

SEMESTER IV

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

Code No.	Course Title	L	T	P	M
THEORY					
1	Probability and Queuing Theory	4	0	0	100
2	Design and Analysis of Algorithms	4	0	0	100
3	Analog and Digital Communication	4	0	0	100
4	Database Management Systems (Common for CSE & IT)	4	0	0	100
5	Operating Systems	4	0	0	100
6	Visual Programming	4	0	0	100
PRACTICAL					
1	Linux & RDBMS Lab	0	0	3	100
2	Visual Programming Lab	0	0	3	100

SEMESTER IV

PROBABILITY AND QUEUEING THEORY

AIM

The probabilistic models are employed in countless applications in all areas of science and engineering. Queuing theory provides models for a number of situations that arise in real life. The course aims at providing necessary mathematical support and confidence to tackle real life problems.

OBJECTIVES

At the end of the course, the students would

- Have a fundamental knowledge of the basic probability concepts.
- Have a well – founded knowledge of standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable and functions of random variables.
- Understand and characterize phenomena which evolve with respect to time in a probabilistic manner.
- Be exposed to basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

UNIT I PROBABILITY AND RANDOM VARIABLE 9 + 3

Axioms of probability - Conditional probability - Total probability – Baye’s theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS 9 + 3

Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties - Functions of a random variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9 + 3

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression - Transformation of random variables - Central limit theorem.

UNIT IV RANDOM PROCESSES AND MARKOV CHAINS 9 + 3

Classification - Stationary process - Markov process - Poisson process - Birth and death process - Markov chains - Transition probabilities - Limiting distributions.

UNIT V QUEUEING THEORY 9 + 3

Markovian models – M/M/1, M/M/C , finite and infinite capacity - M/M/∞ queues - Finite source model - M/G/1 queue (steady state solutions only) – Pollaczek – Khintchine formula – Special cases.

TUTORIAL 15

TOTAL : 60

TEXT BOOKS

1. Ross, S., "A first course in probability", Sixth Edition, Pearson Education, Delhi, 2002.

2. Medhi J., "Stochastic Processes", New Age Publishers, New Delhi, 1994.

(Chapters 2, 3, & 4)

3. Taha, H. A., "Operations Research-An Introduction", Seventh Edition, Pearson Education Edition Asia, Delhi, 2002.

REFERENCES

1. Veerarajan., T., "Probability, Statistics and Random Processes", Tata McGraw-Hill, Second Edition, New Delhi, 2003.

2. Allen., A.O., "Probability, Statistics and Queuing Theory", Academic press, New Delhi, 1981.

3. Gross, D. and Harris, C.M., "Fundamentals of Queuing theory", John Wiley and Sons, Second Edition, New York, 1985.

SEMESTER IV

DESIGN AND ANALYSIS OF ALGORITHMS

AIM

To create analytical skills, to enable the students to design algorithms for various applications, and to analyze the algorithms.

OBJECTIVES

- To introduce basic concepts of algorithms
- To introduce mathematical aspects and analysis of algorithms
- To introduce sorting and searching algorithms
- To introduce various algorithmic techniques
- To introduce algorithm design methods

UNIT I BASIC CONCEPTS OF ALGORITHMS 8

Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Fundamentals of the Analysis Framework – Asymptotic Notations and Basic Efficiency Classes.

UNIT II MATHEMATICAL ASPECTS AND ANALYSIS OF ALGORITHMS 8

Mathematical Analysis of Non-recursive Algorithm – Mathematical Analysis of Recursive Algorithm – Example: Fibonacci Numbers – Empirical Analysis of Algorithms – Algorithm Visualization.

UNIT III ANALYSIS OF SORTING AND SEARCHING ALGORITHMS 10

Brute Force – Selection Sort and Bubble Sort – Sequential Search and Brute-force string matching – Divide and conquer – Merge sort – Quick Sort – Binary Search – Binary tree-Traversal and Related Properties – Decrease and Conquer – Insertion Sort – Depth first Search and Breadth First Search.

UNIT IV ALGORITHMIC TECHNIQUES 10

Transform and conquer – Presorting – Balanced Search trees – AVL Trees – Heaps and Heap sort – Dynamic Programming – Warshall's and Floyd's Algorithm – Optimal Binary Search trees – Greedy Techniques – Prim's Algorithm – Kruskal's Algorithm – Dijkstra's Algorithm – Huffman trees.

UNIT V ALGORITHM DESIGN METHODS 9

Backtracking – n-Queen's Problem – Hamiltonian Circuit problem – Subset-Sum problem – Branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem.

TUTORIAL

15

TOTAL : 60

TEXT BOOKS

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, 2003.

REFERENCES

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms", PHI Pvt. Ltd., 2001
2. Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", Pearson Education Asia, 2003.
3. A.V.Aho, J.E. Hopcroft and J.D.Ullman, "The Design and Analysis Of Computer Algorithms", Pearson Education Asia, 2003.

SEMESTER IV

ANALOG AND DIGITAL COMMUNICATION

UNIT I AMPLITUDE MODULATION: TRANSMISSION AND RECEPTION 9

Principles of amplitude modulation - AM envelope, frequency spectrum and bandwidth, modulation index and percent modulation, AM power distribution, AM modulator circuits – low level AM modulator, medium power AM modulator, AM transmitters – Low level transmitters, high level transmitters, receiver parameters, AM reception – AM receivers – TRF, super heterodyne receiver, double conversion AM receivers.

UNIT II ANGLE MODULATION: TRANSMISSION AND RECEPTION 9

Angle modulation - FM and PM waveforms, phase deviation and modulation index, frequency deviation, phase and frequency modulators and demodulators, frequency spectrum of Angle – modulated waves. Bandwidth requirements for Angle-modulated waves, commercial Broadcast band FM, Average power of an angle-modulated wave, frequency and phase modulators, A direct FM transmitters, Indirect transmitters, Angle modulation Vs amplitude modulation, FM receivers: FM demodulators, PLL FM demodulators, FM noise suppression, frequency verses phase modulation.

UNIT III DIGITAL TRANSMISSION AND DATA COMMUNICATION 9

Introduction, pulse modulation, PCM – PCM sampling, sampling rate, signal to quantization noise rate, companding – analog and digital – percentage error, delta modulation, adaptive delta modulation, differential pulse code modulation, pulse transmission – ISI, eyepattern, Data communication history, standards, data communication circuits, data communication codes, Error control, Hardware, serial and parallel interfaces, data modems, - Asynchronous modem, Synchronous modem, low-speed modem, medium and high speed modem, modem control.

UNIT IV DIGITAL COMMUNICATION 9

Introduction, Shannon limit for information capacity, digital amplitude modulation, frequency shift keying, FSK bit rate and baud, FSK transmitter, BW consideration of FSK, FSK receiver, phase shift keying – binary phase shift keying – QPSK, Quadrature Amplitude modulation, bandwidth efficiency, carrier recovery – squaring loop, Costas loop, DPSK.

UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS TECHNIQUES 9

Introduction, Pseudo-noise sequence, DS spread spectrum with coherent binary PSK, processing gain, FH spread spectrum, multiple access techniques – wireless communication, TDMA and FDMA, wireless communication systems, source coding of speech for wireless communications.

TOTAL : 60

TEXT BOOKS

1. Wayne Tomasi, "Electronic Communication Systems: Fundamentals Through Advanced", Pearson Education, 2001. (UNIT I-IV Chapters- 3,4,6,7,12,13,15).
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons., 2001. (Unit V Chapters- 7,8).

REFERENCES

1. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.
2. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, PHI, 2002.

SEMESTER IV

DATABASE MANAGEMENT SYSTEMS

AIM

To provide a strong foundation in database technology and an introduction to the current trends in this field.

OBJECTIVES

- To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.
- To have an introductory knowledge about the emerging trends in the area of distributed DB- OO DB- Data mining and Data Warehousing and XML.

UNIT I INTRODUCTION AND CONCEPTUAL MODELING 9

Introduction to File and Database systems- Database system structure – Data Models – Introduction to Network and Hierarchical Models – ER model – Relational Model – Relational Algebra and Calculus.

UNIT II RELATIONAL MODEL 9

SQL – Data definition- Queries in SQL- Updates- Views – Integrity and Security – Relational Database design – Functional dependences and Normalization for Relational Databases (up to BCNF).

UNIT III DATA STORAGE AND QUERY PROCESSING 9

Record storage and Primary file organization- Secondary storage Devices- Operations on Files-Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree – Query Processing.

UNIT IV TRANSACTION MANAGEMENT 9

Transaction Processing – Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules – Concurrency Control – Types of Locks- Two Phases locking- Deadlock- Time stamp based concurrency control – Recovery Techniques – Concepts- Immediate Update- Deferred Update - Shadow Paging.

UNIT V CURRENT TRENDS 9

Object Oriented Databases – Need for Complex Data types- OO data Model- Nested relations- Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogenous- Distributed data Storage – XML – Structure of XML- Data- XML Document- Schema- Querying and Transformation. – Data Mining and Data Warehousing.

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan- "Database System Concepts", Fourth Edition, McGraw-Hill, 2002.

REFERENCES

1. Ramez Elmasri and Shamkant B. Navathe, "Fundamental Database Systems", Third Edition, Pearson Education, 2003.
 2. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003.
 3. Hector Garcia-Molina, Jeffrey D.Ullman and Jennifer Widom- "Database System Implementation"- Pearson Education- 2000.
- Peter Rob and Corlos Coronel- "Database System, Design, Implementation and Management", Thompson Learning Course Technology- Fifth edition, 2003.

SEMESTER IV

OPERATING SYSTEMS

AIM

To have a thorough knowledge of processes, scheduling concepts, memory management, I/O and file systems in an operating system.

OBJECTIVES

- To have an overview of different types of operating systems
- To know the components of an operating system.
- To have a thorough knowledge of process management
- To have a thorough knowledge of storage management
- To know the concepts of I/O and file systems.

UNIT I

9

Introduction - Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication.

UNIT II

9

Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors.

UNIT III

9

System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging.

UNIT IV

9

Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection

UNIT V

9

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management. Kernel I/O Subsystems - Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management. Case Study: The Linux System, Windows

TOTAL : 45

TEXT BOOK

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", Sixth Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2003.

REFERENCES

1. Harvey M. Deitel, "Operating Systems", Second Edition, Pearson Education Pvt. Ltd, 2002.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India Pvt. Ltd, 2003.
3. William Stallings, "Operating System", Prentice Hall of India, 4th Edition, 2003.
4. Pramod Chandra P. Bhatt – "An Introduction to Operating Systems, Concepts and Practice", PHI, 2003.

SEMESTER IV

VISUAL PROGRAMMING

AIM

To make the students to understand the windows programming concepts including Microsoft Foundation Classes

OBJECTIVES

9

- To introduce the concepts of windows programming
- To introduce GUI programming using Microsoft Foundation Classes
- To enable the students to develop programs and simple applications using Visual C++

UNIT I WINDOWS PROGRAMMING

9

Windows environment – a simple windows program – windows and messages – creating the window – displaying the window – message loop – the window procedure – message processing – text output – painting and repainting – introduction to GDI – device context – basic drawing – child window controls

UNIT II VISUAL C++ PROGRAMMING – INTRODUCTION

9

Application Framework – MFC library – Visual C++ Components – Event Handling – Mapping modes – colors – fonts – modal and modeless dialog – windows common controls – bitmaps

UNIT III THE DOCUMENT AND VIEW ARCHITECTURE

9

Menus – Keyboard accelerators – rich edit control – toolbars – status bars – reusable frame window base class – separating document from its view – reading and writing SDI and MDI documents – splitter window and multiple views – creating DLLs – dialog based applications

UNIT IV ACTIVEX AND OBJECT LINKING AND EMBEDDING (OLE)

9

ActiveX controls Vs. Ordinary Windows Controls – Installing ActiveX controls – Calendar Control – ActiveX control container programming – create ActiveX control at runtime – Component Object Model (COM) – containment and aggregation Vs. inheritance – OLE drag and drop – OLE embedded component and containers – sample applications

UNIT V ADVANCED CONCEPTS

9

Database Management with Microsoft ODBC – Structured Query Language – MFC ODBC classes – sample database applications – filter and sort strings – DAO concepts – displaying database records in scrolling view – Threading – VC++ Networking issues – Winsock – WinInet – building a web client – Internet Information Server – ISAPI server extension – chat application – playing and multimedia (sound and video) files

TOTAL : 45

TEXT BOOKS

1. Charles Petzold, "Windows Programming", Microsoft press, 1996 (Unit I – Chapter 1-9)
2. David J.Kruglinski, George Shepherd and Scot Wingo, "Programming Visual C++", Microsoft press, 1999 (Unit II – V)

REFERENCE

1. Steve Holtzner, "Visual C++ 6 Programming", Wiley Dreamtech India Pvt. Ltd., 2003.

LINUX & RDBMS LAB

LIST OF EXPERIMENTS

LINUX LAB

(Implement the following on LINUX platform. Use C for high level language implementation)

1. Shell programming
 - command syntax
 - write simple functions
 - basic tests
2. Shell programming
 - loops
 - patterns
 - expansions
 - substitutions
3. Write programs using the following system calls of UNIX operating system:
fork, exec, getpid, exit, wait, close, stat, opendir, readdir
4. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
5. Write C programs to simulate UNIX commands like ls, grep, etc.
6. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
7. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
8. Implement the Producer – Consumer problem using semaphores.
9. Implement some memory management schemes – I
10. Implement some memory management schemes – II

Example for expt 9 & 10:

Free space is maintained as a linked list of nodes with each node having the starting byte address and the ending byte address of a free block. Each memory request consists of the process-id and the amount of storage space required in bytes. Allocated memory space is again maintained as a linked list of nodes with each node having the process-id, starting byte address and the ending byte address of the allocated space.

When a process finishes (taken as input) the appropriate node from the allocated list should be deleted and this free disk space should be added to the free space list. [Care should be taken to merge contiguous free blocks into one single block. This results in deleting more than one node from the free space list and changing the start and end address in the appropriate node]. For allocation use first fit, worst fit and best fit.

RDBMS LAB - LIST OF EXPERIMENTS

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
3. High-level language extension with Cursors.
4. High level language extension with Triggers
5. Procedures and Functions.
6. Embedded SQL.
7. Database design using E-R model and Normalization.
8. Design and implementation of Payroll Processing System.
9. Design and implementation of Banking System.
10. Design and implementation of Library Information System.

VISUAL PROGRAMMING LAB

LIST OF EXPERIMENTS

Windows SDK / Visual C++

1. Writing code for keyboard and mouse events.
2. Dialog Based applications
3. Creating MDI applications

Visual C++

4. Threads
5. Document view Architecture, Serialization
6. Dynamic controls
7. Menu, Accelerator, Tool tip, Tool bar
8. Creating DLLs and using them
9. Data access through ODBC
10. Creating ActiveX control and using it