UNIVERSITY DEPARTMENTS

ANNA UNIVERSITY CHENNAI : : CHENNAI 600 025

REGULATIONS - 2009

CURRICULUM I TO VI SEMESTERS (PART TIME)

M.E SYSTEMS ENGINEERING AND OPERATIONS RESEARCH

SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
	MA9105	Probability and Statistical Methods	3	0	0	3
	SO9111	Object Oriented Programming using C++	3	1	0	4
	SO9112	Systems Engineering Methodologies	3	0	0	3
		TOTAL	9	0	2	10

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
	MA9124	Linear Mathematical Programming	3	0	0	3
	SO9114	Java, UML & Extreme Programming	3	0	0	3
	SO9115	Data Communication and Networks	3	0	0	3
PRACTICAL						
	SO9117	Java and UML lab	0	0	4	2
		TOTAL	9	0	4	11

SEMESTER III

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
	SO9121	Discrete Systems Simulation	3	0	0	3
	SO9122	Network Security and Management	3	0	0	3
	E	Elective I	3	0	0	3
PRACTICAL						
	SO9125	System Simulation lab – I	0	0	4	2
		TOTAL	9	0	4	11

SEMESTER IV

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
	SO9127	Advanced Optimization Techniques	3	0	0	3
	SO9128	Relational Database Management System	3	1	0	4
	E	Elective II	3	0	0	3
		TOTAL	9	0	4	10

SEMESTER V

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
	SO9131	Software Project Management	3	0	0	3
	E	Elective III	3	0	0	3
	E	Elective IV	3	0	0	3
PRACTICAL						
	SO9135	Project Work (Phase I)	0	0	12	6
		TOTAL	9	0	12	15

SEMESTER – VI

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
	SO9145	Project Work (Phase II)	0	0	24	12
		TOTAL	0	0	24	12

Total no.of credits to be earned for the award of Degree = 69

LIST OF ELECTIVES

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	SO9151	Data mining and Ware Housing	3	0	0	3
2	SO9152	System Analysis and Design	3	0	0	3
3	SO9153	Data Structures and Algorithms	3	0	0	3
4	SO9154	Fuzzy logic, Neural Networks and applications	3	0	0	3
5	SO9155	Mobile computing	3	0	0	3
6	SO9156	Design Patterns	3	0	0	3
7	SO9157	Applied Cryptography	3	0	0	3
8	SO9158	Total Quality Management	3	0	0	3
9	SO9159	Real Time Systems	3	0	0	3
10	SO9160	Operating System Design	3	0	0	3
11	SO9161	Non-linear Mathematical Programming	3	0	0	3
12	SO9162	Supply chain Networks Management	3	0	0	3
13	SO9163	Probabilistic Operations Research	3	0	0	3
14	SO9164	Pervasive Computing	3	0	0	3
15	SO9165	Adhoc and Sensor Networks	3	0	0	3
16	SO9166	Data Analysis	3	0	0	3
17	SO9167	Financial Engineering	3	0	0	3
18	SO9168	Network Protocols	3	0	0	3
19	SO9169	Knowledge Management	3	0	0	3
20	SO9170	Context Modelling	3	0	0	3
21	SO9171	Grid Computing	3	0	0	3
22	SO9172	Methods for Selfish/ Malicious Nodes Detection	3	0	0	3

MA9105   PROBABILITY AND STATISTICAL METHODS

L T P C
3 0 0 3

UNIT I   PROBABILITY AND DISTRIBUTION   9

Axioms of probability – Conditional probability – Total Probability – Random variables – Binomial, Poisson and Normal distributions with moment generating functions – Correlation – Regression.

UNIT II   SAMPLING DISTRIBUTIONS AND ESTIMATION   9

Sampling distributions – Estimation of parameters – Method of moments – Principle of least squares – Method of maximum likelihood.

UNIT III   TESTING OF HYPOTHESIS   9

Basic definitions of statistical hypothesis – Tests based on Normal, t, chi-square and F distributions for mean, variance and proportion.

UNIT IV   DESIGN OF EXPERIMENTS   9

Analysis of variance – One way and two way classifications – Completely randomized design – Randomized block design – Latin square design – 2^2 factorial design

UNIT V   TIME SERIES ANALYSIS AND CASE STUDY   9

Characteristics and representation – Moving averages – Exponential smoothing – Auto regressive processes - Case study using statistical package.

TOATL: 45

REFERENCES:

1. R.A. Johnson, Miller and Freund's, " *Probability and Statistical for Engineers*, 7th Edition, Prentice-Hall of India Private Ltd., New Delhi, 2005
2. Tamas Rudas, *Handbook of Probability: Theory and Applications*, SAGE publication, 2008, ISBN : 1412927145.
3. Jay L. Devore, *Probability and Statistics for Engineering and the Sciences*, Duxbury publication, 2007, ISBN 0534372813.
4. Douglas C. Montgomery, George C. Runger , *Applied Statistics and Probability for Engineers*, 4th Edition, Wiley publication, 2006
5. Ronald Deep, *Probability and Statistics: with Integrated Software Routines*, Academic Press, 2006, ISBN : 0123694639
6. Montogomery D.C. and Johnson, L.A., "*Forecasting and Time Series*" McGraw Hill 2002.

SO9111   OBJECT ORIENTED PROGRAMMING USING C++

L T P C
3 1 0 4

UNIT I   INTRODUCTION TO C++   12
Programming Paradigms - Comparison of Programming Paradigms – Object Oriented Languages - Benefits of Object Oriented Programming - Comparison with C - Overview of C++ - Types and Declarations - Pointers, Arrays, References and Structures - Expressions and Statements – Functions –- Scope and Namespaces - Source Files and Programs

UNIT II   CLASSES AND OBJECTS   9
Dynamic Memory Allocation - Classes and Objects – Constructors and Destructors - Function Overloading – Copy Constructor - Friends - Operator Overloading.

UNIT III   DERIVED CLASSES   8
Composition and Inheritance – Access Control - Virtual functions and Polymorphisms – Abstract Base Classes - Design of Class Hierarchies

UNIT IV   ADDITIONAL FEATURES   8
I/O Stream - File I/O - Exception Handling - Templates - STL – Library Organization and Containers – Standard Containers - Overview of Standard Algorithms, Iterators and Allocators

UNIT V   DESIGN USING C++   8
Development Process – Management - Object Identification – Components - Object Oriented Design Fundamentals – Case Studies

TOTAL = 45

REFERENCES:

1. Balagurusamy, E, "Object Oriented Programming with C++", Fourth Edition, Tata Mcgraw-Hill., 2008.
2. Bjarne Stroustrup, "The C++ Programming Language", Third Edition, Pearson Education, 2004.
3. Stanley B.Lippman, Jove Lajoie, "C++ Primer", Fourth Edition, Pearson Education, Asia, 2007.
4. Ashok N Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", First Edition, Pearson Education, 2003.

SO9112   SYSTEMS ENGINEERING METHODOLOGIES

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3 0 0 3

UNIT I   SYSTEMS SCIENCE CONCEPTS   10
System as a function of system-hood and thing-hood, Systems thinking, Evolution of systems movement, Framework of deductive and inductive approaches, classification systems models, Methodological paradigms, Laws of systems science, Organized complexity, Systems simplification

UNIT II   SYSTEMS ENGINEERING PROCESSES   10
Life cycles-Phases-Steps, Formulation of Issues: Problem Identification – Scoping – Bounding, Problem definition – Identification of needs, alterables, constraints; Value System Design: Objectives and objective measures; Generation of Alternatives/ system synthesis – Identification of activities and activity measures; Functional decomposition and analysis
Tools: Objectives hierarchies – trees, cross interaction matrix; Functional analysis approaches – SADT, DFD, CFD, FFBD, ICOM, Node tree, Context diagram, decomposition; BPR, QFD, Brain storming, Brain writing, Groupware, Delphi, Morphological box

UNIT III   ANALYSIS OF ALTERNATIVES   10
Uncertain/ Imperfect information; Cross-impact analysis, Hierarchical inference, logical reasoning inference; Structural modeling; System Dynamics;
Tools: Coupled uncoupled events – Baye's model – event trees, Causal loop diagram, probability trees; Structural models – Tree structures, reachability graph and matrix, Causal loop diagrams, influence diagrams, decision trees; System Dynamic Models – population models, urban dynamics, world dynamic models; Economic models

UNIT IV   INTERPRETATION OF ALTERNATIVES AND DECISION MAKING   10
Types of decisions – descriptive, prescriptive, normative; Decision assessment efforts types – under certainty, probabilistic uncertainty, probabilistic imprecision, information imperfection, conflict and cooperation; Prescriptive normative decision assessments; Utility theory; Group decision making, Game Theory

UNIT V   SYSTEMS ENGINEERING MANAGEMENT   5
Concepts: organizational structures, SE management plan; Network based systems planning and management methods; Cognitive factors in SE.

REFERENCES:
1. Introduction to Systems Engineering, Andrew P Sage and James E Armstrong, Wiley Series (2000)

George J Klir, Facets of Systems Science, Kluwer Publishers, 2001

MA9124   LINEAR MATHEMATICAL PROGRAMMING

L T P C
3 0 0 3

UNIT I   LINEAR PROGRAMMING   14
Statement of Problems - Mathematical Models – Linear Programming Models – Graphical Method –The Simplex Algorithm – Optimality and Feasibility Criteria – Product Criterion – Multiple Optimal Solution - Two Phase Method – Degeneracy, Redundancy, Cycling, Popping Variables and Connectivity Among Them – Transportation and Assignment Models – Revised Simplex Method.

UNIT II   SENSITIVITY IN LINEAR PROGRAMMING   12
Generic Activities Versus Resources Perspective – Quantifying Sensitivity to Changes in Lp Model Parameters – Primal-Dual Models Properties – Simplex Multiplier – Economic Interpretation of Simplex Multiplier – Dual Simplex Method – Post Optimality or Sensitivity Analysis.

UNIT III   REDUNDANCY ANALYSIS   10
Heuristics Algorithm – A Priori Identification of Redundancies of Constraints and Variables Using Matrix of Intercepts – Gradient Matrix of the Constraints – Union of the Matrix of Intercepts and the Gradient Matrix of the Constraints - Application of Primal – Dual Properties to Identify Redundancies – Model Reduction – Comparison of Computational Efficiencies.

UNIT IV   ADVANCED LINEAR PROGRAMMING   14
Integer Linear Programming – Branch and Bound Algorithm – Cutting Plane Algorithm - Bounded Variable Algorithms.

UNIT V   DECISION ANALYSIS AND GAMES   10
Decision Making – Under Certainty – Decision Making Under Risk - Decision Making Under Uncertainty - Game Theory – Optimal Solution to Two-Person Zero – Sum Games – Solution of Mixed Strategy Games.

Total = 60

REFERENCES

1. Hamdy A Taha, "Operations Research An Introduction", Prentice Hall, Eighth Edition, 2007.
2. Ronald L. Rardin, "Optimization in Operations Research", Pearson Education, Asia, 2002..
3. Tulsian, "Quantitative Techniques – Theory and Problems", Pearson Education, Asia, 2002.
4. Jit. S. Chandran, Mahendran P. Kawatra, Ki Ho Kim, "Essentials of Linear Programming", Vikas Publishing House Pvt. Ltd., New Delhi, 1994.
5. Hiller F.S, Liberman G.J, "Introduction to Operations Research", Sixth Edition, McGraw Hill, Inc., 1995

SO9114   JAVA , UML & EXTREME PROGRAMMING

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3 0 0 3

UNIT I   JAVA FUNDAMENTALS   9

Java Virtual Machine – Reflection – I/O Streaming – Filter and Pipe Streams – Byte Codes – Byte Code Interpretation – Dynamic Reflexive Classes – Threading – Java Native Interfaces – GUI Applications.

UNIT II   ADVANCE JAVA   12

Threads – Java Beans Enterprise - Java Beans – Distributed Object models – RMI and RMI-IIOP.Custom sockets - Remote Method Invocation - Activation - Object serialization - Distributed garbage collection - RMI - IIOP - Interface definition language - CORBA - JINI overview - Servlets - Java Server Pages - JDBC - Case study - Deploying n-tier application.

UNIT III   UML FUNDAMENTALS   8

Software Development process – OMT, Unified process. Use cases, class diagrams, static and dynamic behavior, interactions, package diagrams, state and activity diagrams. UML extensibility, Model constraint, stereotype, meta model. Analysis patterns and design patterns.UML and programming.

UNIT IV   UML AND PATTERNS   9

Project Initiation; Project Planning, execution and tracking; Project Wind-up; Concept of process/project database.

UNIT V   EXTREME PROGRAMMING (XP)   8

Software development methodologies. Basic activities and values of XP. Project control variables.XP principles and practices and key features. Design strategy, XP development life cycle-customer requirements, team roles, pair programming.XP development tools-unit testing with java tools- implementing XP. Refactoring techniques. Agile modeling with XP - Scrum methodology. Dynamic system development - Case studies.

TOTAL = 45

REFERENCES

1.   Jaime Nino and Frederick A. Hosch , "An introduction to programming and object-oriented design using Java version 5.0", Second Edition, 2005.
2.   Martin Fowler, Kendall Scottt, "UML Distilled : A Brief Guide to the Standard Object Modeling Language", Second Edition, Person Education Asia, 2004.
3.   Craig Larman, Applying UML and Patterns, Second Edition, Addison Wesley,2001.
4.   Kent Beck, "Extreme programming explained", Person Education Asia, 2002.
5.   Stewart," Extreme programming", Person Education Asia, 2002.
7.   Ali Bahrami, Object Oriented System Development, McGraw Hill International Edition,1999.
8.   Bill Venners, "Inside the Java Virtual Machine", Published by McGraw-Hill, 1998

SO9115   DATA COMMUNICATION AND NETWORKS

                                                                                          L T P C
                                                                                          3 0 0 3

UNIT I   NETWORK ARCHITECTURE   9
Components of network – Topologies- OSI Architecture – Internet Architecture – Link and
Medium Access Protocols – Framing – Error Detection – Reliable Transmission – IEEE
802 Standards – Ethernet – Wireless.

UNIT II   NETWORK LAYER   9
Circuit Switching – Packet Switching – Switching and Forwarding – Bridges and LAN
Switches –Cell Switching – Inter networking – Routing – Global Internet – Multicast.

UNIT III   TRANSPORT LAYER   9
 UDP – TCP – Remote Procedure Call – Performance – Resource Allocation – TCP
Congestion Control – Congestion Avoidance Mechanisms – Quality of Service.

UNIT IV   NETWORK SECURITY AND APPLICATION   9
Cryptographic Algorithms – DES – RSA – MD5 – Security Mechanisms – Fire Walls –
DNS – Traditional Applications – SMTP – HTTP –Network Management -SNMP.

UNIT V   STUDY OF SIMULATION TOOLS   9
Study of various network simulators –Designing and evaluating the performance of various
Transport and Routing protocols of Wireless networks using any network simulator.

                                                                                  TOTAL: 45

REFERENCES

1. William Stallings, "Data & Computer Communication", Eighth Edition, Pearson Education, 2008.
2. Behrouz A. Forouzan, "Data Communication and Networking", Fourth Edition, Tata McGraw Hill, 2007.
3. S. Tanenbaum, "Computer Networks", Prentice Hall, Fourth Edition, 2006.
4. Larry L. Peterson and Brule S. Davie, "Computer Networks: A System Approach", Fourth Edition, MarGan Kaufmann, Harcourt Asia, 2007.

SO9117   JAVA AND UML LAB

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0 0 4 2

1.

Familiarization of features of anyone of the standard UML case tool – Capturing key functional requirements - use cases class diagrams in online ticket / hotel reservation systems – student information system – sales & marketing system – banking system and inventory tracking system.

2.

Behavioural diagrams – state chart diagram, etc for application systems – Implementation using anyone of Object Oriented languages like Java, C++ for systems – component diagrams – deployment diagrams for systems – Test cases, integration test cases for systems

3.

Java server pages, servlets – Distributed applications – Networking - E-banking applications -Event handling, Multithreading and E-commerce applications.

4.

Web services – Business logic using Java - Components design using UML and implementation using Java - Persistence Frame work design using Java - Realization of Design patterns like fcade, chain of responsibility, proxy, momentos, observers, etc.

SO9121   DISCRETE SYSTEMS SIMULATION

LT P C
3 0 0 3

UNIT I   INTRODUCTION   6
Introduction to Simulation, Simulation examples, concepts in discrete event simulation

UNIT II   RANDOM NUMBERS AND VARIATES   9
Pseudo random numbers, methods of generating random numbers, testing of random numbers, methods of generating random variates

UNIT III   ANALYSIS OF SIMULATION DATA   9
Problem formulation, Input modeling, Verification and validation of simulation models, Output analysis for a single model, Evaluation of alternative system designs

UNIT IV   SIMULATION SOFTWARE   9
Comparison and selection of simulation languages, study of any one simulation language.

UNIT V   CASE STUDIES   12
Development of simulation models using a simulation language   for systems like, queuing systems, production systems, inventory systems, maintenance and replacement systems, investment analysis and networks.

TOTAL: 45 PERIODS

REFERENCES

1. Law A.M, Simulation Modelling and Analysis, Tata Mc Graw Hill,2008
2. Kelton, W. David, Simulation with Arena ,McGraw-Hill,2006
3. Jerry Banks, John S.Carson, Barry L Nelson, David M.Nicol, P. Shahabudeen, Discrete event system simulation, Pearson Education, 2007.
4. Thomas J. Schriber, Simulation using GPSS, John Wiley, 1991.

SO9122   NETWORK SECURITY AND MANAGEMENT

L T P C
3 0 0 3

UNIT I   INTRODUCTION TO NETWORK SECURITY   9
Introduction – Need for security – Security Approaches – Information and Computational Complexity Based Security – One Way Functions - Security Attacks – Security Definitions and Requirements - Layers and Cryptography – Multi level Models of Security – Model of Adversary - Classical Encryption Techniques

UNIT II   PRIVATE AND PUBLIC KEY ENCRYPTION   9
One Time Pad Encryption Scheme - Data Encryption Standard (DES) – Double and Triple DES - Modes of Operation – Advanced Encryption Standard (AES). PKI - Introduction to Number Theory - Trap Door Functions – RSA Algorithm – RSA Security – Efficiency of RSA

UNIT III   AUTHENTICATION MECHANISMS   9
Message Authentication: Hash functions - MAC Algorithms - Digital Signature Standard. Entity Authentication: KDC and Trusted intermediaries - Kerberos – X.509 Authentication Service - Password Based Authentication.

UNIT IV   KEY DISTRIBUTION AND WEB SECURITY MECHANISMS   9
Key Distribution - Diffie Hellman Key Exchange – Three Party Key Exchange - Authenticated Key Exchanges – Zero Knowledge Protocols. Electronic Mail Security – PGP - S/MIME - IP Security - Firewalls – VPN – IDS.

UNIT V   SECURITY MANAGEMENT   9
Security Planning – Risk Analysis – Organizational Security Policies –Physical Security – Protecting Programs and Data – Information and the Law – Software Failures – Computer Crime – Privacy – Ethical Issues

TOTAL = 60

REFERENCES

1. William Stallings, "Cryptography and Network Security: Principles and Practices", Fourth Edition, Prentice Hall of India 2006.
2. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003.
3. Behrouz A. Forouzan, "Cryptography and Network Security", Tata McGraw-HiII, 2007
4. Charlie Kaufman, Radia Perlman and Mike Speciner "Network Security: Private Communication in a Public Work", Second Edition, Pearson Education, 2002.

SO9125   SYSTEM SIMULATION LAB - I

1. Formulating Linear Programming Models

2. Introduction to Modeling Languages LINGO / MPL

3. Problem Solving using LINGO

4. Development of Random Number Generators and Testing

5. Development of Statistical Distributions and Generation of Variation

6. Development of Simulation Models

7. Study and experiment with Simulation Languages

8. Simulation with Software Package (Arena)

    a. Design simulation experiments for non-terminating systems
    b. Design simulation experiments for terminating systems
    c. Apply appropriate data collection techniques
    d. Interpret the results from simulation experiments
    e. Perform result analysis for comparing similar systems

SO9127   ADVANCED OPTIMIZATION TECHNIQUES

L T P C
3 0 0 3

UNIT I   INTRODUCTION   5
Classification of optimization problems, concepts of design vector, Design constraints, constrains surface, objective function surface and multi-level optimization, parametric linear programming

UNIT II   DECISION ANALYSIS   10
Decision Trees, Utility theory, Game theory, Multi Objective Optimization, MCDM- Goal Programming, Analytic Hierarchy process

UNIT III   NON-LINEAR OPTIMIZATION   15
Unconstrained one variable and multi variable optimization, KKT Conditions, Constrained optimization, Quadratic programming, Convex programming, Separable programming, Geometric programming, Non-Convex programming

UNIT IV   NON-TRADITIONAL OPTIMIZATION   10
Over view of Genetic algorithms, Simulated Annealing, neural network based optimization, Optimization of Fuzzy Systems

UNIT V   NP-COMPLETE PROBLEMS   5
The classes P and NP, Polynomial time reductions, Introduction to NP- Hard problems

REFERENCES:

1.   Singiresu S.Rao, "Engineering optimization – Theory and practices", John Wiley and Sons, 1996.
2.   Ravindran – Phillips –Solberg, "Operations Research – Principles and Practice", John Wiley and Sons, 1987.
3.   Fredrick S.Hillier and G.J.Liberman, "Introduction to Operations Research", McGraw Hill Inc. 1995.
4.   Kalymanoy Deb, "Optimization for Engineering Design",PHI,2003
5.   Christos H. Papadimitriou, Kenneth Steiglitz, Combinatorial Optimization, PHI 2006

SO9128   RELATIONAL DATABASE MANAGEMENT SYSTEM

L T P C
3 0 0 3

UNIT I   DATA BASE SYSTEM CONCEPT   9
File Systems – Database Systems – Database Systems Architecture – Data Models – Relational Model – Hierarchical Model – Network Model – Entity–Relationship Model – Data Dictionary – Database Administration and Control.

UNIT II   RELATIONAL DATABASES   9
Codd's Rules – Base tables – Views – Domains and Key Concept – Integrity Rules – Relational Algebra – Relational Calculus – Commercial Query Languages – Embedded SQL – Normalization and Database Design.

UNIT III   DATABASE SYSTEM DESIGN   9
File and Storage Structures – Indexing and Hashing – Query processing – Database Recovery – Concurrency Control – Transaction Processing – Security and Integrity – Triggers.

UNIT IV   DISTRIBUTED DATABASES   9
Centralized versus Distributed databases – Fragmentation – Distributed database architecture – Client / Server databases – Distributed transactions – Locking and Commit protocols – Distributed concurrency Control – Security and reliability – Parallel databases.

UNIT V   CASE STUDY   9
Database – Database Tuning – Security & Auditing – Backup Recovery – Competitive Study

Total= 45

REFERENCES
1. Avi Silberschatz, Henry F. Korth, and S. Sudharsan, "Database System Concepts", 5th Edition, McGraw-Hill, 2005.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 5th Edition, Addison Wesley, 2007.
3. Peter Rob and Carlos M Corone, "Database Systems – Design, Implementation and Management, 7th Edition, Thompson Learning, Course Technology, 2007.
4. Bob Bryla and Kevin Loney, "Oracle Database 11g DBA Handbook", 1st Edition, McGraw-Hill Osborne Media, December, 2007.
5. C.J. Date, "An Introduction to Database system", 8th Edition, Addison-Wesley, July, 2004

SO9131   SOFTWARE PROJECT MANAGEMENT

L T P C
3 0 0 3

UNIT I   INTRODUCTION   9
Project Definition – Programme and projects-Program Management – Project management-The dynamic life Cycle- programme and project process phase gates

UNIT II   ORGANIZING FOR PROGRAMME MANAGEMENT & KEY ROLES   9
Organizing for ownership-Establishing programme steering team-responsibility of Programme steering team-managing the portfolio- The key roles.

UNIT III   PROJECT PROCESSES AND TECHNIQUES   9
Ideas and opportunities for projects - Defining the project - Scope of work statement - Risk Management & assessment - Risk Monitoring

UNIT IV   PROJECT PLANNING & LAUNCHING   9
Identifying the key stages-Project work breakdown structure-Golden rules- Estimating durations-Identifying critical path of project-Analyzing logic diagram- PERT analysis data- Reviewing project-Establishing key stage work plans- Deriving a milestone schedule- Critical success factors-Managing project changes.

UNIT V   EXECUTING PROJECT WORK   9
Project control system-Monitoring progress, Managing issues, Tracking Project - Problem solving-Progress meeting - Controlling project costs- balancing project- case studies

TOTAL = 45

REFERENCES:

1. Trevor L. Young,"The Handbook of Project Mangement:A Practical Guide to Effective Policies, techniques and process",Second Edition, Kogan Page Publishers, 2007.
2. Andrew Stellman, Jennifer Greene," Applied Software Project Management", O'Reilly, 2005
3. Bob Hughes, Mike Cotterell, "Software Project Management", Fourth Edition, Tata McGraw Hill, 2005.
4. Pankaj Jalote ,"Software Project Management in Practice Addison-Wesley", 2002

SO9151   DATA MINING AND WARE HOUSING

L T P C
3 0 0 3

UNIT I   INTRODUCTION   9
Relation to Statistics, Databases, Machine Learning - Taxonomy of Data Mining Tasks - Steps in Data Mining Process - Overview of Data Mining Techniques.

UNIT II   VISUALIZATION AND STATISTICAL PERSPECTIVES   9
Visualization - Dimension Reduction Techniques - Data Summarization Methods - Statistical Perspective -Probabilistic - Deterministic Models - Clustering - Regression Analysis - Time Series Analysis - Bayesian Learning.

UNIT III   PREDICTIVE MODELING   9
Predictive Modeling - Classification - Decision Trees - Patterns - Association Rules - Algorithms.

UNIT IV   DATA WAREHOUSING   9
Design - Dimensional Modeling - Meta Data - Performance Issues and Indexing -VLDB Issues - Development Life Cycle - Merits.

UNIT V   APPLICATIONS   9
Tools – Applications in Strategic Planning, Human Resource and Operational Management - Case Studies.

Total = 45

REFERENCES

1. Usama M.Fayyad, Geogory Piatetsky - Shapiro, Padhrai Smyth and Ramasamy Uthurusamy, "Advances In Knowledge Discovery And Data Mining", The M.I.T Press, 1996.
2. Ralph Kimball, Margy Ross, Warren Thornthwaite, Joy Mundy, and Bob Becker, "The Data Warehouse Lifecycle Toolkit" 2nd Edition, Wiley - Kimball Group, January, 2008.
3. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", 2nd Edition, The Morgan Kaufmann Publishers, March, 2006.
4. Mehmed Kantardzic "Data Mining – Concepts, Models, Methods And Algorithms" 1st Edition, Wiley-IEEE Press, October, 2002.
5. Sean Kelly, "Data Warehousing In Action", 1st Edition, John Wiley & Sons Inc., 1997

SO9152   SYSTEMS ANALYSIS AND DESIGN

L T P C
3 0 0 3

UNIT I   FUNDAMENTALS OF SYSTEM DEVELOPMENT   8
System Concept – Characteristics – Elements of System – Types of System – Modern Approach to System Analysis and Design – System Development Life Cycle – Approaches to Improving Development – Tools for System Development – Succeeding as a System Analyst – Skills – Managing the Project.

UNIT II   SYSTEM ANALYSIS   9
Determining System Requirements – Traditional Methods - Modern Methods – Radical Methods – Structuring System Requirements – Process Modeling – Data Flow Diagramming – Logic Modeling – Conceptual Data Modeling – E-R Modeling.

UNIT III   SYSTEM DESIGN   9
System Implementation – Software Application Testing – Installation – Documentation – Training and Support – Organizational Issues in Systems Implementation – Maintaining Information System – Conducting System Maintenance.

UNIT IV   IMPLEMENTATION AND MAINTENENCE   9
System Implementation – Software Application Testing – Installation – Documentation – Training and Support – Organizational Issues in Systems Implementation – Maintaining Information System – Conducting System Maintenance

UNIT V   SABILITY AND MEASURING USER SATISFACTION   10
Usability Testing-User satisfaction test- A tool for analyzing user satisfaction –Unified Modeling Language(UML)- Case study: System Design: Application in Human Resource-Financial Applications

TOTAL = 45

REFERENCES

1. Jeffrey A. Hoffer, Joey F. George, Joseph S. Valacich, "Modern Systems Analysis and Design",Fifth Edition, Prentice Hall,March 2007.

2.Ned Kock, "Systems Analysis & Design Fundamentals" Sage South Asia, May 2008.

3. Joseph S. Valacich, Jeffrey A. Hoffer, Joey F. George, "Essentials Of System Analysis And Design" Prentice Hall , August 2005.

4. Rumbaugh et al, "Succeeding with Booch and Rambaugh Methods", Addisson Wesley, second Edition, 1998.

5.Larman, C.," Applying UML and Patterns. An introduction to Object-Oriented Analysis and Design". Prentice-Hall PTR, 2002.

SO9153   DATA STRUCTURES AND ALGORITHMS

                                                            L T P C
                                                            3 0 0 3

UNIT I   9
Data Structures – Data Structure Operations – Arrays – Records – Pointers – Linked Lists – Stacks – Queues – Trees – Graphs – Applications of Data Structures – Sorting and Searching – Hashing.

UNIT II   9
Fundamentals of the Analysis of Algorithm Efficiency – Running Time Calculations – Good Programming Practice – Structured and Modular Programming – Algorithm Analysis Techniques – Solving Recurrence Equations

UNIT III   9
Algorithm Design Techniques – Divide and Conquer – Decrease and Conquer – Transform and Conquer – Dynamic Programming – Greedy Method – Backtracking – Branch and Bound.

UNIT IV   9
Introduction to Parallel Algorithm Design - Decomposition Techniques - Characteristics of Tasks and Interactions - Mapping Techniques for Load Balancing - Methods for Containing Interaction Overheads - Parallel Algorithm Models - Performance Metrics for Parallel Systems.

UNIT V   9
Solving Sparse Systems of Linear Equations - Basic Concepts and Operations-Iterative Methods for Sparse Linear Systems - Direct Methods for Sparse Linear Systems - Preconditioning Techniques - Applications of Sparse Linear System Solvers.

                                                     TOTAL = 45

TEXT BOOKS

1. A.V. Aho, J.E. Hopcroft and J.D. Ullman, "Data Structures and Algorithms", Pearson Education, 2003.

2. Anshul Gupta, Ananth Grama, George Karypis and Vipin Kumar, "An Introduction to Parallel Computing: Design and Analysis of Algorithms", Addison Wesley, 2003.

REFERENCE BOOKS

1. Anany V. Levitin, "Introduction to the Design and Analysis of Algorithms", 2/E Addison - Wesley, 2007.

2. A.V. Aho, J.E. Hopcroft and J.D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 2004.

3. E. Horowitz, S. Sahni and S. Rajasekaran, "Computer Algorithms/C++", Galgotia Publications, 2004.

4. E. Horowitz and S. Sahni, "Fundamentals of Data Structures", Galgotia Publications, 2004.

5. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Addison Wesley, 2004.

SO9154   FUZZY LOGIC, NEURAL NETWORKS AND APPLICATIONS

                                                                    L T P C
                                                                    3 0 0 3
UNIT I   INTRODUCTION TO NEURAL NETWORKS   10
Biological neural - Neural processing - Supervised and unsupervised learning - Neural network learning rules. Single layer perception - discrete and continuous perception - multi layer feed forward network – Back propagation Networks - feed back networks - Training Algorithms.

UNIT II   UNSUPERVISED NETWORKS   9
Unsupervised Learning – Competitive Learning Networks – Kohonen self organising networks – Learning Vector Quantization – Hebbian Learning – Hopfield Network – Content Addressable Nature – Binary Hopfield Network – Continuous Hopfield Network

UNIT III   ASSOCIATIVE MEMEORIES AND SOM   9
Bidirectional Associative Memory – Principle Component Analysis. Auto associative memories - Bidirectional Associative memory (BAM) - Self Organization Maps (SOM) and ART1.

UNIT IV   FUZZY LOGIC   8
Fuzzy sets - Fuzzy Rules: Extension Principle, fuzzy measures - fuzzy relations - fuzzy functions-Fuzzy Reasoning.

UNIT V   FUZZY SYSTEMS AND APPLICATIONS   9
Representation of fuzzy knowledge - fuzzy inference systems- Mamdani Model – Sugeno Model – Tsukamoto Model– Fuzzy decision making – Multi Objective Decision Making – Fuzzy Classification– Fuzzy Control Methods – Application.

REFERENCES

1.   Jang J S R Sun C T and Mizutani E, "Neuro Fuzzy and Soft computing", Pearson Education, (Singapore), 2004.
2.   S Rajasekaran and G A Vijayalakshmi Pai, "Neural networks Fuzzy logics and Genetic algorithms", Prentice Hall of India, 2004
3.   Derong Liu , "Advances in Neural Networks--ISNN 2007 ", Springer, 2007
4.   Timothy J Ross, "Fuzzy Logic Engineering Applications", John Wiley and Sons, 2004
5.   James A. Anderson, "An Introduction to Neural Networks", Prentice Hall, 2002

SO9155   MOBILE COMPUTING

L T P C
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UNIT I   INTRODUCTION   9
Computing Paradigms – Mobile Computing – Pervasive Computing –Distributed Computing – Mobile Computing Architecture –Types of Wireless Networks – Wireless Communication Technology – Signal Encoding – Spread Spectrum Technology – Wireless Medium Access Control

UNIT II   WIRELESS NETWORKING SYSTEM   9
Cellular Networks – 2G - 3G - CDMA and GSM Architecture – Handoff – Security Satellite System – GPRS.

UNIT III   WLAN STANDARDS   8
Wireless LAN Technology – Architecture and Standards – Bluetooth Technology –Wireless ATM - PAN.

UNIT IV   NETWORK ISSUES   9
Ad hoc Network – Characteristics – Performance Issues – Routing Protocols in Mobile and Wireless Networks – Table Driven Routing, On-Demand Routing Protocols – Mobile IP and Mobile Transport layers.

UNIT V   APPLICATION ISSUES   10
Concepts for working with wireless applications. WAP – WML - Mobile database – Content Management – Data synchronization Protocols – SyncML, SMIL – Network Simulators NS2, Glomosim – Case Study.

TOTAL = 45

REFERENCES:

1. Raj Kamal, "Mobile Computing", Oxford University Press, 2007.
2. Asoke K. Talukder and Roopa R. Yavagal, "mobile Computing", TMH, New Delhi, 2005.
3. Jochen Schiller, "Mobile Communications", Pearson Education Asia, 2005.
4. William Stalling, "Wireless Communication and Networking", Pearson Education Asia, 2002.
5. Anna Hac, "Mobile Telecommunication Protocols for Data Networks", John Wiley & Son, Ltd, 2003.
6. Mark Beaulieu, "Wireless Internetworking Applications and Architecture", Addison Wesley, New York, 2002.

SO9156   **DESIGN PATTERNS**

L T P C
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UNIT I   **INTRODUCTION**   **9**
History and Origin Of Patterns – Applying Design Patterns – Prototyping – Testing.

UNIT II   **DESIGN PATTERNS**   **9**
Kinds of Pattern – Quality and Elements – Patterns and Rules – Creativity and Patterns–
Creational Patterns – Structural Patterns – Behavioral Patterns, Factory Patterns.

UNIT III   **FRAMEWORKS**   **9**
State and Strategy of Patterns. Singleton, Composite, Functions and The Command
Patterns, Adaptor, Proxy Pattern, Decorator Pattern – Pattern Frameworks and
Algorithms.

UNIT IV   **CATALOGS**   **9**
Pattern Catalogs and Writing Patterns, Patterns and Case Study.

UNIT V   **ADVANCED PATTERNS**   **9**
Anti-Patterns - Case Studies In UML and CORBA, Pattern Community.

TOTAL = 45

REFERENCES:

1. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides,"Design patterns:
Elements of Reusable object-oriented software",Addison-Wesley, 1995.
2. James W- Cooper, Addison-Wesley,"Java Design Patterns – A Tutorial", 2000.
3. Craig Larman,"Applying UML and Patterns: An Introduction to object-oriented
Analysis and Design and the unified process", Second Edition, Prentice Hall
,2001.
4. Thomas Mowbray and Raphel Malveaux, " CORBA and Design Patterns ", John
Wiley, 1997.
5. William J Brown et al., "Anti-Patterns: Refactoring Software, Architectures and
Projects in Crisis", John Wiley, 1998.

SO9157   **APPLIED CRYPTOGRAPHY**

L T P C
3 0 0 3

UNIT I   OVERVIEW OF CRYPTOGRAPHY   9
Information security and cryptography - Background on functions - Basic terminology and
concepts - Symmetric-key encryption - Stream ciphers - Feedback shift registers –
Stream ciphers based on LFSRs - Block ciphers - – DES, FEAL, IDEA, SAFER, RC5.

UNIT II   AUTHENTICATION   9
Authentication Protocols—Principles - Authentication Protocols—The Real World -
Authentication Framework for Public-Key Cryptography.

UNIT III   FORMAL APPROACHES TO SECURITY ESTABLISHMENT   9
Formal and Strong Security Definitions for Public-Key Cryptosystems – Provably Secure
and Efficient Public- Key Cryptosystems. - Formal Methods for Authentication Protocols
Analysis.

UNIT IV   CRYPTOGRAPHIC PROTOCOLS   9
Zero Knowledge Protocols- Basic definitions – Zero knowledge properties – Proof or
Argument - Protocols with Two sided error – Round Efficiency – Non interactive Zero
knowledge.

UNIT V   IMPLEMENTATION   9
SEAL, RC5, IDEA, FEAL, SAFER - using API's.

Total = 45

REFERENCES:

1.   Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone**, "**Hand book of
      Applied Cryptography", 5th Edition, CRC-Press, 2001.
2.   Wenbo Mao, "Modern Cryptography Theory & Practice", 2nd Edition, Pearson
      Education, 2007.
3.   Atul Kahate, "Cryptography and Network Security", 2nd Edition, Tata McGraw Hill,
      2005.
4.   Tom St Denis, Simon Johnson, "Cryptography for Developers", 1st Edition,
      Syngress, 2007.

SO9158   TOTAL QUALITY MANAGEMENT

L T P C
3 0 0 3

UNIT I   CONCEPT OF TQM   9
Philosophy of TQM, Customer Focus, Organization, Top Management Commitment, Teamwork, Quality philosophies of Deming, Crossby and Muller.

UNIT II   TQM PROCESS   9
QC Tools, Problem solving methodologies, New Management Tools, work habits, Quality Circles, Bench Marking, Strategic Quality Planning.

UNIT III   TQM SYSTEMS   9
Quality policy deployment, quality function deployment, standardization, designing for quality, manufacturing for quality.

UNIT IV   QUALITY SYSTEM   9
Need for ISO 9000 system, advantages, clauses of ISO 9000, Implementation of ISO 9000, Quality Costs, Quality auditing, Case Studies.

UNIT V   IMPLEMENTATION OF TQM   9
Steps, KAIZEN, 5S, JIT, POKAYOKE, Taguchi Methods, Case Studies.

TOTAL = 45

REFERENCES:

1.. S. Kumar, "Total Quality Management", Firewall Media, 2006
2. John Bank, "The Essence of Total Quality Management", Prentice Hall of

India, 1993.

3. Matt Seaver, "Gower Handbook of Quality Management", Third Edition, Gower Publishing, 2003
4. Greg Bounds, Lyle Yorks et all, "Beyond Total Quality Management", McGraw-Hill, 1994.
5. Rose, J.E., "Total Quality Management", Kogan Page Ltd., 1993

SO9159   REAL TIME SYSTEMS

L T P C
3 0 0 3

UNIT I   INTRODUCTION   8
Real Time Systems - Embedded Systems, Pervasive Computing - Information Access Devices - Smart Cards - Embedded Controllers - Hardware Fundamentals- Typical Real Time Applications -Hard Versus Soft Real-Time Systems

UNIT II   REAL TIME OPERATING SYSTEM   8
Overview-Task Management- Processes, Threads, Interrupts, Events – Inter Process Communication-Memory Management –Time Management.

UNIT III   REAL TIME SCEDULING   9
Commonly used approaches to Hard Real Time Scheduling - Clock driver scheduling - Priority driver scheduling of periodic tasks - Scheduling Aperiodic & Sporadic jobs in priority driver system - Resources & Resource Access Control (RAC) - Multiprocessor Scheduling & RAC - Scheduling flexible computation & tasks with temporal distance constraints.

UNIT IV   REAL TIME COMMUNICATIONS   10
Wireless connectivity - Blue Tooth - Other Short Range Protocols - Wireless Application Environment - Service - Discovery – Middleware.

UNIT V   REAL TIME SYSTEM DESIGN   10
Requirements analysis-Decomposition of a system- Test of a decomposition-Detailed design and implementation-Real time architecture projects.

TOTAL=45

REFERENCES
1. Jane W.S.Liu, "Real Time Systems", Second Edition, Pearson Education, 2000.

2. Albert M. K. Cheng, Real-Time Systems: Scheduling, Analysis, and Verification ,John Wiley and Sons, 2003.

3.Douglass B.P., *Real-Time Design Patterns: Robust Scalable Architecture for Real-Time Systems*,Addison Wesley, 2002.

4. R.J.A. Buhr, D.L.Bailey*, "An Introduction to Real-Time Systems"*, Prentice-Hall International, 1999.

5. Qing L., and Yao C. *Real-time Concepts for Embedded Systems*, San Francisco: CMP Books, 2003.

6. Hermann Kopetz ,"Real-time Systems: Design Principles for Distributed Embedded Applications", Springer, 1997.

SO9160   OPERATING SYSTEM DESIGN

L T P C
3 0 0 3

UNIT I   PROCESS MANAGEMENT   9
Operating system and services - Process structure and PCB- Microkernels - Threads –
Inter process communication - CPU scheduling approaches - Process synchronization –
semaphores – Deadlocks – handling deadlocks.

UNIT II   MEMORY MANAGEMENT   9
Memory management- Paging- Segmentation-Virtual memory- Demand paging – Page
replacement algorithms.

UNIT III   FILE AND DISK MANAGEMENT   9
File Systems – Access Methods – Directory Structure and Implementation– File System
Mounting – File Sharing – Protection - File System Structure and Implementation –
Allocation Methods - Free-Space Management - Disk Structure – Disk Scheduling and
Management

UNIT IV   DISTRIBUTED OPERATING SYSTEM   10
Introduction-Remote procedure call – Logical clocks – Vector clocks – Distributed mutual
exclusion – Non token based algorithms – Token based algorithms – Issues in deadlock
detection and resolution – Deadlock detection algorithms – Election algorithms -Byzantine
agreement problem – Load distributing algorithms – Performance comparison. Distributed
File System design issues

UNIT V   CASE STUDY (LINUX / WINDOWS)   8
Case study (Linux / Windows) – Design and implementation of OS - process model and
structure in OS - memory management - file system - I/O management and device drivers.

TOTAL: 45

REFERENCES

1. Abraham Silberschatz , Peter B. Galvin and Greg Gagne " Operating system
concepts", 7th Edition, Addison Wesley Publishing Company, 2004
2. William Stallings, " Operating Systems Internals and Design Principles", 4th Edition,
Pearson Education, 2003.
3. Mukesh singhal, and Niranjan Shivratri, "Distributed operating system", TMH, 2001.
4. Naji, "Linux OS", Printice Hall of India, 2003.
5.   Mukesh Singhal, Niranjan G.Shivaratri, "Advanced Concepts in Operating
Systems", McGraw-Hill, New York, 1994.
6. Bach M.J., "Design of the UNIX operating system", Prentice Hall, 1999.

SO9161   NON-LINEAR MATHEMATICAL PROGRAMMING

L T P C
3 0 0 3

UNIT I   INTRODUCTION   9
Linear vis-à-vis Nonlinear Programming – Unimodal Multimodal Functions – Gradient – Steepest Ascent and Steepest Descent Directions – Unconstrained Problems – Newton Raphson Method – Single and Multivariable Optimization – Necessary and Sufficient Conditions for Optimum – Jacobian Matrix.

UNIT II   UNCONSTRAINED AND CONSTRAINED OPTIMIZATION   9
Taylor's Series – Fibonacci Number and Method – Golden Search Method – Hook's and Jeeves Search – Gradient Projection – Equality Constraints – Lagrangian Method – Inequality Constraints – Cone Concept – Kuhn-Tucker Conditions – Modified Lagrangian Method.

UNIT III   DYNAMIC PROGRAMMING   9
Mathematical Description – Principle of Optimality – Recursive Computation – Multistage – Forward and Backward Recursion – Shortage Route Problem – Curse of Dimensionality – Knapsack Problem.

UNIT IV   NON LINEAR PROGRAMMING   9
Separable Programming – Quadratic Programming – Geometric Programming – Stochastic Programming – Sequential Linear Programming – Linear Combination Method of Search – SUMT Method.

UNIT V   EVOLUTIONARY PROGRAMMING   9
Non Derivative Search Techniques – Genetic Engineering – Genetic Operators – Reproduction – Cross Over – Mutation – Selection – Genetic Local Search – Global Optimization – Introduction to Simulated Annealing.

Total = 45

REFERENCES:

1.   Hamdy A Taha, "Operations Research An Introduction", Prentice Hall, Eighth Edition, 2007.
2.   Rao, S.S, "Optimization – Theory and Applications", Wiley Eastern, New Delhi, 1978.
3.   David E. Goldberg ,- Genetic Algorithm in Search, Optimization and Machine Learning, Pearson Education, 1999.

SO9162   SUPPLY CHAIN NETWORKS MANAGEMENT

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3 0 0 3

UNIT I   **9**
Building a strategic frame work – Elements of evolution of supply chain – Decision phase – process view – examples – Supply chain performance – Supply chain drivers and obstacles.

UNIT II   **9**
Demand forecasting in supply chain – Role of forecasting – Characteristics – Basic approach – Time series forecasting methods – Measures of forecast error – Role of aggregate planning in a supply chain – Aggregate planning using Linear Programming – Excel – Planning supply and demand in a supply chain : Managing predictable variability – Managing supply - demand – Implementing solution.

UNIT III   **9**
Managing Economies of scale in a supply chain – Cycle inventory – Role of cycle inventory in a supply chain – Managing Uncertainty in a supply chain – Safety inventory – Role – Estimation – Management – Determining optimal level of product availability.

UNIT IV   **9**
Transportation in a supply chain – Network design in a supply chain – Information Technology in a supply chain.

UNIT V   **9**
Co-ordinating a supply chain and the role of E-business – Financial Evaluation of supply chain Decision.

REFERENCES:

1.   Sunil Chopra, Peter Meindl, "Supply Chain Management – Strategy, Planning and Operation", Pearson Education, 2003.
2.   David J. Bloomberg, Stephan Lemay, Joe. B. Hanna, "Logistics",   PHI, 2002.
3.   Handfield R.B, Nichols. E.L, "introduction to Supply Chain Management", PHI, 1999.
4.   Shapiro, J.F, "Modelling the Supply Chain", Dubury, 2001.
5.   Simchi – Levi, D., Kaminsky, P and Simchi – Levi, E, "Designing and Managing the Supply Chain – Concepts Strategies and Cases", second edition, Tata McGraw Hill, 2002.
6.   Hartmat Stadtler, Christoper Kilger, :Supply Chain Management and Advanced Planning Concepts, Models, Software and Case Studies", second edition, Springler, 2002.

SO9163   PROBABILISTIC OPERATIONS RESEARCH

LT P C
3 0 0 3

Objective
To impart knowledge on some probabilistic optimization techniques

UNIT I   9
Queuing theory -Single server, multi server, Limited queue capacity – applications,
Queuing Networks types and applications

UNIT II   9
Decision making under certainty, risk and uncertainty, Utility Theory, Decision tree
analysis, MCDM – AHP

UNIT III   9
Markov Chains, DTMC and CTMC, Markov Decision processes and their applications

UNIT IV   9
Game theory **-** Two person zero sum games, pure and mixed strategies – graphical
solution, solving by LP

UNIT V   9
Introduction to Petri nets, ETPN and GSPN models and their applications

REFERENCES:

1.   Frederick S Hillier, Gerald J. Liberman, Introduction to Operations Research, Tata
McGraw-Hill, 2001

2.   Philips, Ravindran and Solberg, Operations Research, John Wiley,2002

3.   Hamdy A Taha, Operations Research – An Introduction, PHI 2003

4.   Viswanatham N and Narahari Y, Performance modeling of automated
manufacturing systems, Prentice Hall, 2000

5.   David R. Anderson, et al , An Introduction to Management Science – Quantitative
approaches to Decision Making, Thomson,2003

SO9164   PERVASIVE COMPUTING

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UNIT I   INTRODUCTION   9
Pervasive Computing Application - Pervasive Computing devices and Interfaces - Device technology trends, Connecting issues and protocols

UNIT II   XML & WAP   9
Pervasive Computing and web based Applications - XML and its role in Pervasive Computing - Wireless Application Protocol (WAP) Architecture and Security - Wireless Mark-Up language (WML) – Introduction

UNIT III   PDA   9
PDA in Pervasive Computing – Introduction - PDA software Components, Standards, emerging trends - PDA Device characteristics - PDA Based Access Architecture

UNIT IV   TRUST IN PERVASIVE COMPUTING   9
Trust computing definition-Trusted Computing-Measurement-storage-Reporting-Delegation and Certified Migration-Enforcing trust in pervasive computing

UNIT V   APPLICATIONS   9
Server side Programming in Java-Pervasive web application architecture-example application-Access from PCs, Access Via WAP, Access from PDA -implementation of simple applications using WAP toolkits.

                                                                  TOTAL = 45

REFERENCES:
1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec & Klaus Rindtorff." Pervasive Computing Technology and Architecture of Mobile Internet Applications",Addision Wesley, Reading, 2002.
2.   Qusay Mahmoud ,"Cognitive Networks: Towards Self-Aware Networks" , Wiley ,September 2007.
   3.   http://www.inderscience.com/storage/f123910658712114.pdf ,2008
4   Adam Greenfield,"Everyware: The Dawning Age of Ubiquitous Computing", New Riders, 2006
5   Pervasive Computing Handbook (ISBN: 3-540-00218-9), Second Edition, by Uwe Hansmann, et al, Springer-Verlag, Berlin, 2003.

SO9165   ADHOC AND SENSOR NETWORKS

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UNIT I   INTRODUCTION TO AD HOC NETWORKS   9
Introduction – Characteristics of the Wireless Channel – IEEE 802.11 Standards - Issues in Ad Hoc Wireless Networks - Issues in Designing a MAC Protocols for Ad Hoc Wireless Networks - Classification of MAC Protocols.

UNIT II   ROUTING PROTOCOLS FOR AD HOC NETWORKS   9
Classification of Routing Protocols – Table–driven – On–demand and Hybrid routing protocols –Routing Protocols with efficient Flooding Mechanisms – Hierarchical and Power–Aware Routing Protocols– Multicast Routing Protocols – Classification – Tree–Based and Mesh Based Protocols Routing Multicast protocols

UNIT III   TRANSPORT LAYER, QOS AND SECURITY PROTOCOLS   10
Classification of Transport layer Solutions –– TCP over Ad Hoc Wireless Networks –– QoS in Ad Hoc Wireless Networks – Issues and Challenges in providing QoS – Classification of QoS solutions -MAC Layer and Network Solutions – Security in Ad Hoc Wireless Networks – Network Security Requirements – Network Security Attacks – Key Management – Secure Routing in Ad Hoc Wireless Networks – protocols

UNIT IV   SENSOR NETWORKS   10
Introduction – Sensor network Architecture – Data Dissemination – Data Gathering – MAC protocols for Sensor networks – Location Discovery

UNIT V   CASE STUDY AND APPLICATIONS IN SENSOR NETWORKS   8
Target Detection Tracking, Habitat Monitoring, Environmental Disaster Monitoring, Practical Implementation Issues, IEEE 802.15.4 Low Rate WPAN, Sensor Network Platforms and Tools – Sensor Node Hardware, Node Level Software Platforms, Node – Level Simulators

Total: 45

REFERENCES

1. C. Siva Ram Murthy and B. S. Manoj, "Ad-Hoc Wireless Networks, Architectures and protocols", Prentice Hall PTR, 2004.
2. Mohammad Ilyas, Imad Mahgoub "Handbook of Sensor Networks: Compact Wireless and Wired Sensing Systems" CRC Press, 2004
3. Prasant Mohapatra, Srikanth Krishnamurthy, "Ad Hoc Networks: Technologies and Protocols" Springer, 2005
4. Charles E. Perkins, "AdHoc Networking", Addison, Wesley, 2000.
5. Holger Karl and Andreas Willig, "Protocols And Architectures For Wireless Sensor Networks ", John Wiley & Sons Ltd , 2006.
6. Roberto Verdone ,"Wireless Sensor Networks: 5th European Conference, EWSN 2008", Springer, 2008.

SO9166   DATA ANALYSIS

L T P C
3 0 0 3

UNIT I   9
Modern data analytic tools, Stastical concepts: Sampling distributions, resampling, statistical inference, prediction error

UNIT II   9
Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics

UNIT III   9
Rule induction: rule learning as search, learning first order rules, evaluating quality of rules, ILP systems at work

UNIT IV   9
Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods

UNIT V   9
Visualization: Visual data analysis techniques, interaction techniques; Systems and applications: Diversity of IDA applications

REFERENCES:

   1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer (2007)
Glenn J. Myatt, Making Sense of Data, John Wiley & S

SO9167   FINANCIAL ENGINEERING

L T P C
3 0 0 3

UNIT I   INVESTMENT SCIENCE AND FINANCIAL ENGINEERING PRINCIPLES
9

Review of markets, players, and conventions; Pricing tools, tools for volatility Engineering, Engineering of equity instruments, Deterministic and random cash flows, derivative securities

UNIT II   PRINCIPLES OF MANAGERIAL FINANCE   9

Financial analysis and planning, short term financial management, long term investment decisions, Mergers, Divestitures and failures

UNIT III   QUANTITATIVE FINANCE   9

Portfolio management, risk types, risk metrics, credit cash metrics, Mechanics of future markets and option markets

UNIT IV   MATHEMATICS OF FINANCIAL DERIVATIVES   9

Financial derivatives, Pricing derivatives, Martingales, Dynamics of derivative prices, Pricing methodologies, Interest rate derivatives, Non-arbitrage pricing model, derivative securities

UNIT V   FINANCIAL RISK MANAGEMENT   9

Overview of Risk management process, Financial products and financial markets, Evolution of Risk management products, selecting and implementing enterprise risk management technologies

REFERENCES:

1. Brain Eales, Financial Engineering, St. Martin's Press, 2001
2. Salih N. Neftci, Principles of Financial Engineering, Academic Press, 2005
3. Perry H. Beaumont, Financial Engineering Principles, Wiley, 2003
4. David Luenberger, Investment Science, Oxford University Press, 2000
5. Keith Cuthbertson, Financial Engineering: Derivatives and Risk Management, Springer, 2005
6. Lawrence J. Gitman, Principles of Managerial Finance, Wiley, 2005
7. Paul Wilmott, Quantitative Finance, Wiley, 2006

SO9168   NETWORK PROTOCOLS

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UNIT I   INTRODUCTION   7
ISO OSI Layer Architecture, TCP/IP Layer Architecture, Functions of Network layer, General Classification of routing, Routing in telephone networks, Dynamic Non hierarchical Routing (DNHR), Trunk status map routing (TSMR), real-time network routing (RTNR), Distance vector routing, Link state routing, Hierarchical routing.

UNIT II   INTERNET ROUTING PROTOCOLS   10
Interior protocol : Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Bellman Ford Distance Vector Routing. Exterior Routing Protocols: Exterior Gateway Protocol (EGP) and Border Gateway Protocol (BGP). Multicast Routing: Pros and cons of Multicast and Multiple Unicast Routing, Distance Vector Multicast Routing Protocol (DVMRP), Multicast Open Shortest Path First (MOSPF), MBONE, Core Based Tree Routing.

UNIT III   ROUTING IN OPTICAL WDM NETWORKS   10
Classification of RWA algorithms, RWA algorithms, Fairness and Admission Control, Distributed Control Protocols, Permanent Routing and Wavelength Requirements, Wavelength Rerouting- Benefits and Issues, Lightpath Migration, Rerouting Schemes, Algorithms- AG, MWPG.

UNIT IV   MOBILE - IP NETWORKS   9
Macro-mobility Protocols, Micro-mobility protocol: Tunnel based : Hierarchical Mobile IP, Intra domain Mobility Management, Routing based: Cellular IP, Handoff Wireless Access Internet Infrastructure (HAWAII).

UNIT V   MOBILE AD –HOC NETWORKS   9
Internet-based mobile ad-hoc networking communication strategies, Routing algorithms – Proactive routing: destination sequenced Distance Vector Routing (DSDV), Reactive routing: Dynamic Source Routing (DSR), Ad hoc On-Demand Distance Vector Routing (AODV), Hybrid Routing: Zone Based Routing (ZRP).

                                                          TOTAL: 45 PERIODS

REFERENCES:

1.   William Stallings, ' High speed networks and Internets Performance and Quality of Service', IInd Edition, Pearson Education Asia. Reprint India 2002
2.   M. Steen Strub, ' Routing in Communication network, Prentice –Hall International, Newyork,1995.
3.   S. Keshav, 'An engineering approach to computer networking' Addison Wesley 1999.
4.   William Stallings, 'High speed Networks TCP/IP and ATM Design Principles, Prentice- Hall, New York, 1995
5.   C.E Perkins, 'Ad Hoc Networking', Addison – Wesley, 2001
6.   Ian F. Akyildiz, Jiang Xie and Shantidev Mohanty, " A Survey of mobility Management in Next generation All IP- Based Wireless Systems", IEEE Wireless Communications Aug.2004, pp 16-27.
7.   A.T Campbell et al., " Comparison of IP Micromobility Protocols," IEEE Wireless Communications Feb.2002, pp 72-82.

8. C.Siva Rama Murthy and Mohan Gurusamy, " WDM Optical Networks – Concepts, Design and Algorithms", Prentice Hall of India Pvt. Ltd, New Delhi –2002.

SO9169   KNOWLEDGE MANAGEMENT

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UNIT I   INTRODUCTION   9
The value of Knowledge – Knowledge Engineering Basics – Knowledge Economy – The task and Organizational content – Knowledge Management – Knowledge Management Ontology.

UNIT II   KNOWLEDGE MODELS   9
Knowledge Model Components – Template Knowledge Models –Reflective Knowledge Models– Knowledge Model Construction – types of Knowledge Models.

UNIT III   TECHNIQUES OF KNOWLEDGE MANAGEMENT   8
Knowledge Elicitation techniques – Modeling communication aspects – Knowledge Management and Organizational learning.

UNIT IV   KNOWLEDGE SYSTEM IMPLEMENTATION   11
Case Studies – Designing Knowledge Systems – Knowledge Codification – Testing and Deployment – Knowledge Transfer and Knowledge Sharing – Knowledge system implementation.

UNIT V   ADVANCED KNOWLEDGE MANAGEMENT   8
Advanced Knowledge Modelling – Value Networks – Business models for knowledge economy – UML Notations – Project Management.

TOTAL = 45

REFERENCES:

1. Guus Schreiber, Hans Akkermans, Anjo Anjewierden, Robert de Hoog, Nigel Shadbolt, Walter Van de Velde and Bob Wielinga, "Knowledge Engineering and Management", Universities Press, 2001.
2. Elias M.Awad, Hassan M. Ghaziri, "Knowledge Management", Pearson Education, 2004.
3. Michael Stankosky, "Creating the discipline of Management", Butterworth - Heinemann , 2005.
4. Tiwana, "Knowledge Management Toolkit", Second Edition, Pearson Education, 2003.

SO9170   CONTEXT MODELLING

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3 0 0 3

UNIT I   INTRODUCTION   9
Ubiquitous computing – Define context –Types of context -Enumeration based – Role Based   Context aware computing and applications – Core capabilities for context awareness – Types of context aware applications – Developing context aware applications – Middleware support Contextual services-Actuator service- Example – Context toolkit – Providing location context.

UNIT II   ONTOLOGY   9
Basic concepts – Ontology Engineering – Advanced topics – Standard upper   ontology - Ontology level – Semantic web – Semantic web languages –   XML & XML schema , RDF & RDF schema – DAML + OIL – OWL – SPARQL - Role of ontology – Semantic markup – Semantic web services – Open issues.

UNIT III   CONTEXT MODEL APPROACHES   9
Requirements for context model – Key Value Models - Markup Scheme Models - Graphical Models - Object Oriented Models - Logic Based Models.

UNIT IV   CONTEXT MODEL ARCHITECTURES   9
Context Broker Architecture CoBrA -Service-Oriented Context-Aware Middleware SOCAM Standard Ontology for ubiquitous and pervasive applications SOUPA – Ontology based Generic context management model GCoM.

UNIT V   APPLICATIONS   9
Office and Meeting Tools - The Active Badge System -The Parc Tab System – Applications   from Georgia Institute of Technology - (Tourist) Guides - Cyberguide – GUIDE - Smart Sight Tourist Assistant - Frameworks supporting Context-Aware Applications - Stick-e Notes framework.

Total: 45

REFERENCES:

1. Dragan Gasevic, Dragan Djuric, Vladan Devedzic, Bran Selic ,Model Driven Architecture and ontology development, Springer-   Verlag Berlin Heidelberg 2006.
2. Frank Adestein, Sandeep K.S. Gupta, Golden G. Richard III, Loren Schwiebert. Fundamentals of Mobile and Pervasive Computing, Tata McGraw-Hill Publishing Company Limited, Edition 2005.
4. Philip Moore, Bin Hu and Jizheng Wan ,Smart-Context: A context Ontology for Pervasive Mobile Computing , 2007.
5. F.Van Harmelen et al. "Owl Web Ontology Language Reference",
    http://www.w3.org/TR/owl-ref/
6. http://www.it.kth.se/edu/Ph.D/LocationAware/aware.vt98.html

SO9171   GRID COMPUTING

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UNIT I   INTRODUCTION   8
Introduction to grid computing – Definition – Scope of Grid Computing-Applications of grid computing organizations and their roles.

UNIT II   GRID COMPUTING INITIATIVES   9
Grid Computing Analogy – Grid Computing road map-Grid Computing anatomy – Next generation of Grid computing initiatives–Merging the Grid services architecture with Web services architecture

UNIT III   GRID COMPUTING TECHNOLOGIES   9
 OGSA – Sample use cases that drive the OGSA platform components – OGSI and WSRF– OGSA Basic Services – Security standards for grid computing.

UNIT IV   GRID SCHEDULING AND HIGH LEVEL SERVICES   10
Actions in grid scheduling-Resource Management- Resource Brokers- Resource Reservations- Existing grid scheduling systems-MDS-NWS-High level grid services-OGSI.NET middleware Solution - Mobile OGSI.NET.

UNIT V   GRID COMPUTING TOOL KIT   9
Globus Toolkit –Architecture –GRAM-MDS-GSI-GridFTP-GT Programming model –A sample grid service implementations.

                                                                   TOTAL: 45

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6.D.Janaki Raman "Grid Computing, A research Monograph", TataMcGraw Hill , 2005.

SO9172   METHODS FOR SELFISH/MALICIOUS NODES DETECTION

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UNIT I   INTRODUCTION TO NETWORK SECURITY   9
Security Trends - OSI Security Architecture – Security Services – Security Mechanisms – Security Requirements - Model for Network Security – Overview of Symmetric and Public Key Encryption – Authentication and Integrity Mechanism – Key Distribution.

UNIT II   ATTACK TAXONOMY   9
Attack Classification : Passive and Active Attacks - Attackers and their Motivation - Characteristics of Attack Taxonomy- List of Categories - Results Categories – Empirical Lists - Matrices - Process Based Taxonomy - Wormhole - Byzantine - Black hole - DoS - Flooding - Resource Consumption - Location Disclosure - Impersonation - Attack Trees - STRIDE

UNIT III   TRUST AND REPUTATION SYSTEMS   9
Notion of Trust – Security and Trust – Collaborative Filtering and Sanctioning - Trust Classes – Trust and Reputation Network Architectures - Reputation Computation Engines - Commercial and Live Reputation System – Trust management in P2P Systems- Trust management in Ad hoc networks – Issues with Reputation Systems

UNIT IV   COOPERATION ENFORCEMENT AND DETECTION MECHANISMS   9
Cooperation Enforcement Techniques: Nuglets - Sprite - Detection Mechanisms: Mitigating Routing Misbehavior – OCEAN – CORE – CONFIDENT – PACKET LEASHES

UNIT V   SIMULATION STUDY   9
GloMoSim: General Architecture of the simulator- Configuring a Network - Mobility Models - Routing Protocols. Network Simulator 2: Nodes - Packet Forwarding – Agents - Mobile Networking - Trace Monitoring Support - Visualization.

TOTAL: 45

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2. B. Wu, J. Chen, and J. Wu, M. Cardei," A Survey of Attacks and Countermeasures In Mobile Ad Hoc Networks," *Wireless Network Security*, Springer-Verlag 2007.
3. A. Josang, R. Ismail, and C. Boyd," A Survey of Trust and Reputation Systems for Online Service Provision," *Decision Support System*, vol. 43, no. 2. pp. 618-644, March 2007.
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