

2007-08

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
HYDERABAD

B.TECH. COMPUTER SCIENCE AND SYSTEMS ENGINEERING

IV Year

II- Semester

COURSE STRUCTURE

Code	Subject	T	P	C
	Management Science		4+1*	- 4
	<b>Elective - III</b>		4+1*	- 4
	Mobile computing			
	VLSI Design			
	Data Warehousing and Data Mining			
	<b>Elective – IV</b>		4+1*	- 4
	Design Patterns			
	Software Testing Methodologies			
	Pattern Recognition			
	Industry Oriented Mini Project		-	- 2
	Seminar		-	- 2
	Project		-	- 10
	Comprehensive viva			- 2
	<b>Total</b>		<b>15</b>	<b>6 28</b>

**NOTE:** All University Examinations (Theory and Practical) are of 3 hours duration.

\* Tutorial

**T:** Theory periods per week

**P:** Practical /Drawing Periods per week

**C:** Total Credits for the subject

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**MANAGEMENT SCIENCE**

**Unit I**

**Introduction to Management:** Concepts of Management and organization- nature, importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Mayo's Hawthorne Experiments, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management.

**Unit II**

**Designing Organisational Structures:** Basic concepts related to Organisation - Departmentation and Decentralisation, Types of mechanistic and organic structures of organisation (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure) and their merits, demerits and suitability.

**Unit III**

**Operations Management:** Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement-Statistical Quality Control:  $\bar{X}$  chart,  $\bar{R}$  chart, c chart, p chart, (simple Problems), Acceptance Sampling, Deming's contribution to quality.

**Unit VI**

- a) **Materials Management:** Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records.  
b) **Marketing:** Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle, Channels of distribution

**Unit V**

**Human Resources Management (HRM):** Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs. PMIR, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

**Unit VI**

**Project Management (PERT/CPM):** Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems)

**Unit VII**

**Strategic Management:** Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

**Unit VIII**

**Contemporary Management Practices:** Basic concepts of MIS, End User Computing, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levels, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Benchmarking, Balanced Score Card.

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**TEXT BOOKS:**

1. Aryasri: *Management Science*, TMH, 2004.
2. Stoner, Freeman, Gilbert, *Management*, 6th Ed, Pearson Education, New Delhi, 2004.

**REFERENCES :**

1. Kotler Philip & Keller Kevin Lane: *Marketing Mangement* 12/e, PHI, 2005
2. Koontz & Wehrich: *Essentials of Management*, 6/e, TMH, 2005
3. Thomas N.Duening & John M.Ivancevich *Management—Principles and Guidelines*, Biztantra,2003.
4. Kanishka Bedi, *Production and Operations Management*, Oxford University Press, 2004.
5. Memoria & S.V.Gauker, *Personnel Management*, Himalaya, 25/e, 2005
6. Samuel C.Certo: *Modern Management*, 9/e, PHI, 2005
7. Schermerhorn, Capling, Poole & Wiesner: *Management*, Wiley, 2002.
8. Parnell: *Strategic Management*, Biztantra,2003.
9. Lawrence R Jauch, R.Gupta &William F.Glueck:*Business Policy and Strategic Management*, Frank Bros.2005.
10. L.S.Srinath: *PERT/CPM*,Affiliated East-West Press, 2005.

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**MOBILE COMPUTING  
(ELECTIVE-III)**

**Unit I:**

Introduction to Mobile Communications and Computing: Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

**Unit II:**

**(Wireless) Medium Access Control:** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

**Unit III:**

**Mobile Network Layer:** Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

**Unit IV:**

**Mobile Transport Layer:** Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

**Unit V:**

**Database Issues:** Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

**Unit VI:**

**Data Dissemination:** Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

**Unit VII:**

**Mobile Ad hoc Networks (MANETs):** Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

**Unit VIII:**

**Protocols and Tools:** Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

**TEXT BOOKS:**

- 1) Jochen Schiller, "Mobile Communications", Addison-Wesley. (Chapters 4, 7, 9, 10, 11), second edition, 2004.
- 2) Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)

**REFERENCES:**

- 1) Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004,
- 2) Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.
- 3) Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, second edition, 2003.
- 4) Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley DreamTech, 2003

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**VLSI DESIGN  
(ELECTIVE-III)**

**UNIT I - INTRODUCTION**

Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS technologies- Oxidation, Lithography, Diffusion, Ion implantation, Metallisation, Encapsulation, Probe testing, Integrated Resistors and Capacitors.

**UNIT II - BASIC ELECTRICAL PROPERTIES**

Basic Electrical Properties of MOS and BiCMOS Circuits:  $I_{ds}$ - $V_{ds}$  relationships, MOS transistor threshold Voltage,  $g_m$ ,  $g_{ds}$ , figure of merit  $\mu_0$ ; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

**UNIT III - VLSI CIRCUIT DESIGN PROCESSES**

VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2  $\mu$ m CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

**UNIT IV - GATE LEVEL DESIGN**

Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Basic circuit concepts, Sheet Resistance  $R_s$  and its concept to MOS, Area Capacitance Units, Calculations -  $t$  - Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers

**UNIT V - SUBSYSTEM DESIGN**

Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters, High Density Memory Elements.

**UNIT VI - SEMICONDUCTOR INTEGRATED CIRCUIT DESIGN**

PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach.

**UNIT VII - VHDL SYNTHESIS**

VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools, Test Principles.

**UNIT VIII CMOS TESTING**

CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip-level Test Techniques, System-level Test Techniques, Layout Design for improved Testability.

**TEXTBOOKS :**

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, PHI, 2005 Edition.
2. Principles of CMOS VLSI Design - Weste and Eshraghian, Pearson Education, 1999.

**REFERENCES :**

1. Chip Design for Submicron VLSI: CMOS Layout & Simulation, - John P. Uyemura, Thomson Learning.
2. Introduction to VLSI Circuits and Systems - John .P. Uyemura, JohnWiley, 2003.
3. Digital Integrated Circuits - John M. Rabaey, PHI, EEE, 1997.
4. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.

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**DATA WAREHOUSING AND DATA MINING  
(ELECTIVE-III)**

**UNIT - I**

**Introduction** : Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining.

**Data Preprocessing** : Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

**UNIT – II**

Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

**UNIT - III**

**Data Mining Primitives, Languages, and System Architectures** : Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems.

**UNIT - IV**

**Concepts Description : Characterization and Comparison** : Data Generalization and Summarization- Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

**UNIT - V**

**Mining Association Rules in Large Databases** : Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

**UNIT - VI**

**Classification and Prediction** : Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Backpropagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

**UNIT - VII**

**Cluster Analysis Introduction** : Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

**UNIT - VIII**

**Mining Complex Types of Data** : Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

**TEXT BOOKS :**

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.

**REFERENCES :**

1. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION
2. Data Mining Techniques – ARUN K PUJARI, University Press.
3. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
4. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION.
5. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT EDITION.

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**DESIGN PATTERNS  
(ELECTIVE-IV)**

**UNIT –I:**

Introduction: What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

**UNIT-II:**

**A Case Study: Designing a Document Editor:** Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Lookand- Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.

**UNIT-III:**

**Creational Patterns:** Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

**UNIT-IV:**

**Structural Pattern Part-I:** Adapter, Bridge, Composite.

**UNIT-V:**

**Structural Pattern Part-II:** Decorator, açade, Flyweight, Proxy.

**UNIT-VI:**

**Behavioral Patterns Part-I:** Chain of Responsibility, Command, Interpreter, Iterator.

**UNIT-VII:**

**Behavioral Patterns Part-II:** Mediator, Memento, Observer, State, Strategy, Template Method ,Visitor, Discussion of Behavioral Patterns.

**UNIT-VIII:**

What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

**TEXT BOOK:**

1. Design Patterns By Erich Gamma, Pearson Education

**REFERENCES:**

1. Pattern's in JAVA Vol-I By Mark Grand ,Wiley DreamTech.
2. Pattern's in JAVA Vol-II By Mark Grand ,Wiley DreamTech.
3. JAVA Enterprise Design Patterns Vol-III By Mark Grand ,Wiley DreamTech.
4. Head First Design Patterns By Eric Freeman-Oreilly-spd
5. Design Patterns Explained By Alan Shalloway, Pearson Education.

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**SOFTWARE TESTING METHODOLOGIES  
(ELECTIVE-IV)**

**UNIT I :**

**Introduction** : Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs

**UNIT II :**

**Flow graphs and Path testing** : Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

**UNIT III :**

**Transaction Flow Testing** : Transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

**UNIT IV :**

**Domain Testing**:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

**UNIT V :**

**Paths, Path products and Regular expressions** : Path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

**UNIT VI :**

**Logic Based Testing** : Overview, decision tables, path expressions, kv charts, specifications.

**UNIT VII :**

**State, State Graphs and Transition testing** : State graphs, good & bad state graphs, state testing, Testability tips.

**UNIT VIII :**

**Graph Matrices and Application** : Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools.

Usage of JMeter and Winrunner tools for functional / Regression testing, creation of test script for unattended testing, synchronization of test case, Rapid testing, Performance testing of a data base application and HTTP connection for website access.

**TEXT BOOKS :**

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

**REFERENCES :**

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

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**PATTERN RECOGNITION  
(ELECTIVE IV)**

**UNIT-I:**

**Introduction:** Machine perception, pattern recognition example, pattern recognition systems, the design cycle, learning and adaptation (Text book-1, p.nos: 1-17).

**UNIT-II:**

**Bayesian Decision Theory :** Introduction, continuous features – two categories classifications, minimum error-rate classification- zero-one loss function, classifiers, discriminant functions, and decision surfaces (Text book-1, p.nos: 20-27, 29-31).

**UNIT-III:**

**Normal density:** Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context (Text book-1, p.nos: 31-45,51- 54,62-63).

**UNIT-IV:**

**Maximum likelihood and Bayesian parameter estimation:** Introduction, maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case (Text book-1, p.nos: 84-97).

**UNIT-V:**

**Un-supervised learning and clustering:** Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, Kmeans clustering. Date description and clustering – similarity measures, criteria function for clustering (Text book-1, p.nos: 517 – 526, 537 – 546).

**UNIT-VI:**

**Component analyses:** Principal component analysis, non-linear component analysis; Low dimensional representations and multi dimensional scaling (Text book-1, p.nos: 568-570,573 – 576,580-581).

**UNIT-VII:**

**Discrete Hidden Markov Models:-** Introduction, Discrete-time markov process, extensions to hidden Markov models, three basic problems for HMMs. (Text book -2, p.nos: 321 – 344)

**UNIT-VIII:**

**Continuous hidden Markov models:** Observation densities, training and testing with continuous HMMs, types of HMMs. (Text book-2, p.nos: 348 – 352)

**TEXT BOOKS:**

1. Pattern classifications, Richard O. Duda, Peter E. Hart, David G. Stroke. Wiley student edition, Second Edition.
2. Fundamentals of speech Recognition, Lawrence Rabiner, Biing – Hwang Juang Pearson education.

**REFERENCE:**

1. Pattern Recognition and Image Analysis – Earl Gose, Richard John baugh, Steve Jost PHI 2004