

Semester – IV

MCC401	Programming with Java	3-1-0	4
MCC402	Computer Graphics & Multimedia	3-0-0	3
MCC403	Software Engineering	3-0-0	3
MCC404	Compiler Design	3-1-0	4
MCC405	Quantitative Techniques-I (Operations Research)	3-0-0	3
MCC406	E-Commerce & ERP	3-0-0	3
MCL407	Lab – VII (Programming with Java Lab.)	0-0-6	4
MCL408	Lab – VIII (Comp. Graphics & Multimedia Lab.)	0-0-3	2
MCS409	Seminar	0-0-3	2
Total		28	

Semester – V

MCC501	Artificial Intelligence and Expert system	3-1-0	4
MCC502	Object Oriented Analysis and Design with UML	3-0-0	3
MCC503	Internet Technology and enterprise Java	3-1-0	4
MCC504	Quantitative Techniques-II (Modeling & Simulation)	3-0-0	3
Elective-I		3-0-0	3
Elective-II		3-0-0	3
Elective-I			
MCE505	Distributed Systems		
MCE506	Parallel Computing		
MCE507	Image Processing		
MCE508	Web Engineering		
Elective-II			
MCE509	Computer Security		
MCE510	Software Design		
MCE511	Bioinformatics		
MCE512	Soft Computing		
MCL513	Assignment *	0-0-3	2
MCL514	Lab – X (Enterprise Web Computing Java Lab.)	0-0-6	4
MCV515	Comprehensive Viva-voce		4
Total		30	

Semester –VI

MCP601	Project work for 16 weeks**	20	
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* There will be atleast 10 weekly assignments to be submitted by students on the subject “object oriented Analysis and design with UML”. Weekly evaluation will be done by a group of teachers of the department of 10 marks each taking personal viva of the students for a total of 100 marks.

** There will be a 16 weeks project work to be undertaken by the students in any Industry / Institution. At the end of the project there will an evaluation of the project for 20 credits by a group of experts including one external expert and teachers of the department.

3RD SEMESTER

MCC 301 ANALYSIS AND DESIGN OF ALGORITHMS

Module-I (13 hours)

Introduction to analysis and design of algorithm, Growth of functions, Asymptotic notations, Recurrences, Solution of recurrences by substitution, Recurrence tree and the master method. Divide and conquer algorithms (Worst case analysis of merge sort, quick sort and heap sort algorithms), Priority queue, Data structure for disjoint sets (Disjoint set operations, linked list representation, disjoint set forests)

Module-II (13 hours)

Dynamic programming approach: Matrix chain multiplication, longest common subsequence. Greedy method: Activity solution problem, Greedy verses dynamic programming, Huffman codes. Concept of backtracking, branch & bound design techniques. Graph algorithms: Minimal spanning tree (Kruskal and Prim's algorithms), Single source shortest paths (Bellman-Ford and Dijkstra's algorithm), Floyd's algorithm.

Module –III (14 hours)

Flow Network, Ford-Fulkerson method, Fast Fourier Transform, Rabin-Karp string matching algorithm. NP-Completeness, Polynomial time solvability, Verification and Reducibility, NP complete problems (without proof), Approximation algorithm for the traveling salesman problem.

Text book:

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and L. Stein, "Introduction to Algorithms", Second Edition, PHI Learning, 2002

Chapters: 1, 2, 3, 4(excluding 4.4), 6, 7 (7.4.1), 15(15.2, 15.3, 15.4), 16(16.1, 16.2, 16.3), 21(21.1, 21.2, 21.3) 23, 24(24.1, 24.2, 24.3), 26(26.1, 26.2), 30(30.1, 30.2), 32(32.1, 32.2), 34, 35(35.2)

Reference books:

1. E. Horowitz, S. Sahani, S. Rajsekharan, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, 2007

2. J. Kleinbers, E.Tardos, Algorithm design, Pearson Education Inc., New Delhi , 2006

3. R. Johnsonbaugh, M. Schaefer, "Algorithms", Pearson Education Inc., New Delhi , 2004

4. Kenneth A. **Berman** & Jerome L. **Paul**, "Algorithms", Revised Edition, 2005, CENGAGE Learning India Pvt. Ltd., New Delhi.

5. Anany V. **Levitin**, "Introduction to the Design and Analysis of Algorithms", Second Edition, 2007, Pearson Education Inc., New Delhi.

6. Michael T. **Goodrich** and Roberto **Tamassia**, "Algorithm Design: Foundations, Analysis, and Internet Examples", 2nd Edition, Wiley India Pvt. Ltd., New Delhi

MCC 302: OPERATING SYSTEMS

Module-1 (16 hours)

Introduction — Evolution of Operating Systems, Types of operating systems, Operating System Structures, Hardware and software structures needed for an operating system.

Process Management: Processes—States & Life cycle of process, Schedulers, Context Switching, Process scheduling policies—Preemptive vs. Non-preemptive, CPU scheduling algorithms, Threads—States & Life cycle of thread, thread scheduling, Types of threads & Examples. Inter-process Communication (IPC) Mechanisms—Concurrent processes, Process synchronization, Critical Section, Peterson's Solution, Classic IPC Problems, Semaphores, Concurrent programming, Monitors.

Module-2 (14hours)

Deadlock—Basic cause of deadlock, Conditions for deadlock, resource allocation graph, Wait for graph, Strategies for handling deadlocks, Starvation, Havender's linear ordering principle, deadlock avoidance & detection, Safe state, Dijkstra's Banker's Algorithm.

Memory Management: Main Memory, Static & Dynamic Partition schemes, multiple partitions schemes, Fragmentation, Compaction, Buddy Systems, Partition selection algorithms, de-allocation strategy, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory: Demand Paging, Copy-on-Write, Page Replacement Policies, Belady's Anomaly, Thrashing, Working set model.

Module-3 (10hrs)

Storage (File and Device) Management: File-System Interface, File-System Implementation, Mass-Storage Structure, Disk Scheduling, RAID Structure, I/O Systems.

Outline of : Multiprocessor Management, Protection & Security, Real-Time Operating Systems, and Multimedia Operating Systems, Case Studies: Windows XP/ Vista, Linux.

Text books:

1. Abraham **Silberschatz**, Peter Baer **Galvin**, Greg **Gagne**, "Operating System Concepts", Eighth Edition, 2009, Wiley India Pvt. Ltd., New Delhi.
Reading Chapters: 1-15 & 19-22 (excluding chapters: 16, 17, 18, and 23).
2. Harvey M. **Deitel**, Paul J. **Deitel**, David R. **Choffnes**, "Operating Systems", Third Edition, 2004, Pearson Education Inc., New Delhi.

Reference Books:

1. Andrew S. **Tanenbaum**, "Modern Operating Systems", Third Edition, 2008, PHI Learning Pvt. Ltd., / Pearson Education Inc., New Delhi.
2. Ramez **Elmasri**, A. G. **Carrick**, David **Levine**, "Operating Systems: A Spiral Approach", First Edition, 2009, McGraw-Hill Education (India), New Delhi.
3. Ann **McIver Hoes** and Ida M. **Flynn**, "Understanding Operating Systems", Fifth Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
4. Gary **Nutt**, "Operating Systems", 3rd Edition, 2004, Pearson Education Inc., New Delhi.
5. William **Stallings**, "Operating Systems: Internals and Design Principles", Sixth Edition, 2009, PHI Learning Pvt. Ltd., / Pearson Education Inc., New Delhi.

MCC 303: COMPUTER NETWORKS

Module-I (12 hours)

Introduction to Data Communications and Networking, Evolution of Computer Networks, General Principles of Network Design: Topologies, Network Models (ISO-OSI, TCP/IP), Network Architecture & Standardization (IEEE 802.x), Example Networks, Access Networks.

Physical Layer: Theoretical Basis for Data Communication-Data, Signals, Transmission (Digital vs Analog), Throughput, Bandwidth, Bit rate, Baud Rate, Data rate measurement-Nyquist formula & Shannon capacity, Multiplexing, Transmission Media (Guided Media, Unguided media: Wireless), Switching (Circuit, Message, Packet).

Module-II (16 hours)

Data Link Layer: Data Link Layer Design Issues, Error detection and Correction, Data Link Control, Elementary Data Link Protocols, Sliding Window Protocols, Protocol Verification, MAC Sub layer: Channel Allocation Problems, Multiple Access Protocols, Ethernet, Wireless LANs, Broadband Wireless, Bluetooth, Data Link Layer Switching, Network devices: Repeater, Hubs, Bridges, Switches, Routers, Gateways, Backbone networks and Virtual LANs, Wireless WANs, Virtual Circuit Networks: Frame Relay and ATM

Network Layer: Network Layer Design Issues, Logical Addressing, Internet Protocol, Address Mapping, Error Reporting and Multicasting, Delivery, Forwarding, Routing Algorithms.

Module-III (12 hours)

Transport Layer: Transport Service, Elements of Transport Protocols, Process to Process Delivery—UDP, TCP, Congestion Control, Congestion Control Algorithms, Quality of Service.

Application Layer: DNS, Remote Logging, File transfer, SNMP, Multimedia, Ziff's law.

Security: Cryptography, Network Security, Kerberos, Internet Security: IPsec, SSL/TLS, PGP, VPN, Firewalls.

Text Books:

1. Behrouz A. **Forouzan**, "Introduction to Data Communications and Networking", Fourth Edition, 2007, McGraw-Hill Education (India), New Delhi.
2. Natalia **Olifer** & Victor **Olifer**, "Computer Networks: Principles, Technologies and Protocols", First Edition, 2006, Wiley India Pvt. Ltd., New Delhi.

Reference Books:

1. Andrew S. **Tanenbaum**, "Computer Networks", Fourth Edition, 2003, PHI Learning Pvt. Ltd., / Pearson Education Inc., New Delhi.
2. James F. **Kurose**, Keith W. **Ross**, "Computer Networking: A Top-Down Approach Featuring the Internet", 4th Edition (2008), Pearson Education Inc., New Delhi.
3. Wayne Tomasi, "Introduction to Data Communications and Networking", First Edition, 2005, Pearson Education Inc., New Delhi.
4. Prakash **Gupta**, "Data Communication and Computer Networks", 2008, PHI Learning Pvt. Ltd., New Delhi.
5. Curt **White**, "Data Communications and Networking", First Edition, 2008, CENGAGE Learning India Pvt. Ltd., New Delhi.
6. L. L. Peterson & B. S. Davie," Computer Networks", Fourth Edition, Elsevier Inc,

MCC 304: DATABASE SYSTEMS

Module 1

(10 hours)

Introduction: Data & Information, Evolution of Database Systems, Overview of a DBMS, Database System Concepts & Architecture - Data models, schemas and instances, Data Abstraction, Data Independence, Database languages and interfaces.

Database Characteristics: Data modeling using Entity - Relationship (ER) Model: Entity sets, attributes and keys, Relationship types, sets, roles and structural constraints, Weak Entity types. Data Models: Relational, Network, Hierarchical and Object Oriented.

The Relational model: Relational data model concepts, Codd's 12 rules, Relational model constraints and schemas, Relational Algebra and Relational calculus, Constraints on Relations, Relational database design by ER & EER to Relational Mapping, Database Language SQL & QBE. SQL Programming Techniques: Constraints and Triggers, Views and Indexes, SQL in Server Environment.

Module 2

(16 hours)

Database Design: Data dependency, Armstrong's Axioms, Functional dependencies and Normalization of Relational Databases, First, Second and Third Normal forms, Boyce-Codd Normal form (BCNF), Relational Database design Algorithms and further dependencies, De-normalization

Storage Strategies and file organizations: Disc Storage, Basic File Structures and Hashing, Indexing structures for files, multi-level indexing using B-trees and B⁺-trees.

Query Processing and Optimization: Evaluation of Relational Algebra Expressions, Query Equivalence, Join strategies, Query Execution, Query Compiler, and Query Optimization Algorithms.

Module 3

(14 hrs)

Transaction processing concepts: Introduction to Transaction Processing concepts and Theory, ACID Properties, concurrency control, Serializability and Recoverability, Database recovery techniques - Shadow paging, ARIES recovery algorithm, Database Security. Deadlock: Detection, Avoidance and Recovery.

Outline of: Information Integration, Data Mining, Data Warehousing and OLAP, Database Systems and the Internet, Search Engines, Semi-structured Data Model, XML and Web Databases, Object & Object Relational Databases, Distributed Databases, Deductive Databases, Mobile Databases, Multimedia Databases, GIS.

Text Books:

1. Ramez **Elmasri** and Shamkant B. **Navathe**, "*Fundamentals of Database Systems*", Fifth Edition (2007), Pearson Education Inc., New Delhi.
2. Abraham **Silberschatz**, Henry F. **Korth** and S. **Sudarshan**, "*Database Systems Concepts*", Fifth Edition (2006), McGraw-Hill Education, New Delhi

Reference Books:

1. Hector **Garcia-Molina**, Jeffret D. **Ullman**, Jenniffer **Widom**, "*Database Systems: A Complete Book*", Second Edition, 2009, Pearson Education Inc., New Delhi.
2. Peter **Rob** & Carlos **Coronel**, "*Database Systems: Design, Implementation, and Management*", Eighth Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
3. Mark L. **Gillenson**, "*Fundamentals of Database Management Systems*", First Edition, 2005, Wiley India Pvt. Ltd., New delhi.
4. Nilesh **Shah**, "*Database Systems Using Oracle*", Second Edition, 2005, PHI Learning Pvt. Ltd., New Delhi.
5. **Raghu Ramakrishnan**, Johannes **Gehrke**, "*Database Management Systems*", Third Edition (2003), McGraw-Hill Education (India), New Delhi.

MCC: 305 PROBABILITY AND STATISTICS

Module 1 (13 hours)

Probability: Introduction, Probability of an event, additive rule & multiplication rule, conditional probability Bayes' rule, random variable, discrete and continuous probability distribution, Joint probability distribution, Mathematical expectation, Variance and co-variance of random variables, Mean and co-variance of linear combination of random variables, Chebyshev theorem, Binomial & Multinomial, Hypo-geometric, Geometric, Poisson distribution.

Module 2 (13 hours)

Uniform, Normal, Exponential Distribution, Weibull's Distribution, Chi-square distribution, Sampling Distribution: Sampling distribution of S^2 , t- distribution, F-distribution

Estimation of parameter: methods of estimation, Estimating the mean of a single sample, Standard error, Prediction interval, Tolerance limits, Estimating the difference between means of two samples, Estimating proportion and variance of a single sample, Estimating the difference between two proportions and variances of two samples, maximum likelihood estimation.

Module 3 (14 hours)

Test of hypothesis: one and two tailed test, test on a single mean when variance is known & variance is unknown. Test on two means, test on a single mean population and test on two populations. One and two sample test for variance. χ^2 test for goodness of fit and test for independence.

Introduction to linear regression: Simple regression models, Method of least square, Properties of least square estimators, Inferences concerning the regression coefficients, Coefficients of determination and its application.

Statistical quality control (Simple idea only)

Text Book:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers & Keying Ye, "Probability & Statistics for Engineers & Scientists", Eighth Edition, 2007, Pearson Education Inc., New Delhi.
2. Jay L. Devore, "Probability and Statistics for Engineering and Sciences", Seventh Edition, Thomson/CENGAGE Learning India Pvt. Ltd

Reference Books:

1. William Mendenhall, Robert J. Beaver & Barbara M. Beaver, "Introduction to Probability and Statistics", 13th Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
2. Arnold Allen, "Probability Statistics and Queuing Theory with Computer Science Applications", Second Edition, 2005, Elsevier India Pvt. Ltd., New Delhi.
3. Levin and Rubin, "Statistics for Management", PHI
4. T. Veerarajan, "Probability, Statistics and Random Processes", Tata McGraw Hill
5. Ronald Deep, "Probability and Statistics", Academic Press

MCC: 306 MANAGEMENT INFORMATION SYSTEMS

Module-I (12 hours)

Fundamentals of Information Systems, Systems approach to problem solving, Developing information system solutions. Information system components, Information quality, Data resource management, Database, Data models, Information Systems in marketing, manufacturing, HRM, Accounting and Finance.

Module-II (12 hours)

Information analysis and design tools : Decision tools, Decision Table, Structured Analysis, Dataflow Analysis, Tools for dataflow strategy, Developing dataflow diagrams, Leveling, Data dictionary, Structured flow chart, HIPO, Warnier/ORR diagram

Module-III (12 hours)

Planning & implementation of Information Systems, Transaction Processing Systems, Executive information Systems, Decision Support Systems, Expert Systems, Knowledge Management. Computer crime, Security (Goals, risks, controls, security & recovery measures of IS, economics of information security) & ethical challenges.

Text Books:

1. James A. **O'Brien**, George M. **Marakas**, "*Management Information Systems*", Eighth Edition, 2008, McGraw-Hill Education (India), New Delhi.
2. Kenneth C. **Laudon**, Jane P. **Laudon**, "*Management Information Systems*", Tenth Edition, Pearson Education Inc., New Delhi.

Reference Books:

1. Kenneth E. Kendall, Julie E. Kendall "*System Analysis and design*", PHI Learning Pvt. Ltd., New Delhi.
2. James A. Senn "*Analysis & Design of Information Systems*", McGraw-Hill Education, New Delhi
3. Effy Oz, "*Management Information Systems*", Sixth Edition, 2009, CENGAGE Learning India Pvt. Ltd., New Delhi.
4. Robert G. **Murdick**, Joel E. **Ross**, James R. Claggett, "*Information Systems for Modern Management*", Third Edition, PHI Learning Pvt. Ltd., New Delhi.
5. Stephen **Haag**, Maeve **Cummings**, Amy **Philips**, "*Management Information Systems*", Sixth Edition, 2007, McGraw-Hill Education (India), New Delhi.
6. Gordon B. **Davis**, Margarethe H. **Olson**, "*Management Information Systems*", Second Edition, 1985, McGraw-Hill Education (India), New Delhi.
7. Mahadeo **Jaiswal**, Monika **Mital**, "*Management Information Systems*", First Edition, 2004, Oxford University Press, New Delhi.

MCL: 307 OPERATING SYSTEMS AND NETWORKS LAB

Topics

01. UNIX Structures, UNIX/LINUX Commands, Common Commands practice session.
 02. vi/vim editor basics, creating & managing files with vi/vim.
 03. Working with sed and awk, programming with awk.
 04. Shell scripting, shell variables, data types.
 05. Shell programming-control structures, loops etc.
 06. Creating processes- fork and join, pid, child process.
 07. Implementing Threads, Thread programming.
 08. Inter process communication-Producer & consumer.
 09. Implementing readers and writers problem using c/c++.
 10. Implementing sleeping barber problem using c/c++.
 11. Implementing semaphores using c/c++.
 12. Implementing deadlock mechanism using c/c++.
 13. Implementing bankers algorithm using c/c++.
 14. Simulation program for memory allocation & de-allocation.
 15. Implementing file allocation problem using c/c++.
 16. Socket programming in C: Client and server Sockets.
 17. Connection establishment through TCP/IP Sockets.
 18. Communicating with server w. r. t. clients via sockets
 19. Implementing a File copy program using Sockets.
 20. Creating and Installing Server Software.
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MCL: 308 DATABASE LABORATORY USING ORACLE

Topics

01. Installation of Oracle or MySQL.
 02. Learning basic DDL and DML commands
 03. Learning basic DCL and TCL commands.
 04. Insertion, Deletion, Updating to a table using SQL commands
 05. Working with dual table.
 06. Data retrieval using Select & where clause.
 07. Oracle inbuilt functions-Date, aggregate, group by etc.
 08. Use of Joins and Sub queries.
 09. Views, sequences and indexes.
 10. Managing users, privileges and roles.
 11. PL/SQL-Data types, control structures.
 12. Creating procedures with PL/ SQL.
 13. Error handling in PL/ SQL.
 14. Cursor Management in PL/ SQL.
 15. Sub program design in PL/ SQL.
 16. Writing Program segments in embedded SQL using C/C++.
 17. Writing Programs on Packages & triggers.
 18. Implementing OO features in Oracle.
 19. Report generation using SQL.
 20. Database backup & Recovery Management.
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MCL 309 COMMUNICATION AND INTERPERSONAL SKILLS FOR CORPORATE READINESS

Lab

30 hours

This course will focus on communication in professional (work-related) situations of the kind that BPUT graduates may expect to encounter on entering the professional domain. Some typical forms of work-related communication, oral or written, are listed below. Practice activities for all four skills can be designed around these or similar situations.

1. Gaining entry into an organization
 - i. Preparing job-applications and CVs
 - ii. Facing an interview
 - iii. Participating in group discussion (as part of the recruitment process)

- 2 In-house communication
 - a. Superior/ Senior → subordinate / junior (individual → individual / group)
 - i. Welcoming new entrants to the organization, introducing the workplace culture etc.
 - ii. Briefing subordinates / juniors : explaining duties and responsibilities etc.
 - ii. Motivating subordinates / juniors ('pep talk')
 - iii. Instructing/ directing subordinates/ juniors
 - iv. Expressing / recording appreciation, praising / rewarding a subordinate or junior
 - v Reprimanding / correcting / disciplining a subordinate/junior (for a lapse) ; asking for an explanation etc.

 - b. Subordinate / Junior → Superior / Senior
 - i. Responding to the above
 - ii. Reporting problems / difficulties / deficiencies
 - iii. Offering suggestions
