TC	
	4	-	-	4	
Prerequisites	Basic knowledge about all windows, XP, UNIX & Linux operation system process management.				
Course Objectives	<ul style="list-style-type: none"> • To make the students understand operating system with various Resource Manager that explores variety of applications of Information Technology. • 2. To provide knowledge of Process Management: Concepts, and elementary functions Basic Operating System and its Applications. 				
Course Contents	<p>UNIT - I</p> <p>Operating System: Definition, Operating System as Resource Manager. Types of Operating Systems: Simple Batch Processing, Multi-programmed Batch Processing, Time Sharing, Personal Computer systems, Parallel, Distributed and Real Time Operating Systems. Operating System Components, Services, Calls, System Programs, Operating System Structure, Virtual Machines, System Design and Implementation. Process Management: Concepts, Scheduling, Operations, Co-operating processes, Inter-process Communication. Threads: Thread usage, threads in User Space, threads in Kernel, Hybrid Implementation, Scheduler Activation, Pop-up threads, Multithreading. CPU Scheduling: Basic Concepts, Scheduling Criteria, Algorithms, Multiple-processor Scheduling, Real Time Scheduling, and Algorithm Evaluation.</p> <p>UNIT - II</p> <p>Process Synchronization: Critical Section Problem, Synchronization Hardware, Semaphores, Classical Problem of synchronization, Critical Regions, Monitors. Deadlock: Characteristics, Necessary Conditions, Prevention, Avoidance, Detection and Recovery. Memory Management: Logical and Physical Address Space, Swapping. Contiguous Allocation: Single-partitioned, Multi-partitioned. Non-contiguous Allocation: Paging, Segmentation, and Segmentation with Paging. Virtual Memory: Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing, Demand Segmentation.</p> <p>UNIT - III</p> <p>File and Directory System: File Concepts, Access Methods, Directory Structure, Protection, File system Structure, Allocation Methods, Free Space Management, Directory Implementation, Recovery. Secondary Storage Management: Disk Structure, Dedicated, Shared, Virtual, Sequential Access and Random Access Devices, Disk Scheduling, Disk Management, Swap-space Management, Disk Reliability, Stable Storage Management. Protection and Security: Threats, Intruders, Accidental Data Loss, Cryptography, User Authentication, Attacks from inside the system, Attacks from outside the system, Protection Mechanism, Trusted Systems, Domain of Protection, Access Matrix, Programs Threats, System Threats.</p>				



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	<p>UNIT - IV</p> <p>Distributed systems, topology network types, design strategies. Network operating structure, distributed operating system, remote services, and design issues. Distributed file system: naming and transparency, remote file access, Stateful v/s Stateless Service, File Replication.</p> <p>UNIT – V</p> <p>Distributed co-ordinations: Event Ordering, Mutual Exclusion, Atomicity, Concurrency Control, Deadlock Handling, Election Algorithms, and Reaching Agreement. Case studies of Unix and MS-DOS operating system.</p>
Course Outcomes	<ul style="list-style-type: none">• After completion of this course the students will be able to apply basic knowledge of Advanced Operating System.
Text Books	<ol style="list-style-type: none">1. Distributed, Database and multiprocessor operating systems" .MC Graw Hill education.2. Niranjana G.Shivaratri, "Advanced concepts in operating systems
Reference Books	<ol style="list-style-type: none">1. Mukesh Singhal, Advanced concepts in operating systems:2. Rajib Mall, “Real-Time Systems: Theory and Practice”, Pearson education.



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Course Title	INFORMATION SECURITY SYSTEMS				
Course Code	EMT04103				
Course Credits	L	T	P	TC	
	4	-	-	4	
Prerequisites	Basic knowledge about basic Object Oriented Programming.				
Course Objectives	<ul style="list-style-type: none"> • To learn basic concepts of java programming and features. • To understand working principle of basic concepts and, applications. • To gain knowledge of java applications of functionality. • To learn concepts of all java live problem and its solutions. 				
Course Contents	<p>UNIT - I</p> <p>OVERVIEW OF INFORMATION SECURITY SYSTEMS</p> <p>Essentials of Information Security, Need of information security, Sources of security threats – Intruders, Viruses, Worms and related threats, Threat identification and Threat analysis - Vulnerability identification and Assessment, Components of Computer Security - Physical Security, System Access & Control, Goals of Information Security</p> <p>UNIT - II</p> <p>MECHANISMS OF INFORMATION SECURITY SYSTEMS</p> <p>Cryptography - Public Key Cryptography, Principles of Public Key Cryptosystems, The RSA Algorithm, Key Management – Authentication, Elements, Types and Methods, Digital Signature, Intrusion Detection System (IDS), Types and Challenges, Intrusion Prevention System (IPS) – Firewalls, Design Principles, Scanning, Filtering and Blocking.</p> <p>UNIT - III</p> <p>SOURCES OF ATTACKS AND SECURITY POLICIES</p> <p>Vulnerabilities – Sources of Vulnerabilities, Cyber Crime and Hackers, Viruses and Content Filtering - Security Assessment, Analysis and Assurance, Computer Network Security Protocol and Standards - Security Policies, Integrity Policies, Confidentiality Policies, Security Models - Access Control Matrix Model, Take-Grant Protection Model.</p> <p>UNIT - IV</p> <p>IP BASED WEB SECURITY AND STANDARDS</p> <p>Secure Sockets – IPSec Overview, IPSec Architecture, IPSec-Internet Key Exchanging (IKE), IKE phases, Encoding, Internet Security, Threats to privacy – Packet Sniffing, Spoofing, Web Security Requirements – Real Time Communication Security, Security Standards, Kerberos.</p>				



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	<p>UNIT - V</p> <p>TRUSTED SYSTEMS USING PROTOCOLS</p> <p>Security Protocols, Transport Layer Protocols, SSL, Electronic Mail Security, PEM and S/MIME Security Protocol, Pretty Good Privacy, Firewalls Design Principles, Trusted Systems, Electronic Payment Protocols.</p>
Course Outcomes	<ul style="list-style-type: none">• After completion of this course the students will be able to apply Information Security Concepts.
Text Books	<ol style="list-style-type: none">1. William Stallings, “Cryptography and Network Security: Principles and Standards”, Prentice Hall India, 3rd Edition, 2003.2. Charlie Kaufman, Radia Perlman and Mike Speciner, “Network Security: Private Communication in a public world”, Prentice Hall India, 2nd Edition, 2002.
Reference Books	<ol style="list-style-type: none">1. Charles P. Pleege, “Security in Computing”, Pearson Education Asia, 2001.2. William Stallings, “Network Security Essentials: Applications and Standards”, Pearson Education Asia, 2000.



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Course Title	Advanced Data Structures & Algorithms				
Course Code	EMT04104				
Course Credits	L	T	P	TC	
	4	-	-	4	
Prerequisites	Basic knowledge about Data Structure and Algorithms.				
Course Objectives	<ul style="list-style-type: none"> • To understand fundamental concepts of Data Structure. • To get idea of various Concepts of Algorithm Design and a solid background in algorithms. • To Demonstrate a familiarity with major algorithms and data structures 				
Course Contents	<p>UNIT - I</p> <p>Introduction: Analysing algorithms, Growth function: Asymptotic notation, Standard notation & common functions, Recurrence relation heaps and introduction to notation & common functions, Recurrence relation heaps and introduction to 2-3 trees, Heap sort, Amortised Analysis.</p> <p>UNIT - II</p> <p>Dynamic Programming Paradigm: The basis dynamic programming paradigm, Viewing shortest path algorithms from that perspective, Dynamic programming solution to the optimal matrix chain multiplication and the longest common subsequence problems, Top down recursive algorithms using tables of solutions of sub problems as an alternative to bottom up general dynamic programming. Greedy Paradigm: The basic greedy strategy & computing minimum spanning trees, Algorithms of Kruskal and Prim, Use of Union Find Algorithm in implementation of Kruskal's algorithms, The relationship in Dijkstra's and Prim's algorithms, Use of greedy strategy in algorithms for the Knapsack problem and Huffman trees.</p> <p>UNIT – III</p> <p>Divide and Conquer Paradigm: Divide and Conquer recurrence equations and their solutions, Quick and merge sorting techniques from the perspective of their fitting into the divide and conquer paradigm, Linear time selection algorithm, The basic divide and conquer algorithm for matrix multiplication. Basic Graph Algorithms: Representational issues in graphs, Depth first search on graphs, Computation of biconnected components and strongly connected components using the depth first –search paradigm, Topological sorting of nodes of an acyclic graph. Shortest Path Algorithms on Graphs: Bellman – Ford shortest path problem, Dijkstra's algorithm & Analysis of Dijkstra's algorithm using Fibonacci heaps, FloydWarshall's all pairs shortest path algorithm and its refinement for computing the transitive closure of a graph.</p> <p>UNIT - IV</p> <p>String Matching Algorithms: Modeling the general string problems finite automata, Motivation of the failure function in the Knuth Morris and Pratt Paradigm, Linear time analysis of the KMP algorithm, The Boyer-Moore</p>				



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	<p>refinement of the KMP algorithm and computation of the failure functions for the Boyer-Moore algorithm.</p> <p>UNIT - V</p> <p>NP-Complete Problems: Examples of problems like traveling salesman tour for which enumeration and back tracking seems to be the only method of finding the optimal solution, notion of a non deterministic algorithm and its basic relationship to back tracing. The notion of a polynomial time non-deterministic algorithm, 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 and reductions, Reductions to show that the clique problem, vertex cover, subset sum and Hamiltonian cycle problems are NP-complete.</p>
Course Outcomes	<ul style="list-style-type: none">• Demonstrate a broad understanding of the role of advance computer system.• Demonstrate understanding of the theoretical knowledge of basis of computer system.
Text Books	<ol style="list-style-type: none">1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, and Ronald L. Rivest, MIT Press and McGraw Hill.2. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft and Jeffrey D.Ullman, Addison Wesley.
Reference Books	<ol style="list-style-type: none">1. Fundamentals of Computer Algorithms, Ellis Horowitz and Satarj Shani, Computer Science Press.2. Introduction to Algorithms: A Creative Approach, Udi Manber Addison Wesley.



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Course Title	High Speed Computer Network				
Course Code	EMT04105				
Course Credits	L	T	P	TC	
	4	-	-	4	
Prerequisites	Basic knowledge about computers Network models and its networks and network models.				
Course Objectives	<ul style="list-style-type: none"> • To differentiate and understand low-level networks and high-level networks and network models. • To understand protocols and programming networks and network layer, its design issues. • To understand the use of networks and appropriate to specific networks functionality and its problems. • Demonstrate the use of various networks connections. • Demonstrate the use of the various control of networks its category. 				
Course Contents	<p>UNIT – I</p> <p>Introduction: Computer network design requirements, Network architecture, Implementing network software, Performance. Direct Link Networks: Hardware building blocks, Encoding, Framing, Error detection, Reliable transmission, Ethernet (802.3), Token Rings (802.5, FDDI), Wireless (802.11).</p> <p>UNIT - II</p> <p>Packet Switching: Switching and Forwarding, Bridges and LAN switches, Cell switching (ATM), Implementation and performance. Internetworking: Simple internetworking (IP), Routing, Global Internet, Multicast, Multiprotocol Label Switching (MPLS).</p> <p>UNIT - III</p> <p>End-to-End Protocols: Simple Demultiplexer (UDP), Reliable Byte Stream (TCP). Congestion Control and Resource Allocation: Issues in resource allocation, Queuing disciplines, TCP congestion control, Congestion avoidance mechanisms, Quality of Service.</p> <p>UNIT - IV</p> <p>Applications: Name Service (DNS), Electronic Mail, World Wide Web, Real-time Transport Protocol, Session control and call control, Overlay networks.</p> <p>UNIT - V</p> <p>Network Management: Network monitoring and control, SNMP –V1, V2 & V3, RMON and RMONV2.</p>				



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Course Outcomes	<p>After completion of the course study, students will be able to :-</p> <ul style="list-style-type: none">• Use and differentiate between basic concepts of computer network and network layer, its issues.• how to solved the network layer problems and issues• Read, trace and understand and network problems and troubleshooting that problems.• Analyse network problems and resolved.
Text Books	<ol style="list-style-type: none">1. Larry L. Peterson & Bruce S. Davie, Computer Networks – A Systems Approach, Morgan Kaufmann Publishers, 3rd Edition, 2003.2. William Stallings, SNMP, SNMPV2, SNMPV3, RMON1 and 2, Addison Wesley, 3rd Edition, 1999.
Reference Books	<ol style="list-style-type: none">1. Mani Subramanian, Network Management: Principles and Practice, Addison Wesley, 2000.2. James F. Kurose and Keith W. Ross, Computer Networking – A Top-down approach featuring the Internet, Addison Wesley, 3rd Edition, 2004.3. S. Keshav, An Engineering approach to Computer Networks, Addison Wesley, 1997.4. R. Perlman, Interconnections – Bridges, Routers, Switches, and Internetworking Protocols, 2nd Edition, Addison Wesley, 2000.



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Course Title	ADVANCED OPERATING SYSTEM – LAB				
Course Code	EMT04191				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Basic knowledge about all windows operation system and its features.				
Course Objectives	<ul style="list-style-type: none">• To make the students understand the OS & its Application and Operating System as various Resource Manager that explore variety of applications.• Advanced OS and to provide knowledge of Process Management: Concepts, & elementary functions including its Resources & Applications.				
Course Contents	<p style="text-align: center;">List of Experiments</p> <ol style="list-style-type: none">1. Write a program for the implementation of various CPU scheduling algorithms (FCFS, SJF, & Priority).2. Write a program for the implementation of various page replacement algorithms (FIFO, Optimal, and LRU).3. Write a program for the implementation of Readers Writers problem.4. Write a program for the implementation of Banker’s algorithm.5. Write a program to simulate the concept of semaphores.6. Write a program to simulate the concept of inter process communication.7. Write a program for the implementation of various memory allocation algorithms (First fit, Best fit, and Worst fit).8. Write a program for the implementation of various Disk scheduling algorithms.9. (FCFS, SCAN, SSTF, C-SCAN).10. Write a program for the implementation of Producer-Consumer problem.• Write a program for the implementation of Fork and V-fork of UNIX operating system.				
Course Outcomes	After completion of the course study, students will be able to :- <ul style="list-style-type: none">• Use and differentiate between basic concepts of computer operation system, its issues and Read, trace and understand and OS problems and troubleshooting that problems.				
Text Books	<ol style="list-style-type: none">1. Advanced Engg. Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.2. Applied Mathematics by P.N.Wartikar & J.N. Wartikar. Vol- II– Pune Vidyarthi Griha Prakashan, Pune.				



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Reference Books	<ol style="list-style-type: none">1. Applied Mathematics for Engineers & Physicists by Louis A. Pipes- TMH.2. Level Module M 1.1 Information Technologies by Khanna Book Publications, New Delhi.
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Course Title	ADVANCED DATASTRUCTURES AND ANALYSIS OF ALGORITHMS - LAB				
Course Code	EMT04192				
Course Credits	L	T	P	TC	
	-	-	4	2	
Prerequisites	Basic knowledge about C programming language.				
Course Objectives	<ul style="list-style-type: none"> • To learn the Computer Fundamental concepts of Data Structure. • To aware students about Problem Solving approach. • To make them to use basic components of Data structure using Programming 				
Course Contents	<p>LIST OF EXPERIMENTS</p> <ol style="list-style-type: none"> 1. Write a program to demonstrate the use of Output statements that draws any object of your choice e.g Christmas Tree using ‘*’ 2. Write a program that reads in a month number and outputs the month name. 3. Write a program that demonstrate the use of various input statements like getchar(), getch(), scanf(). 4. Write a program to demonstrate the overflow and underflow of various datatype and their resolution? 5. Write a program to demonstrate the precedence of various operators. 6. Write a function to find the GCD and LCM of two numbers. 7. Implement a swap() function which exchanges the values of two integers. Call the function from the main to test the function with different values. 8. Write a C function to remove duplicates from an ordered array. For example, if input array contains 10,10,10,30,40,40,50,80,80,100 then output should be 10,30,40,50,80,100. 9. Write a function to generate the Fibonacci series using recursions? 10. Write a recursive function that adds first ‘n’ natural numbers? 11. Write a recursive function that finds factorial of a number? 12. Write a program to demonstrate the use of recursion in Tower of Hanoi problem. 13. Write a program to find the number of occurrences of a word in a sentence? 14. Write a program to concatenate two strings without using the inbuilt function? 15. Write a program to check if two strings are same or not? 16. Write a program to check whether a string is a palindrome or not? 17. Write a program to find the number of vowels and consonants in a sentence? 				



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	<ol style="list-style-type: none">18. Write a program that reverses the contents of a string?19. Write a program to implement a stack and it's operations.20. Write a program to implement a linear queue, circular queue using an array.21. Write a program to convert an infix expression into its equivalent postfix expression using a stack.22. Write a program to evaluate a postfix expression using a stack.23. Write a program to create and display a linked list of integers.24. Write a program to create a linked list and define functions to add a node (at the beginning, end and middle), delete a node, search a node and display all the nodes.25. Write a program to create two linked list and append one list at the end of another using function.26. Write a program to implement a stack and queue of strings using a linked list.27. Write a program to implement a priority queue using linked list.28. Write a program to define functions to add a node (at the beginning, end and middle), delete a node, search a node and display all the nodes in a header circular linked list.29. Write a program to implement a circular queue over a circular linked list.30. Write a program to create and display a doubly linked list.31. Write a program to define the following functions to add a node (at the beginning, end and middle), delete a node (from the beginning, end and middle) from a doubly linked list.32. Write a program to create and display a doubly circular linked list.33. Write programs to sort an array of integers using the techniques of Selection sort, Bubble sort, Insertion sort, Quick sort, Shell sort, Heap sort.34. Write a program to search for a particular element in an unsorted array of integers using linear search technique.35. Write a program to demonstrate the technique of Binary search on a sorted array of integers.
Course Outcomes	<ul style="list-style-type: none">• Have a comprehensive knowledge of the data structures and algorithms on which file structures and databases are based.
Text Books	<ol style="list-style-type: none">1. Aaron M. Tenenbaum, YedidyahLangsam and Moshe J. Augenstein “Data Structures Using C and C/C++” , PHI2. Horowitz and Sahani, “Fundamentals of Data Structures”, Galgotia Publication
Reference Books	<ol style="list-style-type: none">1. R. Kruse etal, “Data Structures and Program Design in C”, Pearson Education2. Lipschutz, “Data Structures” Schaum’s Outline Series, TMH3. G A V Pai, “Data Structures and Algorithms”, TMH



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