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1701CP101- APPLIED PROBABILITY AND STATISTICS

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3 2 0 4

OBJECTIVES:

- To introduce the basic concept of Probability function
- To enable the students in handling Estimation and Testing of Hypothesis
- To learn the Application of Statistics in Engineering Decision Making

UNIT I: INTRODUCTION TO PROBABILITY (9+3)

Basic definitions and rules for Probability- Properties-Conditional Probability- Independent Events- Mutually exclusive Events- Total Probability- Baye'Theorem

UNIT II: RANDOM VARIABLES (9+3)

One dimensional Random Variable- Moments- Moment Generating Function- Functions of Random Variable- Two Dimensional Random Variable - Correlation

UNIT III: ESTIMATION THEORY (9+3)

Estimation: Point and Interval estimates for population parameters of large sample and small samples, determining the sample size- unbiased Estimators- Maximum Likelihood Estimation-Curve Fitting by Principle of Least square

UNIT IV: TESTING OF HYPOTHESIS- PARAMETRIC TESTS (9+3)

Hypothesis testing: one sample and two sample tests for means and proportions of large samples z-test, one sample and two sample tests for means of small sample t-test, F-test for two sample standard deviations, ANOVA one and two way.

UNIT V: NON PARAMETRIC TESTS (9+3)

Chi-square test for single sample standard deviation. Chi-square tests for independence of attributes and goodness of fit. Sign test for paired data. Rank sum test. Comparing two populations. Mann – Whitney U test and Kruskal Wallis test.

TOTAL : 45+15 = 60 PERIODS

OUTCOMES:

On completion of the course the students will be able to

CO1	Acquire knowledge in basic concepts of Probability
CO2	Deal with one dimensional and two dimensional Random Variable
CO3	Estimate the sample size and prediction of unknown values
CO4	Solve Parametric and non parametric statistical problem
CO5	Apply statistical techniques for solving Engineering problems

REFERENCES:

1. Jay L. Devore, "Probability and Statistics For Engineering and the Sciences",Thomson and Duxbury, 2002.
2.Richard Johnson. "Miller & Freund's Probability and Statistics for Engineer", Prentice – Hall,Seventh Edition, 2007.
3.Richard A. Johnson and Dean W. Wichern, "Applied Multivariate Statistical Analysis", Pearson Education, Asia, Fifth Edition, 2002.
4.Gupta S.C. and Kapoor V.K."Fundamentals of Mathematical Statistics", Sultan and Sons, 2001.
5.Dallas E Johnson , "Applied Multivariate Methods for Data Analysis", Thomson an Duxbury press,1998.

1702CP102-**ADVANCED DATA STRUCTURES AND ALGORITHMS** **L T P C**
4 0 0 4

OBJECTIVES

- To understand the implementation and use of advanced data structures.
- To learn how to analyze the space and time requirements of a given algorithm.
- To design efficient algorithms using algorithmic techniques.

UNIT I COMPLEXITY ANALYSIS AND ELEMENTARY DATA STRUCTURES **9**

Asymptotic notations – Properties of big oh notation – Asymptotic notation with several parameters – Conditional asymptotic notation – Amortized analysis – NP Completeness - Arrays – Linked lists – Trees.

UNIT II HEAP STRUCTURES AND AMORTIZED ANALYSIS **9**

Min-max heaps – D-Heaps – Leftist heaps –Binomial heaps – Fibonacci heaps – Skew heaps - Lazy binomial heaps- Amortized analysis – Binomial heaps – Skew heaps – Fibonacci heaps

UNIT III SEARCH STRUCTURES **9**

Binary search trees – AVL trees – 2-3 trees – 2-3-4 trees – Red-black trees – B-trees – Splay trees- Hashing and collision resolution.

UNIT IV GREEDY AND DIVIDE AND CONQUER **9**

Knapsack problem- Minimum spanning trees: Prim's algorithm - Kruskal's algorithm -Tree-vertex splitting – Job sequencing with deadlines – Optimal storage on tapes - Quicksort – Strassen's matrix multiplication – Convex hull.

UNIT V DYNAMIC PROGRAMMING AND BACKTRACKING **9**

Multistage graphs – 0/1 knapsacks using dynamic programming – Flow shop scheduling – 8-queens problem – Graph coloring – Knapsack using backtracking- Hamiltonian cycles.

Total: 45 PEROIDS

OUTCOMES

CO1 Understand the properties of various data structures and analyze different algorithm design techniques
CO2 Design and employ appropriate data structures for solving real time applications.
CO3 Implementation of advanced search structure with problem solving
CO4 Implementation and understand the complexity analysis of algorithms using greedy method and divide and conquer methods
CO5 Analyze algorithms using dynamic programming and backtracking.

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REFERENCES

1. Mark Allen Weiss, *Data Structures and Algorithms in C++*, Pearson, 2009.
2. E. Horowitz, S. Sahni and S. Rajasekaran, *Computer Algorithms / C++*, University Press, 2007.
3. Adam Drozdex, *Data Structures and* algorithms in C++. New Delhi: Thomson learning, 2006.
4. T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, *Introduction to Algorithms*, Prentice hall of India, 2003.

1702CP103-**ADVANCED COMPUTER ARCHITECTURE** **L T P C**
3 0 0 3

OBJECTIVES

- To introduce the fundamental techniques based on parallel processing.
- To develop the foundations for analyzing the benefits of design options in computer architecture.
- To give experience of the application of the various computing techniques.

UNIT I PIPELINING AND ILP **9**

Fundamentals of computer design - Measuring and reporting performance - Instruction level parallelism and its exploitation - Concepts and challenges - Overcoming data hazards with dynamic scheduling – Dynamic branch prediction – Speculation-Multiple issue processors.

UNIT II ADVANCED TECHNIQUES FOR EXPLOITING ILP **9**

Compiler techniques for exposing ILP - Limitations on ILP for realizable processors - Hardware versus software Speculation - Multithreading: Using ILP support to exploit Thread-level parallelism - Performance of advanced multiple issue processors-Efficiency in advanced multiple issue processors.

UNIT III MULTIPROCESSORS **9**

Symmetric and distributed shared memory architectures – Cache coherence issues - Performance Issues – Synchronization issues – Models of memory consistency - Interconnection networks – Buses, crossbar-Multi-stage switches.

UNIT IV MEMORY HIERARCHY **9**

Introduction - Optimizations of cache performance - Memory technology and optimizations - Protection: Virtual memory and virtual machines-Design of memory hierarchies.

UNIT V STORAGE SYSTEMS **9**

Advanced topics in disk storage- Definition and examples of real faults and failures-I/O performance, reliability measures and benchmarks-A Little queuing theory.

Total: 45 Hours

OUTCOMES

CO1 Analyze the working principle of different ILP and TLP techniques
CO2 Demonstrate the concepts of multiprocessor architecture
CO3 Identify the need of cache and virtual memory.
CO4 Apply the concept of memory hierarchy for efficient memory design and virtual memory to overcome the memory wall
CO5 Interpret the performance of the I/O devices during the occurrence of real faults and failures.

References

1. John L. Hennessey and David A. Patterson, *Computer Architecture – A quantitative approach*. Noida:
Morgan Kaufmann / Elsevier, 2012.

2. William Stallings, *Computer Organization and Architecture – Designing for Performance*. New Delhi: Pearson Education, 2006.
3. David E. Culler and Jaswinder Pal Singh, *Parallel Computing Architecture: A hardware/ software approach*. Noida: Morgan Kaufmann / Elsevier, 1999.

1702CP104-**ADVANCED OPERATING SYSTEMS** **L T P C**

3 0 0 3

OBJECTIVES:

- To learn the fundamentals of Operating Systems
- To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols
- To gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols
- To know the components and management aspects of Real time, Mobile operating systems

UNIT I FUNDAMENTALS OF OPERATING SYSTEMS **9**

Overview – Synchronization Mechanisms – Processes and Threads - Process Scheduling – Deadlocks: Detection, Prevention and Recovery – Models of Resources – Memory Management Techniques.

UNIT II DISTRIBUTED OPERATING SYSTEMS **9**

Issues in Distributed Operating System – Architecture – Communication Primitives – Lamport's Logical clocks – Causal Ordering of Messages – Distributed Mutual Exclusion Algorithms – Centralized and Distributed Deadlock Detection Algorithms – Agreement Protocols.

UNIT III DISTRIBUTED RESOURCE MANAGEMENT **9**

Distributed File Systems – Design Issues - Distributed Shared Memory – Algorithms for Implementing Distributed Shared memory–Issues in Load Distributing – Scheduling Algorithms – Synchronous and Asynchronous Check Pointing and Recovery – Fault Tolerance – Two-Phase Commit Protocol – Nonblocking Commit Protocol – Security and Protection.

UNIT IV REAL TIME AND MOBILE OPERATING SYSTEMS **9**

Basic Model of Real Time Systems - Characteristics- Applications of Real Time Systems – Real Time Task Scheduling - Handling Resource Sharing - Mobile Operating Systems –Micro Kernel Design - Client Server Resource Access – Processes and Threads - Memory Management – File system.

UNIT V CASE STUDIES **9**

Linux System: Design Principles - Kernel Modules - Process Management Scheduling – Memory Management - Input-Output Management - File System - Interprocess Communication. iOS and Android: Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer – File System.

TOTAL: 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students should be able to:

CO1 Discuss the various synchronization, scheduling and memory management issues
CO2 Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
CO3 Discuss the various resource management techniques for distributed systems
CO4 Identify the different features of real time and mobile operating systems

CO5 Install and use available open source kernel
CO6 Modify existing open source kernels in terms of functionality or features used

REFERENCES:

1. Mukesh Singhal and Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems", Tata McGraw-Hill, 2001.
2. Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, "Operating System Concepts", Seventh Edition, John Wiley & Sons, 2004.
3. Daniel P Bovet and Marco Cesati, "Understanding the Linux kernel", 3rd edition, O'Reilly, 2005.
4. Rajib Mall, "Real-Time Systems: Theory and Practice", Pearson Education India, 2006.
5. Neil Smyth, "iPhone iOS 4 Development Essentials – Xcode", Fourth Edition, Payload media, 2011.

1702CP105-**DESIGN AND MANAGEMENT OF COMPUTER NETWORKS**

L T P C
3 0 2 4

OBJECTIVES:

- To learn definitions of network analysis, architecture, and design
- To study about different types of requirements from the user, application, device and network components.
- To learn about how to group requirements together and to map the locations of applications and devices.
- To learn how to identify and characterize traffic flows
- To develop internal and external relationships within and between major functions like addressing and routing

UNIT I INTRODUCTION TO NETWORK MANAGEMENT **9**

Overview of Analysis, Architecture and Design Process-System Methodology, Service methodology, Service Description - Service characteristics - Performance Characteristics - Network supportability - Requirement analysis – User Requirements – Application Requirements – Device Requirements – Network Requirements – Other Requirements - Requirement specification and map.

UNIT II REQUIREMENTS ANALYSIS **9**

Requirement Analysis Process – Gathering and Listing Requirements- Developing service metrics – Characterizing behavior – Developing RMA requirements – Developing delay Requirements - Developing capacity Requirements - Developing supplemental performance Requirements – Requirements mapping – Developing the requirements specification

UNIT III FLOW ANALYSIS **9**

Individual and Composite Flows – Critical Flows - Identifying and developing flows – Data sources and sinks – Flow models- Flow prioritization – Flow specification algorithms – Example Applications of Flow Analysis

UNIT IV NETWORK ARCHITECTURE **9**

Architecture and design – Component Architectures – Reference Architecture – Architecture Models – System and Network Architecture – Addressing and Routing Architecture – Addressing and Routing Fundamentals – Addressing Mechanisms – Addressing Strategies – Routing Strategies – Network Management Architecture – Network Management Mechanisms Performance Architecture – Performance Mechanisms – Security and Privacy Architecture – Planning security and privacy Mechanisms

UNIT V NETWORK DESIGN **9**

Design Concepts – Design Process - Network Layout – Design Traceability – Design Metrics –Logical Network Design – Topology Design – Bridging, Switching and Routing Protocols- Physical Network Design – Selecting Technologies and Devices for Campus and Enterprise Networks – Optimizing Network Design

TOTAL: 45 PERIODS

OUTCOMES:
The Students should be able to

CO1 Gather, derive, define and validate real requirements for the specified network.
CO2 Implement how and where addressing and routing, security, network management, and performance are required in the network
CO3 Evaluate and select vendors, vendor products, and service providers for the project
CO4 Develop traceability between requirements, architecture decisions, and design decisions
CO5 Apply routing protocols (RIP/RIPv2, OSPF, BGP-4, MPLS), as well as classful and classless IP addressing mechanisms.

REFERENCES:
1. Network Analysis, Architecture, and Design By James D. McCabe, Morgan Kaufmann, Third Edition, 2007.ISBN-13: 978-0123704801
2. Computer Networks: A Systems Approach by Larry L. Peterson, Bruce S. Davie - 2007, Elsevier Inc.
3. Top-down Network Design: [a Systems Analysis Approach to Enterprise Network Design] By Priscilla Oppenheimer, Cisco Press , 3rd Edition, ISBN-13: 978-1-58720- 283-4 ISBN-10: 1- 58720-283-2
4. Integrated Management of Networked Systems: Concepts, Architectures, and Their Operational Application (The Morgan Kaufmann Series in Networking), Heinz-Gerd Hegering, Sebastian Abeck, and Bernhard Neumair, 1999.
5. "Network Design and Management" – by Steven T.Karris, Orchard publications, Second edition, Copyright 2009, ISBN 978-1-934404-15-7
6. "Network Design, Management and Technical Perspective", Teresa C. Mann-Rubinson and Kornel Terplan, CRC Press, 1999