UNIVERSITY DEPARTMENTS

ANNA UNIVERSITY, CHENNAI 600 025

REGULATIONS - 2013

M.E. SYSTEMS ENGINEERING AND OPERATIONS RESEARCH

CURRICULUM AND SYLLABUS I TO VI SEMESTERS (PART - TIME)

PROGRAM OBJECTIVES :

a) Enable students to appreciate review and understand the foundations in computing systems and optimization techniques
b) Enable students to use optimization techniques to enhance computing systems
c) Enable students to understand the management of enterprise resources using current tools, frameworks and reusable resources
d) Prepare students to critically analyze existing literature in an area of specialization and develop innovative and research oriented methodologies to tackle gaps identified
e) Enable students to continue to pursue lifelong multidisciplinary learning as professional engineers and scientists and effectively communicate technical information, function effectively on teams, and develop and apply engineering solutions within a global, societal, and environmental context

PROGRAM OUTCOMES:

After Successful completion of this program, the students

a. Acquire knowledge in resource management techniques and tools and have the capability apply in any systems concerned, like, computer system or electrical system or mechanical system, or so.
b. Have the capability to apply mathematical knowledge, data structure and algorithmic principles in design and development for software system
c. Acquire leadership/managerial capabilities in decision making, analyse the alterable and mange the digital assets.
d. Acquire knowledge in the area of computer networks, including wireless mobile networks, with the due experience
e. Ability to write object oriented programs, sql scripts for rdbms and other scripts for simulators like, ns2, matlab, etc.
f. Critically analyze existing literature in the area(s) of specialization and develop innovative and research oriented methodologies to tackle gaps identified
g. Communicate effectively, both orally with the range of audiences and prepare technical documents .

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M.E. SYSTEMS ENGINEERING AND OPERATIONS RESEARCH

CURRICULUM I TO VI SEMESTERS (PART - TIME)

SEMESTER I

SL.NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	SO8101	Computer Architecture	3	0	0	3
2.	SO8102	Data Structures and Object Oriented Programming	3	0	0	3
3.	SO8103	Principles of Systems Engineering	3	0	0	3
4.	MA8154	Advanced Mathematics for Computing	3	1	0	4
PRACTICAL						
5.	SO8111	Object Oriented Programming Laboratory	0	0	4	2
		TOTAL	**12**	**1**	**4**	**15**

SEMESTER II

SL.NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	SO8201	Advanced Database Management System	3	0	0	3
2.	SO8202	Computer Networks	3	0	0	3
3.	SO8203	Linear Programming and Applications	3	0	0	3
4.	SO8204	Operating System	3	0	0	3
PRACTICAL						
5.	SO8211	Database Management System Laboratory	0	0	3	2
		TOTAL	**12**	**0**	**3**	**14**

SEMESTER III

SL.NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	SO8301	Non-Linear Programming	3	0	0	3
2.	IF8351	Virtualization	3	0	0	3
3.		Elective I	3	0	0	3
PRACTICAL						
4.	SO8311	Virtualization Laboratory	0	0	3	2
		TOTAL	**9**	**0**	**3**	**11**

SEMESTER IV

SL.NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	SO8401	Systems Modeling and Simulation	3	0	0	3
2.	IF8254	Mobile and Pervasive Computing	3	0	0	3
3.		Elective II	3	0	0	3
PRACTICAL						
4.	SO8411	Simulations Tools Laboratory	0	0	3	2
		TOTAL	**9**	**0**	**3**	**11**

SEMESTER V

SL.NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	SO8501	Dynamic Programming	3	0	0	3
2.		Elective III	3	0	0	3
PRACTICAL						
4.	SO8511	Project Work Phase I	0	0	12	6
		TOTAL	**6**	**0**	**12**	**12**

SEMESTER VI

SL.NO	COURSE CODE	COURSE TITLE	L	T	P	C
1.	SO8611	Project Work Phase II	0	0	24	12
		TOTAL	**0**	**0**	**24**	**12**

TOTAL NUMBER OF CREDITS: 75

LIST OF ELECTIVES

SI.NO	COURSE CODE	COURSE TITLE	L	T	P	C
ELECTIVE-I						
1.	CP8351	Security Principles and Practices	3	0	0	3
2.	SO8003	Decision Models	3	0	0	3
3.	SO8006	Enterprise Architecture / Framework	3	0	0	3
4.	SO8007	Parallel Programming	3	0	0	3
5.	SO8009	Supply Chain Planning and Management	3	0	0	3
ELECTIVE-II						
6.	CP8071	Advanced Database Administration and Tuning	3	0	0	3
7.	CP8073	Data Mining Techniques	3	0	0	3
8.	MM8251	Multimedia Databases	3	0	0	3
9.	SO8004	Design Patterns	3	0	0	3
10.	SW8071	Software Verification and Validation	3	0	0	3
ELECTIVE-III						
11.	CP8074	Real Time System Design	3	0	0	3
12.	CP8151	Advanced Data Structures and Algorithms	3	0	0	3
13.	IF8081	Soft Computing	3	0	0	3
14.	SO8002	Computer System Performance	3	0	0	3
15.	SO8008	Soft ware Testing and Quality Assurance	3	0	0	3
16.	SO8001	Business Process Management	3	0	0	3
17.	SO8005	Digital Assets Management	3	0	0	3

SO8101 **COMPUTER ARCHITECTURE** **L T P C**
3 0 0 3

OBJECTIVES :

- To have a through understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the processing units
- To study the hierarchical memory system including cache memories and virtual memory.
- To study the concept of pipelining and shared memory

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues.

UNIT II ARITHMETIC AND PROCESSING UNITS 9

Addition and subtraction of signed numbers – Design of fast adders – Multiplication - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations. Execution of a complete instruction – Hardwired & Micro programmed control -

UNIT III MEMORY AND I/O SYSTEM 9

Basic concepts – Semiconductor RAMs - ROMs – Cache memories - Virtual memory- Memory Management requirements – Secondary storage. Accessing I/O devices – Interrupts – Direct Memory Access – Standard I/O Interfaces (PCI, SCSI, USB).

UNIT IV PIPELINEING 9

Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation. Linear and non-linear processors

UNIT V PARALLEL COMPUTING AND CACHE COHERENCE 9

Why Parallel Architecture, Convergence of Parallel Architectures, Fundamental Design issues, Parallel Programs**:** The Parallelization Process, parallelization of an Example program. Shared memory Multiprocessor: Cache Coherence, Memory consistency, Design Space for Snooping Protocols, Synchronization.

TOTAL: 45 PERIODS

OUTCOMES:

- Acquired knowledge of organization of computer, memory and I/O
- Understand the exploitation of power of microprocessor

REFERENCES:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition “Computer Organization”, McGraw-Hill, 2002.
2. David A.Patterson and John L.Hennessy, “Computer Organization and Design: The hardware / software interface”, 2nd Edition, Morgan Kaufmann, 2002.
3. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Pearson Education, Seventh Edition, 2006.
4. John L. Hennessey and David A. Patterson, “Computer Architecture – A Quantitative Approach”, Morgan Kaufmann / Elsevier, 4th. edition, 2007
5. John P.Hayes, “Computer Architecture and Organization”, 3rd Edition, McGraw Hill, 1998.

SO8102 DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:

- To review & understand data structure and algorithms, and to enhance their expertise in algorithmic analysis and algorithm design techniques.
- Expected to learn a variety of useful algorithms and techniques and extrapolate from them in order to then apply those algorithms and techniques to solve problems

UNIT I INTRODUCTION TO DATA STRUCTURES 9

Abstract Data Types (ADT) – List ADT – array-based implementation – linked list implementation – cursor-based linked lists – doubly-linked lists – applications of lists – Stack ADT – Queue ADT – circular queue implementation – Applications of stacks and queues

UNIT II INTRODUCTION TO C++ 9

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 III CLASSES AND OBJECTS 9

Dynamic Memory Allocation - Classes and Objects – Constructors and Destructors - Function Overloading – Copy Constructor - Friends - Operator Overloading.

UNIT IV DERIVED CLASSES AND ADDITIONAL FEATURES 9

Composition and Inheritance – Access Control - Virtual functions and Polymorphisms – Abstract Base Classes - Design of Class Hierarchies - I/O Stream - File I/O - Exception Handling.

UNIT V DYNAMIC DATA STRUCTURES IMPLEMENTATION 9

Stack Operations – Queue Addition and Deletion – Linked List Search – Linked List Insertion and Deletion – Binary Tree Search – Binary Tree Insertion and Deletion.

TOTAL: 45 PERIODS

OUTCOMES:

- Acquire ability to select the better algorithm based on complexity and efficiency
- Master a variety of advanced data structures and their implementations.
- Ability to apply and implement learned algorithm design techniques and data structures to solve problems.

REFERENCES:

1. Sahni, “Data Structures Using C++”, The McGraw-Hill, 2006.
2. Balagurusamy, E, “Object Oriented Programming with C++”, Fourth Edition, Tata Mcgraw-Hill., 2008.
3. Bjarne Stroustrup, “The C++ Programming Language”, Third Edition, Pearson Education, 2004.
4. Stanley B.Lippman, Jove Lajoie, “C++ Primer”, Fourth Edition, Pearson Education, Asia, 2007.
5. Ashok N Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, First Edition, Pearson Education, 2003.
6. Seymour, “Data Structures”, The McGraw-Hill, 2007
7. Harvey M. Deitel , Paul J. Deitel, C++ How to Program, 4th Edition, Prentice Hall, 2002

SO8103 PRINCIPLES OF SYSTEMS ENGINEERING L T P C
3 0 0 3

OBJECTIVE :

- Introduce the concepts related to system engineering, with design, analysis, game theory, decision making analysis, etc.

UNIT I SYSTEMS ENGINEERING PROCESSES 9

Systems Engineering – Basic Definitions - System Life cycles -Phases-Steps, Formulation of Issues: Problem Identification – Scoping – Bounding, Problem definition – Identification of needs, alterable, constraints; Value System Design: Objectives and objective measures; Functional decomposition and analysis Tools: Objectives hierarchies – trees, cross interaction matrix; Functional analysis approaches – Node tree, Context diagram, system decomposition;

UNIT II ANALYSIS OF ALTERNATIVES 9

Generation of Alternatives/ system synthesis – Identification of activities and activity measures; Uncertain/ Imperfect information; Cross-impact analysis, Hierarchical inference, logical reasoning inference; Coupled uncoupled events – Baye's model – event trees, probability trees; Causal loop diagrams, influence diagrams

UNIT III STRUCTURAL MODEL & SYSTEM DYNAMICS 9

Structural modeling; System Dynamics; Structural models – Tree structures, reachability graph and matrix; System Dynamic Models – population models, urban dynamics, world dynamic models; Economic models

UNIT IV DECISION MAKING 9

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;

UNIT V GAME THEORY, SYSTEMS PLANNING & MANAGEMENT 9

Game Theory basics – Decision making and game theory, Game theory in Group decision making, SE management plan; Network based systems planning and management methods; Cognitive factors in SE

TOTAL: 45 PERIODS

OUTCOMES:

- Have the capability to design and analyse the system
- Decision making ability
- Familiarity in system engineering design tools

REFERENCES:

1. Andrew P Sage and James E Armstrong, Systems Engineering, Wiley Inter science publications (2004)
2. Alexander Kossiakoff, William N. Sweet, Systems Engineering : Theory & Practice, John Wiley & Sons, 2002
3. James N. Martin, Systems Engineering Guidebook: A Process for Developing Systems and Products, CRC Press, 1997

MA8154 ADVANCED MATHEMATICS FOR COMPUTING L T P C
3 1 0 4

OBJECTIVES:

- To understand the basics of random variables and standard distributions
- To understand the arrival process and various queueing and server models
- To appreciate the use of simulation techniques
- To apply testing of hypothesis to infer outcome of experiments
- To apply mathematical linear programming techniques to solve constrained problems.

UNIT I RANDOM VARIABLES 12

Random variables – Bernoulli, Binomial, Geometric, Poisson, Uniform, Exponential, Erlang and Normal distributions – Function of a Random variable - Moments, Moment generating function.

UNIT II QUEUEING MODELS 12

Poisson Process – Markovian Queues – Single and Multi-server Models – Little's formula – Machine Interference Model – Steady State analysis – Self Service Queue.

UNIT III SIMULATION 12

Discrete Event Simulation – Monte – Carlo Simulation – Stochastic Simulation – Applications to Queuing systems.

UNIT IV TESTING OF HYPOTHESIS 12

Sampling distributions – Estimation of parameters - Statistical hypothesis – Tests based on Normal, t, Chi-square and F distributions for mean, variance and proportion.

UNIT V LINEAR PROGRAMMING 12

Formulation – Graphical solution – Simplex method – Two phase method -Transportation and Assignment Problems.

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the student will be able to

- Identify the type of random variable and distribution for a given operational conditions/scene
- Study and Design appropriate queuing model for a given problem/system situation
- To understand and simulate appropriate application/distribution problems
- Differentiate/infer the merit of sampling tests.
- Formulate and find optimal solution in the real life optimizing / allocation / assignment problems involving conditions and resource constraints.

REFERENCES:

1. Johnson, R.A. Miller and Freund's," Probability and Statistical for Engineers, Prentice Hall of India Pvt., Ltd., New Delhi, Seventh Edition, 2005.
2. Hamdy A. Taha, "Operations Research: An Introduction", Prentice Hall of India Pvt., Ltd. New Delhi, Eighth Edition, 2007.
3. Jay L. Devore," Probability and Statistics for Engineering and the Sciences", Cengage Learning, Seventh Edition, 2009.
4. Ross. S.M., "Probability Models for Computer Science", Academic Press, 2002
5. Winston, W.L., "Operations Research", Thomson – Brooks/Cole, Fourth Edition, 2003.
6. Gross D. and Harris C.M., "Fundamentals of Queueing Theory", John Wiley and Sons, New York, 1998.
7. J.Medhi," Stochastic models of Queueing Theory", Academic Press,Elsevier, Amsterdam,2003.

SO8111 OBJECT ORIENTED PROGRAMMING LABORATORY L T P C
0 0 4 2

OBJECTIVES :

To acquire practical experience in object oriented programming

1. Implement fundamental algorithms to generate number sequences.
2. Implement factorial methods like finding factors and random number generation.
3. Implement Array techniques to remove duplicates and find longest Monotone seq
4. Implement Merging, Sorting and Searching techniques.
5. Text Processing and Pattern Searching algorithms Implementation
6. Implementation of Object Oriented Programming concepts, like, inheritance, multiple inheritance, polymorphism, encapsulation, overloading over-riding and fault tolerance

TOTAL : 60 PERIODS

OUTCOMES :

- Capable of implementing object oriented programming concepts with c++
- Ability to implement data structures using c++

SO8201 ADVANCED DATABASE MANAGEMENT SYSTEM L T P C
3 0 0 3

OBJECTIVES:

- Able to design and implement relational databases,
- distributed databases, XML databases, multimedia
- databases and be familiar with the current issues

UNIT I RELATIONAL MODEL 9

Data Model – Types of Data Models - Entity Relationship Model – Relational Data Model – Relational Algebra – Transforming Entity Relationship Model to Relational Model – Structured Query Language

UNIT II DATABASE NORMALIZATION 9

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second and Third Normal Forms – Dependency Preservation – Boyce Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form – Domain Key Normal Form

UNIT III TRANSACTION MANAGEMENT 9

Transaction – Transaction States – ACID Properties – System Recovery – Media Recovery – Save Points – SQL Facilities for recovery –Concurrency Control - Locking Protocols – Deadlocks

UNIT IV PARALLEL AND DISTRIBUTED DATABASES 9

Centralized and Client-Server Architectures – Parallel Systems- Distributed Systems – Parallel Databases- I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing

UNIT V XML DATABASES 9

XML Databases: XML Data Model – DTD - XML Schema - XML Querying – Web Databases – Open Database Connectivity

TOTAL: 45 PERIODS

OUTCOME:

- Ability to design and implement the concepts of relational, distributed and XML databases

REFERENCES:

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley**,** 2008.
2. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Fourth Edition, Pearson Education, 2008.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Sixth Edition, McGraw Hill, 2010.
4. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

SO8202 COMPUTER NETWORKS L T P C
3 0 0 3

OBJECTIVES:

- The course is designed to present an overview of the Modern Telecommunication, and of those communication applications that will expand student's skill and expertise in Networking.
- Data communication layout and application in enterprise world will be covered.

UNIT I NETWORK ARCHITECTURE 9

Network Architecture - OSI Architecture - Internet Architecture - Network Topologies - LAN, WAN and MAN – Data and signals - Digital Transmission - Analog transmission -. Multiplexing - Performance-Bandwidth - Latency - Delay - Application performance needs.

UNIT II DATALINK LAYER 9

Error detection and correction - Data Link control - Multiple accesses.-Flow control – Error Control-Bridges and Switches

UNIT III NETWORK LAYER 9

Switching and forwarding- Packet Switching – Cell switching - Routing and forwarding –IP Addressing – IPv4 and IPv6 - internetworking- Global Internet – Multicast.

UNIT IV TRANSPORT LAYER 9

UDP – TCP – Remote Procedure Call – Resource Allocation – TCP Congestion Control – Congestion Avoidance Mechanisms – QoS - Traffic Shaping algorithms – End to End solutions.

UNIT V APPLICATION LAYER 9

WWW - HTTP – DNS - Electronic Mail Systems - File transfer - Network Management Systems– SNMP Communication Model –Major changes in SNMPv2 and SNMPv3 – Remote monitoring– RMON SMI and MIB – Network management Applications.

TOTAL: 45 PERIODS

OUTCOMES:

- Student can use the knowledge gained to analyze the network architecture and infrastructure.
- Fundamental understanding in telecom industry business is enhanced.

REFERENCES:

1. Behrouz A. Forouzan, “Data Communication and Networking”, Fourth Edition, Tata McGraw Hill, 2007.
2. Larry L Peterson and Bruce S Davie, ‘Computer Networks: A Systems Approach’, Fourth Edition, Morgan Kaufman Publishers, 2007.
3. Computer Networking: A Top-Down Approach Featuring the Internet- Sixth Edition - James F. Kurose, Keith W. Ross. Pearson Education, 2005.
4. William Stallings, “Data & Computer Communication”, Eighth Edition, Pearson Education, 2008.
5. Andrew S. Tanenbaum, “Computer Networks”, Prentice Hall, Fourth Edition, 2006.

TOTAL : 45 PERIODS

SO8203 LINEAR PROGRAMMING AND APPLICATIONS L T P C
3 0 0 3

OBJECTIVES:

- To introduce the basic concepts and some tools in optimization.
- To explore the advanced concepts vertically to make clear understanding and application of the concepts in engineering and scientific applications.

UNIT I INTRODUCTION 9

Formulation and Graphical Solutions, Solution of Maximization Model, Solution of Minimization Model, Simplex method, Degeneracy, Unbounded Solution, Infeasible Solution, Alternative Optima.

UNIT II ADVANCED LINEAR PROGRAMMING 9

BIG-M method, Two-Phase method, Special cases in the Simplex method, Transportation and Assignment Problems, Revised Simplex Method, Duality in Linear Programming Problems, Dual Simplex method, Bounded variable technique,

UNIT III SENSITIVITY ANALYSIS 9

Sensitivity Analysis or Post Optimality Analysis-Changes in the Right hand side, Objective function, Changes affecting feasibility, Changes affecting optimality.

UNIT IV INTEGER PROGRAMMING 9

Knapsack Problem, Cutting plane algorithm, Branch and bound algorithm, Mixed integer programming, travelling salesperson problem.

UNIT V CASE STUDIES AND TOOLS 9

Case Studies: Urban Planning model, Investment problem, Currency Arbitrage, Production Planning and Inventory Control, Manpower planning, Solving LP problems using TORA / LINDO/ LINGO.

TOTAL:45 PERIODS

OUTCOMES:

- Conceptually understand and emerge towards optimization.
- Optimize effectively through LP methods and tools.

REFERENCES:

1. Hamdy A Taha, "Operations Research An Introduction", Prentice Hall, Eighth Edition, 2007.
2. J.K.Sharma, "Operations Research Theory and applications" Macmillan, 4th Edition,2009.
3. Hiller F.S, Liberman G.J, "Introduction to Operations Research", Sixth Edition, McGraw Hill, Inc., 1995
4. Ronald L. Rardin, "Optimization in Operations Research", Pearson Education, Asia, 2002.
5. Swarup k etal, "Operations Research", S.Chand.
6. Jit. S. Chandran, Mahendran P. Kawatra, Ki Ho Kim, "Essentials of Linear Programming", Vikas Publishing House Pvt. Ltd., New Delhi, 1994.
7. Harvey M.Wagner, " Principles of Operations Research with applications to Managerial Decisions", PHI Leraning Private Limited, 2nd Edition,2009

SO8204 OPERATING SYSTEM L T P C
3 0 0 3

OBJECTIVES:

- The course introduces numerous concepts and principles of operating systems.
- This provides exposure to the students on popular operating system like Windows/Linux and gain hands-on experience.

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- Allocation algorithms

UNIT III FILE AND SECONDARY STORAGE MANAGEMENT 9

File Systems – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection - File System Structure – File System Implementation – Allocation Methods - Free-Space Management – Directory Implementation – Recovery - Disk Structure – Disk Scheduling – Disk Management

UNIT IV DISTRIBUTED OPERATING SYSTEM 12

Issues - Communication Primitives – Remote procedure call – Logical clocks – Vector clocks – Distributed mutual exclusion – Non token based algorithms – Token based algorithms – Issues in deadlock detection and resolution – Centralized and distributed deadlock detection algorithms – Election algorithms, Solutions to the Byzantine agreement problem – Impossibility result. Issues in load distributing – Load distributing algorithms – Performance comparison. Distributed File System design issues – Mechanisms for building DFS

UNIT V CASE STUDY (LINUX / WINDOWS) 6

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 PERIODS

OUTCOMES:

- The course will enhance the knowledge about the operations, implementation and performance of modern operating systems.
- The students will be able to compare the relative merits and suitability of each operating system for complex user applications.

REFERENCES:

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

SO8211 DATABASE MANAGEMENT SYSTEM LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The expected learning outcome of this course is, a student who has successfully completed this course will be able to:

Implement Relational Database and Perform Query Operations, Update Operations and Report Generation, Active Database Concepts, Distributed Database Concepts, Distributed Database Concepts, XML Databases, ODBC

SOFTWARE:
Oracle 10 G or Higher / Equivalent

TOPICS TO BE COVERED:

1. DATA DEFINITION LANGUAGE

- Create, Alter, Drop
- Truncate, Comment, Rename Command
- Enforcing Integrity Constraints
- Views, Synonyms, Sequences, Indexes

2. DATA MANIPULATION LANGUAGE

- Insert
- Delete
- Update

3. JOINING DATA FROM MULTIPLE TABLES IN QUERIES

- The JOIN Condition / The Cartesian Product
- Equijoin
- Self-join
- Outer JOINs

4. SET OPERATIONS

5. AGGREGATE FUNCTIONS AND THE GROUP BY CLAUSE

6. USING SUB-QUERIES

7. ANALYTIC FUNCTIONS

8. INTRODUCTION TO PROCEDURES AND FUNCTIONS

- Creating stored PL / SQL objects, procedures, functions

9. CREATING PACKAGES

- Creating package specifications and bodies

10. CREATING DML TRIGGERS

- Triggering events, Trigger behavior
- Correlation identifiers, Multi-statement triggers
- Trigger firing behavior, Enabling / Disabling triggers

11. DISTRIBUTED DATABASE IMPLEMENTATION.

TOTAL : 45 PERIODS

SO8301 NON-LINEAR PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:

- To introduce and familiarize non-linear approaches in optimization.
- To conceptualize the real life applications in terms of non-linearity and also to learn MATLAB for solving the same.

UNIT I INTRODUCTION 9

Linear Vs Non-linear Programming-Basic properties of solutions and Algorithms: First order necessary conditions, Examples of unconstrained problems, second-order conditions, convex and concave functions, minimization and maximization of convex functions-saddle points-jacobian matrix.

UNIT II ONE DIMENSIONAL OPTIMIZATION 9

Descent methods an introduction-Global convergence of Decent Algorithms-Speed convergence-Fibonacci method-Golden section search method-Steepest Descent-Newton's method-Polynomial Approximation method.

UNIT III MULTI-DIMENSIONAL OPTIMIZATION 9

Unconstrained Optimization without derivatives-Conjugate directions-Descent properties of the conjugate Direction method-Conjugate gradient method-Partial conjugate gradient method-Powell's method-Variable metric Algorithms without derivatives-Quasi-Newton method: modified.

UNIT IV UNCONSTRAINED OPTIMIZATION FOR CONSTRAINED PROBLEMS 9

Lagrange method-Inequality constraints-KKT conditions-Quadratic programming-Geometric programming-Separable Linear Programming-sequential linear Programming-Feasible Direction method.

UNIT V EVOLUTIONARY PROGRAMMING 9

Genetic Engineering-Genetic operators-reproduction-Crossover, mutation, Selection-Genetic local search-simulated Annealing - Ant colony Optimization-Particle swarm Optimization- Matlab - Simulation of NLP techniques / concepts with Matlab

TOTAL: 45 PERIODS

OUTCOMES :

- Applying the concepts of non-linear programming in real life scenarios.
- Provide instant results through MATLAB.

REFERENCES:

1. Hamdy A Taha, "Operations Research An Introduction", Prentice Hall, Eighth Edition, 2007.
2. David G.Luenberger "Linear and Non linear Programming, Springer Publications, 3rd Edition, 2008
3. Rao S S "Optimization -Theory and Applications", Wiley Easten, New Delhi,1978.
4. Sivanandam S. N ,Deepa S N "Principles of Soft Computing" Wiley India Pvt.ltd, 2nd Edition,2007.
5. David E. Goldberg " Genetic Algorithm in search, Optimization and machine learning", Pearson, 1999.

IF8351 VIRTUALIZATION L T P C

3 0 0 3

OBJECTIVES:

- To understand the concept of virtualization.
- To understand the various issues in virtualization.
- To familiarize themselves with the types of virtualization.
- To compare and analyze various virtual machines products.

UNIT I OVERVIEW OF VIRTUALIZATION 10

Basics of Virtualization - Virtualization Types – Desktop Virtualization – Network Virtualization – Server and Machine Virtualization – Storage Virtualization – System-level
of Operating Virtualization – Application Virtualization-Virtualization Advantages - Virtual Machine Basics – Taxonomy of Virtual Machines - Process Virtual Machines - System Virtual Machines – Hypervisor - Key Concepts.

UNIT II SERVER CONSOLIDATION 8

Hardware Virtualization – Virtual Hardware Overview - Sever Virtualization – Physical and Logical Partitioning - Types of Server Virtualization – Business cases for Sever Virtualization – Uses of Virtual server Consolidation – Planning for Development –Selecting server Virtualization Platform.

UNIT III NETWORK VIRTUALIZATION 10

Design of Scalable Enterprise Networks - Virtualizing the Campus WAN Design – WAN Architecture - WAN Virtualization - Virtual Enterprise Transport Virtualization–VLANs and Scalability - Theory Network Device Virtualization Layer 2 - VLANs Layer 3 VRF Instances Layer 2 - VFIs Virtual Firewall Contexts Network Device Virtualization – DataPath Virtualization Layer 2: 802.1q - Trunking Generic Routing Encapsulation - IPsec L2TPv3 Label Switched Paths - Control-Plane Virtualization– Routing Protocols- VRF - Aware Routing Multi-Topology Routing.

UNIT IV VIRTUALIZING STORAGE 8

SCSI- Speaking SCSI- Using SCSI buses – Fiber Channel – Fiber Channel Cables –Fiber Channel Hardware Devices – iSCSI Architecture – Securing iSCSI – SAN backup and recovery techniques – RAID – SNIA Shared Storage Model – Classical Storage Model – SNIA Shared Storage Model – Host based Architecture – Storage based architecture – Network based Architecture – Fault tolerance to SAN – Performing Backups – Virtual tape libraries.

UNIT V VIRTUAL MACHINES PRODUCTS 9

Xen Virtual machine monitors- Xen API – VMware – VMware products - VMware Features – Microsoft Virtual Server – Features of Microsoft Virtual Server.

TOTAL:45 PERIODS

OUTCOMES:

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

- Create a virtual machine and to extend it to a virtual network.
- Discuss on various virtual machine products.
- Compile all types of virtualization techniques and utilize them in design of virtual machines.

REFERENCES:

1. William von Hagen, “Professional Xen Virtualization”, Wrox Publications, January, 2008.
2. Chris Wolf, Erick M. Halter, “Virtualization: From the Desktop to the Enterprise”, A Press 2005.
3. Kumar Reddy, Victor Moreno, “Network virtualization”, Cisco Press, July, 2006.
4. James E. Smith, Ravi Nair, “Virtual Machines: Versatile Platforms for Systems and Processes”, Elsevier/Morgan Kaufmann, 2005.
5. David Marshall, Wade A. Reynolds, “Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center”, Auerbach Publications, 2006.

SO8311 VIRTUALIZATION LABORATORY L T P C

0 0 3 2

OBJECTIVES :

- To acquire hands-on experience & familiarity in virtualization environment & techniques.
- To acquire the capability of implementing the virtualization techniques/concepts

OUTCOMES :

- Knowledge in the virtualization environment like vmware
- Ability to implement virtualization concepts/techniques

1. Install and Configuring Type-2 Hypervisors
2. Install and Configuring Type-1 Hypervisors
3. Deploying virtual machines using templates and converters
4. Modifying, managing and migrating virtual machines
5. Configuring user access control through roles and permissions, Workload assessment and monitoring configuration
6. Setup of resource pools and distributed resource scheduler cluster
7. Setup of high availability of cluster, Patch upgrades ,Backup and recovery of virtual machines
8. Install and Configuring Application Virtualization Infrastructures

REQUIREMENTS:

- CPU - Single socket, dual core
- Memory - Minimum: 2GB
- Network - one NIC, plus one for Management interface
- Local Storage (SATA/SAS) - Minimum: one 80GB drive
- Shared Storage - NFS, iSCSI, Fibre Channel for VM storage
- Hypervisor – Xen / vmwarevSphere(free edition) / KVM
- Application Virtualisation – Ulteo VDI (Open Source)

TOTAL : 45 PERIODS

SO8401 SYSTEMS MODELLING AND SIMULATION L T P C
3 0 0 3

OBJECTIVES:

- To obtain sufficient knowledge to model any given system,
- to simulate the modeled system for performance study.

UNIT I INTRODUCTION 9

System definition, Types and characteristics-Need for modeling and simulation-Types of Simulation-Introduction to discrete event simulation-Single server- Multiserver Exercises - system modeling - Simple Petrinets: Introduction to Petrinets,

UNIT II MODELLING APPROACHES 9

Modeling concurrent systems, Analysis of Petrinets-Finite state Automata and Regular Expressions: Finite state Automata and Regular Expression relationship, FSA with silent transitions, Pumping lemma for regular sets, Analysis using DFS and model checking.

UNIT III QUEUING MODELS 9

Characteristics of queuing systems-Notations-Types of Queues-Markovian model-Non-Markovian model-Queuing Networks-Applications of queuing systems.

UNIT IV SIMULATION DATA 11

Methods for generating random numbers, Testing of random numbers-Methods of generating random variates-Problem formulation-input modeling-Verification and Validation-Output Analysis.

UNIT V CASE STUDY 7

GPSS-Development of simulation models using GPSS for queuing systems, Production systems, Inventory systems, Networks, Maintenance Systems.

TOTAL:45 PERIODS

OUTCOMES:

- Modeling any given system with rationality.
- Predicting the behavior through fine grained analysis.

REFERENCES:

1. Fitzgerald, Jhon, Larsen,Peter Gorm , "Modelling Systems; Practical Tools and Techniques in software development", Cambridge University Press, 2009.
2. Hopcroft, John E, Motwani, Rajeev, Ullman, Seffrey D, "Introduction to automata theory, languages and computation", pearson/Addison Wesley, 3rd Edition,2007.
3. Donald Gross and Carl M. Harris, Fundamentals of Queueing theory, 2nd edition,John Wiley and Sons, New York (1985).
4. Hamdy A Taha, "Operations Research An Introduction", Prentice Hall, Eighth Edition, 2007.
5. Jerry Banks "Discrete-event system simulation", Pearson Eduaction, 2009.
6. Jeofrey Gordon " System Simulation", Prentice Hall of India, 2009.

IF8254 MOBILE AND PERVASIVE COMPUTING L T P C
3 0 0 3

OBJECTIVES :

- To understand the basics of Mobile computing and Personal computing.
- To learn the role of wireless networks in Mobile Computing and Pervasive Computing.
- To study about the underlying wireless networks.
- To understand the architectures of mobile and pervasive applications.
- To become familiar with the pervasive devices and mobile computing platforms.

UNIT I INTRODUCTION 9

Differences between Mobile Communication and Mobile Computing – Contexts and Names – Functions – Applications and Services – New Applications – Making Legacy Applications Mobile Enabled – Design Considerations – Integration of Wireless and Wired Networks – Standards Bodies – Pervasive Computing – Basics and Vision – Principles of Pervasive Computing – Categories of Pervasive Devices

UNIT II 3G AND 4G CELLULAR NETWORKS 9

Migration to 3G Networks – IMT 2000 and UMTS – UMTS Architecture – User Equipment – Radio Network Subsystem – UTRAN – Node B – RNC functions – USIM – Protocol Stack – CS and PS Domains – IMS Architecture – Handover – 3.5G and 3.9G a brief discussion – 4G LAN and Cellular Networks – LTE – Control Plane – NAS and RRC – User Plane – PDCP, RLC and MAC – WiMax IEEE 802.16d/e – WiMax Internetworking with 3GPP

UNIT III SENSOR AND MESH NETWORKS 9

Sensor Networks – Role in Pervasive Computing – In Network Processing and Data Dissemination – Sensor Databases – Data Management in Wireless Mobile Environments – Wireless Mesh Networks – Architecture – Mesh Routers – Mesh Clients – Routing – Cross Layer Approach – Security Aspects of Various Layers in WMN – Applications of Sensor and Mesh networks

UNIT IV CONTEXT AWARE COMPUTING 9

Adaptability – Mechanisms for Adaptation - Functionality and Data – Transcoding – Location Aware Computing – Location Representation – Localization Techniques – Triangulation and Scene Analysis – Delaunay Triangulation and Voronoi graphs – Types of Context – Role of Mobile Middleware – Adaptation and Agents – Service Discovery Middleware

UNIT V APPLICATION DEVELOPMENT 9

Three tier architecture - Model View Controller Architecture - Memory Management – Information Access Devices – PDAs and Smart Phones – Smart Cards and Embedded Controls – J2ME – Programming for CLDC – GUI in MIDP – Application Development ON Android and iPhone.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the student should be able to,

- To deploy 3G networks.
- To develop suitable algorithms for 4G networks.
- To use sensor and mesh networks to develop mobile computing environment.
- To develop mobile computing applications based on the paradigm of context aware computing.

REFERENCES:

1. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, “Mobile Computing: Technology, Applications and Service Creation”, Second Edition, Tata McGraw Hill, 2010.
2. Reto Meier, “Professional Android 2 Application Development”, Wrox Wiley, 2010.
3. .Pei Zheng and Lionel M Li, ‘Smart Phone & Next Generation Mobile Computing’, Morgan Kaufmann Publishers, 2006.
4. Frank Adelstein, ‘Fundamentals of Mobile and Pervasive Computing’, TMH, 2005
5. Jochen Burthardt et al, ‘Pervasive Computing: Technology and Architecture of Mobile Internet Applications’, Pearson Education, 2003
6. Feng Zhao and Leonidas Guibas, ‘Wireless Sensor Networks’, Morgan Kaufmann Publishers, 2004
7. Uwe Hansmaan et al, ‘Principles of Mobile Computing’, Springer, 2003
8. Reto Meier, “Professional Android 2 Application Development”, Wrox Wiley, 2010.
9. Stefan Poslad, “Ubiquitous Computing: Smart Devices, Environments and Interactions”, Wiley, 2009.

SO8411 SIMULATION TOOLS LABORATORY L T P C
0 0 3 2

OBJECTIVES:

- To introduce the basic concepts in simulation.
- To learn and implement the facilities in MATLAB.
- To understand the network related concepts through simulation in NS/2.

TOOLS:

MATLAB 2012 or higher version in Windows environment.
NS/2
(Network Simulator)

LIST OF EXPERIMENTS:

Installation and study of selected MATLAB tools.

Basic exercises (Graph plotting, Arithmetic calculations, Regular Expressions, etc.,) in MATLAB.

- Image Processing in MATLAB.
- Mini project in MATLAB
- Installation of NS/2.
- Study of Wired and Wireless environment in NS/2.
- Simple experiment to plot graph and edit TCL.
- Algorithm implementation for wired environment.
- Algorithm implementation for wireless environment.
- Networking in NS/2.
- Mini project in NS/2.

OUTCOME :

- Ability to simulate with Matlab & ns/2

TOTAL: 45 PERIODS

SO8501	**DYNAMIC PROGRAMMING**	**L T P C**
		3 0 0 3

OBJECTIVES:

To make more specific linear and non-linear approaches that suits both stochastic and deterministic applications. Also to ensure optimal results faster under any given situation.

UNIT I INTRODUCTION AND APPLICATIONS OF DYNAMIC PROGRAMMING 9

Characteristics of Dynamic Programming Problems, Formulation, Examples, Disadvantages of Dynamic Programming, Bellman's Principal of Optimality of Dynamic Programming, Applications of Dynamic Programming- Capital Budgeting Problem, Reliability Improvement Problem(Shortest path Problem), Minimizing Scheduling problem, Optimal Subdividing Problem solution of LPP through Dynamic Programming.

UNIT II DETERMINISTIC DYNAMIC PROGRAMMING 9

Introduction, Mathematical description, Principal of Optimality, Recursive computation, Multi stage Forward and Backward Recursion, Selected Dynamic Programming Applications – Cargo loading model, work force size model, equipment replacement model, investment model, inventory models, Problem of Dimensionality.

UNIT III PROBABILISTIC DYNAMIC PROGRAMMING 9

Introduction, Distribution of effort example, New product introduction, A decision Tree, Elementary inventory model, optimal Batch size model, Stochastic regeneration Model-Equipment Replacement, Sales Forecasting problem, Applicability and Computational feasibility.

UNIT IV DYNAMIC PROGRAMMING IN MARKOV CHAINS 9

Introduction, Stochastic Shortest-Route Model, Unbounded horizon with discounting $(\alpha < 1)$, equivalent Average Return $(\alpha = 1)$, Linear Programming Approach, Computational considerations, Markov chain version of the equipment replacement model.

UNIT V RISK, UNCERTAINTY AND COMPETITION 9

Terminology and Classification, Decision making under risk, Multistage Optimization under Risk, Markovian Decision Processes, A variable stage Stochastic Problem, Uncertainty and Adaptive Optimization, Gambling with unknown Probabilities, Two-Person, Zero-Sum Games, Games in Extensive.

TOTAL:45 PERIODS

OUTCOMES:

- Discrimination of concepts to be applied for various optimization approaches.
- Choosing appropriate concept for specific model.

REFERENCES:

1. Hamdy A Taha, "Operations Research an Introduction", Prentice Hall, Eighth Edition, 2007.
2. Harvey M.Wagner, " Principles of Operations Research with applications to Managerial Decisions", PHI Leraning Private Limited, 2nd Edition,2009
3. "Optimization in Operations Research", Ronald Lrdin, PHI, 1998.

CP8351 SECURITY PRINCIPLES AND PRACTICES L T P C
3 0 0 3

OBJECTIVES:

- To understand the mathematical foundations of security principles
- To appreciate the different aspects of encryption techniques
- To understand the role played by authentication in security
- To appreciate the current trends security practices

UNIT I INTRODUCTION AND MATHEMATICAL FOUNDATION 9

An illustrative communication game – safeguard versus attack – Probability and Information Theory - Algebraic foundations – Number theory.

UNIT II ENCRYPTION – SYMMETRIC TECHNIQUES 9

Substitution Ciphers – Transposition Ciphers – Classical Ciphers – DES – AES – Confidentiality Modes of Operation – Key Channel Establishment for symmetric cryptosystems.

UNIT III ENCRYPTION – ASYMMETRIC TECHNIQUES AND DATA TECHNIQUES 9

Diffie-Hellman Key Exchange protocol – Discrete logarithm problem – RSA cryptosystems & cryptanalysis – ElGamal cryptosystem – Need for stronger Security Notions for Public key Cryptosystems – Combination of Asymmetric and Symmetric Cryptography – Key Channel Establishment for Public key Cryptosystems - Data Integrity techniques – Symmetric techniques - Asymmetric techniques

UNIT IV AUTHENTICATION 9

Authentication Protocols Principles – Authentication protocols for Internet Security – SSH Remote logic protocol – Kerberos Protocol – SSL & TLS – Authentication frame for public key Cryptography – Directory Based Authentication framework – Non - Directory Based Public-Key Authentication framework .

UNIT V SECURITY PRACTICES 9

Protecting Programs and Data – Information and the Law – Rights of Employees and Employers – Software Failures – Computer Crime – Privacy – Ethical Issues in Computer Security.

TOTAL:45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to

- Use the mathematical foundations in security principles
- Identify the features of encryption and authentication
- Use available security practices

REFERENCES:

1. William Stallings, “Crpyptography and Network security: Principles and Practices”, Pearson/PHI, 5th Edition, 2010.
2. Behrouz A. Forouzan, “Cryptography and Network Security”, 2nd Edition, Tata McGraw Hill Education, 2010.
3. Wade Trappe, Lawrence C Washington, “Introduction to Cryptography with coding theory”, 2nd Edition, Pearson, 2007.
4. Douglas R. Stinson ,“Cryptography Theory and Practice ”, 3rd Edition, Chapman & Hall/CRC, 2006.
5. W. Mao, “Modern Cryptography – Theory and Practice”, Pearson Education, 2nd Edition, 2007.
6. Charles P. Pfleeger, Shari Lawrence Pfleeger, “Security in computing”, 3rd Edition, Prentice Hall of India, 2006.
7. Wenbo Mao, “Modern Cryptography – Theory and Practice”, Pearson Education, 2006.
8. Charlie Kaufman, Radia Perlman and Mike Speciner, “Network Security Private Communication in a Public World”, PHI, Second Edition, 2012

SO8003 DECISION MODELS L T P C
3 0 0 3

OBJECTIVES:

- This subject aimed towards helping the engineers and scientist to make rational decision,and to explore the supportive systems.

UNIT I INTRODUCTION 9

Types of decisions under certainty, probabilistic uncertainty, probabilistic imprecision, information-imperfection, conflict and cooperation- Prescriptive normative decision assessments-Utility theory-Group decision making.

UNIT II GAME THEORY 9

Overview of game theory- Pure and Mixed Strategies -Nash Equilibrium - Foundations for Nash Equilibrium- Dominated strategies - Iterated Elimination - Rationalizability- Applications of Iterated Dominance - Correlated Equilibrium - Refinements of Nash - Weak-Dominance - Trembling-Hand - Pareto-Dominance - Risk-Dominance - Coalition-Proofness.

UNIT III APPLICATION OF GAME THEORY 9

Extensive Form Games with Perfect Information - Ideas of Perfection - Paradox of Rationality - Applications of Game Theory - Bargaining - Coalitions - War of Attrition - Games with Incomplete Information Return to Strategic Form - Harsanyi's Idea - Bayesian Nash Equilibrium - Applications and Examples – Auctions.

UNIT IV DECISION SUPPORT SYSTEMS 9

Intelligent Support Systems – AI & Expert Systems – Knowledge based Systems –Knowledge Acquisition, Representation & Reasoning, Advanced intelligence system – Intelligence System over internet.

UNIT V CASE STUDY **9**

Implementing MSS in the E-Business ERA – Electronic Commerce – integration, Impacts and the future management support systems.

TOTAL:45 PERIODS

OUTCOME :

- Acquire the knowledge in decision models which strengthen the managerial/leadership capability in real time decision making.

TEXT BOOKS:

1. Andrew P Sage and James E Armstrong, "Introduction to Systems Engineering", Wiley Series (2000)
2. George J Klir, "Facets of Systems Science", Kluwer Publishers, 2001
3. Dixit, Skeath, "Games of Strategy" , Viva publications, 2010
4. Efrem G Mallach , "Decision Support and Data warehouse Systems ", McGraw Hill,2002

SO8006 ENTERPRISE ARCHITECTURES/ FRAMEWORK **L T P C**
3 0 0 3

OBJECTIVES:

- To learn the concepts of ERP,
- Architectures/ Framework

UNIT I INTRODUCTION TO ERP **9**

Integrated Management Information Seamless Integration – Supply Chain Management – Integrated Data Model – Benefits of ERP – Business Engineering and ERP – Definition of Business Engineering – Principle of Business Engineering – Business Engineering with Information Technology.

UNIT II BUSINESS MODELLING FOR ERP **9**

Building the Business Model – ERP Implementation – An Overview – Role of Consultant, Vendors and Users, Customization – Precautions – ERP Post Implementation Options-ERP Implementation Technology –Guidelines for ERP Implementation. The Business Framework - Capturing the Current State with on Entrepreneurship - Analyzing the Current State - Capturing the Target State - Analyzing the Target State

UNIT III ERP AND THE COMPETITIVE ADVANTAGE **9**

ERP domain MPGPRO – IFS/Avalon – Industrial and Financial Systems – Baan IV SAP/R3 Market Dynamics and Dynamic Strategy.

UNIT IV COMMERCIAL ERP **9**

Description – Multi-Client Server Solution – Open Technology – User Interface- Application Integration.

UNIT V SAP ARCHITECTURE **9**

Basic Architectural Concepts – The System Control Interfaces – Services – Presentation Interface – Database Interface.

TOTAL: 45 PERIODS

OUTCOMES:

- Choosing appropriate concepts of ERP
- Knowing ERP Architectures / Framework

REFERENCES:

1. Vinod Kumar Garg and N.K.Venkita Krishnan, “Enterprise Resource Planning – Concepts and Practice”, PHI, 1998.
2. Jose Antonio Fernandz, “The SAP R/3 Handbook”, TMH, 1998.

SO8007 PARALLEL PROGRAMMING L T P C
3 0 0 3

OBJECTIVES :

- To acquire knowledge in parallel programming
- Review parallel architecture and shared memory
- To study parallel algorithms

UNIT I PARALLEL PROGRAMMING 9

Introduction to parallel programming – data parallelism – functional parallelism – pipelining – Flynn's taxonomy – parallel algorithm design – task/channel model – Foster's design methodology – case studies: boundary value problem – finding the maximum – n-body problem – Speedup and efficiency – Amdahl's law – Gustafson-Barsis's Law – Karp-Flatt Metric – Isoefficiency metric.

UNIT II MESSAGE PASSING PROGRAMME 9

The message-passing model – the message-passing interface – MPI standard – basic concepts of MPI: MPI_Init, MPI_Comm_size, MPI_Comm_rank, MPI_Send, MPI_Recv, MPI_Finalize – timing the MPI programs: MPI_Wtime, MPI_Wtick – collective communication: MPI_Reduce, MPI_Barrier, MPI_Bcast, MPI_Gather, MPI_Scatter – case studies: the sieve of Eratosthenes, Floyd's algorithm, Matrix-vector multiplication

UNIT III SHARED-MEMORY PROGRAMMING 9

Shared-memory model – OpenMP standard – parallel for loops – parallel for pragma – private variables – critical sections – reductions – parallel loop optimizations – general data parallelism – functional parallelism – case studies: the sieve of Eratosthenes, Floyd's algorithm, matrix-vector multiplication – distributed shared-memory programming – DSM primitives

UNIT IV PARALLEL ALGORITHMS – I 9

Monte Carlo methods – parallel random number generators – random number distributions – case studies – Matrix multiplication – rowwise block-stripped algorithm – Cannon's algorithm – solving linear systems – back substitution – Gaussian elimination – iterative methods – conjugate gradient method

UNIT V PARALLEL ALGORITHMS – II 9

Sorting algorithms – quicksort – parallel quicksort – hyperquicksort – sorting by regular sampling – Fast fourier transform – combinatorial search – divide and conquer – parallel backtrack search – parallel branch and bound – parallel alp h a - b e ta search

TOTAL : 45 PERIODS

OUTCOMES :

- Ability to write programs for parallel systems
- Knowledgeable in parallel architecture and associated concepts

REFERENCES:

1. Michael J. Quinn, "Parallel Programming in C with MPI and Open MP", Tata McGraw -Hill Publishing Company Ltd., 2003.
2. B. Wilkinson and M. Allen, "Parallel Programming – Techniques and applications using networked workstations and parallel computers", Second Edition, Pearson Education, 2005.
3. M. J. Quinn, "Parallel Computing – Theory and Practice", Second Edition, Tata McGraw-Hill Publishing Company Ltd., 2002.

SO8009 SUPPLY CHAIN PLANNING AND MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To acquaint the concepts in supply chain in management ranging from planning for purchase to delivery of goods to customers.

UNIT I INTRODUCTION 9

Introduction to SCM-Development chain-Global Optimization-Managing uncertainty and risk-Evolution of SCM-Issues in SCM-Decision phase-Supply chain drivers and obstacles-SCM complexity.

UNIT II FORECASTING 9

Demand forecasting-Role of forecasting-Characteristics-Basic Approach-Time series method-Measures of forecast error-Aggregate planning in SCM-Aggregate planning using Linear Programming-Excel-Supply and demand planning in supply chain-Managing supply-Demand-Implementing solution.

UNIT III INVENTORY MANAGEMENT AND RISK POOLING 9

Introduction to inventory-Forms of inventory-Single stage control-EOQ-Lot size model-Demand uncertainty-Single period model-Review Policies-Risk Pooling-centralized Vs decentralized systems-Practical issues-Approaches for future demand.

UNIT IV NETWORK PLANNING AND PROCUREMENT STRATEGY 9

Network design-Inventory positioning and logistics and logistics co-ordination-Resource allocation-Transportation in a supply chain-Outsourcing benefits and risks-Buy/make Decisions-Procurement strategies-E-Procurement.

UNIT V CASE STUDIES 9

International supply chain-Coordinating SCM through E-Business-Financial Evaluation of supply chain Decision-Bullwhip effect-Information sharing and incentives-Performance impact of centralized and decentralized decision making-Role of IT.

TOTAL:45 PERIODS

OUTCOMES :

- Acquire knowledge in the management of supply chain assembly and role of IT in it.
- Capability of Inventory management, planning and decision making

REFERENCES:

1. Sunil Chopra, Peter Mendil, "Supply chain Management-Strategy, Planning and operation",Pearson, 2003.
2. Simchi-Levi, David, Kamisnky, "Designing and managing the supply chain: Concepts, Strategies and case studies", McGraw Hill, 3rd edition, 2008.
3. Handfield R B, Nicholas E.L 'Introduction to Supply Chain Management", PHI,1999.
4. Shapiro, J.F, "Modelling the Supply Chain", Dubury, 2001.
5. Hartmat Stadtler, Christoper Kilger, :Supply Chain Management and Advanced Planning Concepts, Models, Software and Case Studies", second edition, Springler, 2002.

CP8071 ADVANCED DATABASE ADMINISTRATION AND TUNING L T P C
3 0 0 3

OBJECTIVES:

At the end of the course the students would be able to

- Design and implement relational database solutions for general applications.
- Develop database scripts for data manipulation and database administration.
- Understand and perform common database administration tasks, such as database monitoring, performance tuning, data transfer, and security.
- To balance the different types of competing resources in the database environment so that the most important applications have priority access to the resources

UNIT I INTRODUCTION TO DATABASE ADMINISTRATION 9

Database Administration - DBA Tasks- Database Design -Performance Monitoring and Tuning – Availability - Database Security and Authorization - Backup and Recovery - Data Integrity- DBMS Release Migration - Types of DBAs - Creating the Database Environment **-** Choosing a DBMS - DBMS Architectures - DBMS Clustering -DBMS Proliferation - Hardware Issues -Installing the DBMS - DBMS Installation Basics Hardware Requirements -Storage Requirements Memory Requirements Configuring the DBMS - Connecting the DBMS to Supporting Infrastructure Software -Installation Verification - DBMS Environments - Upgrading DBMS Versions and Releases - Fallback Planning Migration Verification

UNIT II DATABASE SECURITY, BACKUP AND RECOVERY 9

Database Users - Granting and Revoking Authority - Types of Privileges - Granting to PUBLIC- Revoking Privileges - Security Reporting - Authorization Roles and Groups - Using Views for Security - Using Stored Procedures for Security Auditing External Security - Job Scheduling and Security - Image Copy Backups - Full vs. Incremental Backups - Database Objects and Backups - DBMS Control - Concurrent Access Issues Backup Consistency - Log Archiving and Backup - DBMS Instance Backup - Designing the DBMS Environment for Recovery - Alternate Approaches to Database Backup - Recovery - Determining Recovery Options Types of Recovery – DBA Tools – DBA Rules of Thumb.

UNIT III FUNDAMENTALS OF TUNING 9

Review of Relational Databases – Relational Algebra – Locking and Concurrency Control – Correctness Consideration – Lock Tuning – Logging and the Recovery Subsystem – Principles of Recovery – Tuning the Recovery Subsystem – Operating Systems Considerations – Hardware Tuning.

UNIT IV INDEX TUNING AND QUERY OPTIMIZATION 9

Types of Queries – Data Structures – B tree – B+ Tree - Hash Structures – Bit Map Indexes – Clustering Indexes – Non Clustering Indexes – Composite Indexes – Hot Tables – Comparison of Indexing and Hashing Techniques. Optimization Techniques - Tuning Relational Systems –- Normalization – Tuning Denormalization – Clustering Two Tables – Aggregate maintenance – Record Layout – Query Cache – Parameter Cache - Query Tuning – Triggers – Client Server Mechanisms – Objects, Application Tools and Performance –Tuning the Application Interface – Bulk Loading Data – Accessing Multiple Databases.

UNIT V TROUBLE SHOOTING 9

Query Plan Explainers – Performance Monitors – Event Monitors – Finding “Suspicious” Queries – Analyzing a Query’s Access Plan – Profiling a Query Execution – DBMS Subsystems.

TOTAL : 45 PERIODS

OUTCOMES:

- Advanced features of databases in design, administration, and applications
- Aspires to improve the performance of a database
- Optimize the use of existing resources within the database environment.

REFERENCES:

1. Craig S. Mullins, Database Administration: The Complete Guide to Practices and Procedures, Addison-Wesley Professional, 2002.
2. Dennis Shasha and Philippe Bonnet, Database Tuning, Principles, Experiments and Troubleshooting Techniques, Elsevier Reprint 2005.
3. Silberschatz, Korth, Database System Concepts, McGraw hill, 6th edition, 2010.
4. Thomas Connoly and Carlolyn Begg, Database Systems, A Practical Approach to Design, Implementation and Management, Fourth Edition, Pearson Education 2008.

CP8073 DATA MINING TECHNIQUES L T P C
3 0 0 3

OBJECTIVES:

- To Understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence
- To expose the students to the concepts of Dataware housing Architecture and Implementation
- To study the overview of developing areas – Web mining, Text mining and ethical aspects of Data mining
- To identify Business applications and Trends of Data mining

UNIT I INTRODUCTION TO DATA WAREHOUSING 8

Evolution of Decision Support Systems- Data warehousing Components –Building a Data warehouse, Data Warehouse and DBMS, Data marts, Metadata, Multidimensional data model, OLAP vs OLTP, OLAP operations, Data cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact constellations

UNIT II DATA WAREHOUSE PROCESS AND ARCHITECTURE 9

Types of OLAP servers, 3–Tier data warehouse architecture, distributed and virtual data warehouses. Data warehouse implementation , tuning and testing of data warehouse. Data Staging (ETL) Design and Development, data warehouse visualization, Data Warehouse Deployment, Maintenance, Growth, Business Intelligence Overview- Data Warehousing and Business Intelligence Trends - Business Applications- tools-SAS

UNIT III INTRODUCTION TO DATA MINING 9

Data mining-KDD versus data mining, Stages of the Data Mining Process-task premitives, Data Mining Techniques -Data mining knowledge representation – Data mining query languages, Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – Data cleaning, Data transformation, Feature selection, Dimensionality reduction, Discretization and generating concept hierarchies-Mining frequent patterns- association-correlation

UNIT IV CLASSIFICATION AND CLUSTERING 10

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Clustering techniques – , Partitioning methods- k-means- Hierarchical Methods – distance based agglomerative and divisible clustering, Density-Based Methods – expectation maximization -Grid Based Methods – Model-Based Clustering Methods – Constraint – Based Cluster Analysis – Outlier Analysis

UNIT V PREDICTIVE MODELING OF BIG DATA AND TRENDS IN DATA MINING 9

Statistics and Data Analysis – EDA – Small and Big Data –Logistic Regression Model - Ordinary Regression Model-Mining complex data objects – Spatial databases – Temporal databases – Multimedia databases – Time series and sequence data – Text mining – Web mining – Applications in Data mining

TOTAL: 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to

- Evolve Multidimensional Intelligent model from typical system
- Discover the knowledge imbibed in the high dimensional system
- Evaluate various mining techniques on complex data objects

TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, third edition2011, ISBN: 1558604898.
2. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", Tata McGraw Hill Edition, Tenth Reprint 2007.
3. G. K. Gupta, "Introduction to Data Min Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. Data Mining: Practical Machine Learning Tools and Techniques, Third edition,(Then Morgan Kufmann series in Data Management systems), Ian. H. Witten, Eibe Frank and Mark. A. Hall, 2011
5. Statistical and Machine learning – Learning Data Mining, techniques for better Predictive Modeling and Analysis to Big Data

REFERENCES:

1. Mehmed kantardzic, "Datamining concepts, models, methods, and logarithms", Wiley Inter science, 2003.
2. Ian Witten, Eibe Frank, Data Mining; Practical Machine Learning Tools and Techniques, third edition, Morgan Kaufmann, 2011.
3. George M Marakas, Modern Data Warehousing, Mining and Visualization, Prentice Hall, 2003.

MM8251 MULTIMEDIA DATABASES L T P C
3 0 0 3

OBJECTIVES:

- To study issues concerning both the traditional and modern database systems and technologies for multimedia data management.
- To understand the basic concepts and techniques pertinent to multimedia databases.
- To learn about Image databases and Text/Document databases, Audio and Video databases.
- To study and use advanced technologies to develop web– based multimedia applications.

UNIT I INTRODUCTION 9

An introduction to Object oriented Databases - Multidimensional Data Structures - K d Trees, Point Quad trees, -The MX Quad tree - R Trees – Comparison of Different Data Structures.

UNIT II IMAGE DATABASES AND TEXT/DOCUMENT DATABASES 9

Raw Images - Compressed Image Representations - Image Processing Segmentation, Similarity based Retrieval – Alternative Image DB Paradigms – Representing Image DBs with Relations – Representing Image DBs with R Trees – Retrieving Images By Spatial Layout - Implementations Text/Document Databases - Precision and Recall – Stop Lists – Word Stems and Frequency Tables – Latent Semantic Indexing -TV Trees – Other Retrieval Techniques.

UNIT III VIDEO DATABASES AND AUDIO DATABASES 9

Video Databases - Organizing Content of a Single Video – Querying Content of Video Libraries – Video Segmentation – video Standards Audio Databases - A General Model of Audio Data – Capturing Audio Content through Discrete Transformation – Indexing Audio Data.

UNIT IV MULTIMEDIA DATABASES 9

Design and Architecture of a Multimedia Database – Organizing Multimedia Data Based on The Principle of Uniformity – Media Abstractions – Query Languages for Retrieving Multimedia Data – Indexing SMDSs with Enhanced Inverted Indices – Query Relaxation/Expansion – Web based multimedia applications.

UNIT V OBJECT MODEL AND SPATIAL DATABASES 9

Creating Distributed Multimedia Presentations Objects in Multimedia Presentations – Specifying Multimedia Documents with Temporal Constraints – Efficient Solution for Temporal Presentation Constraints – Spatial Constraints. Introduction to Spatial Databases – Spatial Concepts and Data Models – Spatial Query Language – Spatial Storage and Indexing.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student will be able to

- Provide a basic study of the development of fundamental database systems.
- Understand the most fundamental MDBMS concepts and techniques
- Acquire knowledge of Image databases, Text/Document databases, Audio and Video databases.
- Grasp the modern database technologies suitable for multimedia data management, and Apply some of the advanced technologies such as spatial databases to develop web based multimedia applications.

REFERENCES

1. V.S. Subrahmanian," Principles of Multimedia Database Systems", Morgan Kauffman, 2nd Edition, 2013.
2. Shashi Shekhar, Sanjiv Chawla,"Spatial Databases", Pearson Education, 2002.
3. Lynne Dunckley,"Multimedia Databases An object relational approach", Pearson Education, 2003.
4. B.Prabhakaran,"Multimedia Database Systems", Kluwer Academic,1997.

SW8071 SOFTWARE VERIFICATION AND VALIDATION L T P C
3 0 0 3

OBJECTIVES:

- To understand the principles of verification and validation
- To appreciate the different verification and validation techniques
- To understand the various stages of testing
- To appreciate the use of tools for verification and validation
- To appreciate the benefit of using metrics for verification and validation

UNIT I INTRODUCTION 9

Principles of verification and validation – software architecture frameworks – model driven architecture – UML – systems modeling language – verification, validation and accreditation –

UNIT II METHODS OF SOFTWARE VERIFICATION 9

Verification and validation life cycle – traceability analysis – interface analysis – design and code verification – test analysis - Reviews – inspections - walkthroughs – audits – tracing – formal proofs – Model based verification and validation - Program verification techniques – formal methods of software verification – clean room methods

UNIT III TESTING 9

Stages of Testing: Test Planning – Test design – Test case definition – Test procedure – Test reporting – Unit testing: white box , black box and performance testing – system testing: Function, performance, interface, operations, resource, security, portability, reliability, maintainability, safety, regression and stress testing – integration testing – acceptance testing: capability, constraint testing - structured testing – structured integration testing –

UNIT IV TOOLS FOR SOFTWARE VERIFICATION 9

Tools for verification and validation: static analyser – configuration management tools – reverse engineering tools – tracing tools – tools for formal analysis – tools for testing – test case generators – test harnesses – debuggers – coverage analysers – performance analysers – test management tools

UNIT V ADVANCED APPROACHES 9

Automatic approach for verification and validation – validating UML behavioral diagrams – probabilistic model checking of activity diagrams in SysML – metrics for verification and validation

TOTAL: 45 PERIODS

OUTCOMES:

Upon Completion of the course the students will be able to

- Identify the different techniques for verification and validation
- Use available traceability analysis tools on some sample requirements
- Modify existing coverage analysers in terms of functionality or features used
- Design system test cases for application of your choice
- Use test case generators and test management tools for sample application

REFERENCES:

1. Mourad Debbabi, Hassaine F, Jarrya Y., Soeanu A., Alawneh L., Verification and Validation in Systems Engineering, Springer, 2010.
2. Marcus S. Fisher, Software Verification and Validation: An Engineering and Scientific Approach, Springer, 2007
3. ESA Board for Software Standardisation and Control (BSSC), Guide to software verification and Validation, European Space Agency ESA PSS-05-10 Issue 1 Revision 1, March 1995
4. Avner Engel, Verification, Validation & Testing of Engineered Systems, Wiley series in systems Engineering and Management, 2010.

SO8004 **DESIGN PATTERNS** **L T P C**
3 0 0 3

OBJECTIVE:

- To make students demonstrate and implement quality design patterns and their underlying object oriented concepts in java and to provide solutions to real world software design problems

UNIT I INTRODUCTION **9**

Definition - 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 CREATIONAL PATTERNS **9**

Abstract Factory - Builder - Factory Method - Prototype - Singleton

UNIT III STRUCTURAL PATTERN **9**

Adapter - Bridge - Composite - Decorator - Façade - Flyweight - Proxy.

UNIT IV BEHAVIORAL PATTERNS **9**

Chain of Responsibility - Command - Interpreter - Mediator - Memento - Observer - State - Strategy

UNIT V ADVANCED TOPICS **9**

Java Core APIs - Distributed Technologies - Jini and J2EE Architectures – Applications and Examples

OUTCOMES :

- Upon successful completion of the course, the student will be able to comprehend most important design patterns and apply object-oriented methodologies for innovating and designing reusable, modular, maintainable and modifiable software.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Erich Gamma, Richar Helm, Ralph Johnson, John Vlissides , “Design Patterns: Elements of Reusable Object-oriented Software”, Pearson Education India, 2004.
2. Eric Freeman, Elisabeth Robson, Bert Bates, Kathy Sierra , “Head First Design Patterns”, O'Reilly Media, Inc., 2004
3. Stephen Stelting, Olav Maassen, “Applied Java Patterns”, Prentice Hall Professional, 2002

CP8074 **REAL TIME SYSTEM DESIGN** **L T P C**
3 0 0 3

OBJECTIVE :

- To learn real time operating system concepts and the associated issues & techniques

UNIT I REAL TIME SPECIFICATION AND DESIGN TECHNIQUES 9

Introduction– Structure of a Real Time System –Task classes – Performance Measures for Real Time Systems – Estimating Program Run Times – Issues in Real Time Computing – Task Assignment and Scheduling – Classical uniprocessor scheduling algorithms –Fault Tolerant Scheduling.

UNIT II REAL TIME SPECIFICATION AND DESIGN TECHNIQUES 9

Natural languages – mathematical specification – flow charts – structured charts – pseudocode and programming design languages – finite state automata – data flow diagrams – petri nets – Warnier Orr notation – state charts – polled loop systems – phase / sate driven code – coroutines – interrupt – driven systems – foreground/background system – full featured real time operating systems.

UNIT III INTERTASK COMMUNICATION AND SYNCHRONIZATION 9

Buffering data – mailboxes – critical regions – semaphores – deadlock – process stack management – dynamic allocation – static schemes – response time calculation – interrupt latency – time loading and its measurement – scheduling is NP complete – reducing response times and time loading – analysis of memory requirements – reducing memory loading – I/O performance.

UNIT IV REAL TIME DATABASES 9

Real time Databases – Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency control issues, Disk Scheduling Algorithms, Two – phase Approach to improve Predictability – Maintaining Serialization Consistency – Databases for Hard Real Time Systems.

UNIT V EVALUATION TECHNIQUES 9

Reliability Evaluation Techniques – Obtaining parameter values, Reliability models for Hardware Redundancy – Software error models. Clock Synchronization – Clock, A Nonfault – Tolerant Synchronization Algorithm – Impact of faults – Fault Tolerant Synchronization in Hardware – Fault Tolerant Synchronization in software.

TOTAL : 45 PERIODS

OUTCOME:

- Understanding principles of real time systems design; be aware of architectures and behaviors of real time operating systems, database and applications.

REFERENCES:

1. C.M. Krishna, Kang G. Shin, “Real – Time Systems”, McGraw – Hill International Editions, 1997.
2. Rajib Mall, ”Real-time systems: theory and practice”, Pearson Education, 2007
3. Stuart Bennett, “Real Time Computer Control – An Introduction”, Prentice Hall of India, 1998.
4. R.J.A Buhur, D.L Bailey, “An Introduction to Real – Time Systems”, Prentice – Hall International, 1999.
5. Philip.A.Laplante, “Real Time System Design and Analysis”, Prentice Hall of India, 3rd Edition, April 2004.
6. Allen Burns, Andy Wellings, “Real Time Systems and Programming Languages”, Pearson Education, 2003.

CP8151 ADVANCED DATA STRUCTURES AND ALGORITHMS L T P C
3 0 0 3

OBJECTIVES:

- To extend the students' knowledge of algorithms and data structures, and to enhance their expertise in algorithmic analysis and algorithm design techniques.
- Expected to learn a variety of useful algorithms and techniques and extrapolate from them in order to then apply those algorithms and techniques to solve problems

UNIT I FUNDAMENTALS 9

Mathematical Proof Techniques: Induction, proof by contradiction, direct proofs - Asymptotic Notations – Properties of Big-oh Notation –Conditional Asymptotic Notation – Algorithm Analysis – Amortized Analysis – Introduction to NP-Completeness/NP-Hard – Recurrence Equations – Solving Recurrence Equations – Time-Space Tradeoff.

UNIT II HEAP STRUCTURES 9

Min/Max heaps – Deaps – Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Skew Heaps – Lazy-Binomial Heaps.

UNIT III SEARCH STRUCTURES 9

Binary Search Trees – AVL Trees – Red-Black trees – Multi-way Search Trees –B-Trees – Splay Trees – Tries.

UNIT IV GEOMETRIC ALGORITHMS 9

Segment Trees – 1-Dimensional Range Searching - k-d Trees – Line Segment Intersection - Convex Hulls - Computing the Overlay of Two Subdivisions - Range Trees - Voronoi Diagram.

UNIT V PARALLEL ALGORITHMS 9

Flynn's Classifications – List Ranking – Prefix computation – Array Max – Sorting on EREW PRAM – Sorting on Mesh and Butterfly – Prefix sum on Mesh and Butterfly – Sum on mesh and butterfly – Matrix Multiplication – Data Distribution on EREW, Mesh and Butterfly.

TOTAL : 45 PERIODS

OUTCOMES:

- Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class.
- Master a variety of advanced data structures and their implementations.
- Master different algorithm design techniques in computational geometry and in parallel algorithms.
- Ability to apply and implement learned algorithm design techniques and data structures to solve problems.

REFERENCES:

1. E. Horowitz, S. Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, University Press, 2007.
2. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall,1988.
3. Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars, Computational Geometry Algorithms and Applications, Third Edition, 2008
4. James A. Storer, An Introduction to Data Structures and Algorithms, Springer, New York, 2002.
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein Introduction to Al,2009.

IF8081 **SOFT COMPUTING** **L T P C**
3 0 0 3

OBJECTIVES:

- To learn the key aspects of Soft computing and Neural networks.
- To study the fuzzy logic components.
- To gain insight onto Neuro Fuzzy modeling and control.
- To know about the components and building block hypothesis of Genetic algorithm.
- To gain knowledge in machine learning through Support Vector Machines.

UNIT I INTRODUCTION TO SOFT COMPUTING **9**

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II GENETIC ALGORITHMS **9**

Introduction to Genetic Algorithms (GA) – Applications of GA - Building block hypothesis-Representation – Fitness Measures – Genetic Operators-. GA based Machine Learning.

UNIT III NEURAL NETWORKS **9**

Machine Learning using Neural Network, Adaptive Networks – Feed Forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Advances in Neural Networks.

UNIT IV FUZZY LOGIC **9**

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.

UNIT V NEURO-FUZZY MODELING **9**

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro-Fuzzy Control – Case Studies.

TOTAL :45 PERIODS

OUTCOMES:

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

- To discuss on machine learning through Neural networks.
- Apply knowledge in developing a Fuzzy expert system.
- Able to model Neuro Fuzzy system for clustering and classification.
- Discover knowledge to develop Genetic Algorithm and Support vector machine based machine learning system.

REFERENCES:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2003.
2. Kwang H.Lee, “First course on Fuzzy Theory and Applications”, Springer–Verlag Berlin Heidelberg, 2005.
3. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1995.
4. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Pearson Edn., 2003.
5. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Addison Wesley, 2007.

6. Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.
7. S.N.Sivanandam, S.N.Deepa, “ Introduction to Genetic Algorithms”, Springer, 2007.

SO8002 COMPUTER SYSTEM PERFORMANCE L T P C
3 0 0 3

OBJECTIVE:

- To learn the performance of computer systems.

UNIT I OVERVIEW OF PERFORMANCE EVALUATION 9

The Art of Performance Evaluation - Performance Projects - overview of Queuing; modeling cycle, workload characterization, sensitivity analysis, sources of insight, common mistakes, Systematic approach, Selection of evaluation techniques and performance metrics, Utility Classification and setting performance requirements.

UNIT II PERFORMANCE BOUNDS 9

Fundamental laws – basic quantities, little’s law, the forced flow law, the flow assumption, Queuing Network Model Inputs and Outputs –model inputs ,outputs, multiple class models, Bounds on performance – Asymptotic bounds, balanced system bounds. Types of workloads – addition Instruction, kernels, synthetic programs, application benchmarks, popular benchmarks, The art of workload selection –services, levels , representative ness, timeliness, other considerations

UNIT III MEASUREMENT TECHNIQUES AND TOOLS 9

workload characterization Techniques –Terminology, Averaging, Specifying Dispersion, Single-Parameter Histograms, Multi-parameter Histogram, Principal components Analysis, Markov models, Clustering. Data Presentation- Types of variables, graphics chart, Pictorial games, Gantt charts, Kiviat graphs, Schumacher charts, Decision maker’s games, Ratio games – Selection of appropriate Base System and Ratio metric, strategies, correct analysis.

UNIT IV EXPERIMENT DESIGN AND SIMULATION 9

Types of experimental design, Factorial design , effects of computation, sign table method, allocation of variation, estimation of experimental errors, analysis of variance, visual diagnostic tests, confidence intervals for effects, Simulation – common mistake, causes of failure, terminology, selection of language, types, event set algorithms, models with one job class, multiple job classes, flow equivalence and hierarchical modeling, disk I/O.

UNIT V QUEUING MODELS AND NETWORKS OF QUEUES 9

Introduction to Queuing theory –Notations, rules, little’s law, types of stochastic processes, Analysis of single queue – Birth –death processes, M/M/1 ,M/M/m , M/M/m/B with finite buffer, Queuing networks – Open and Closed, Product form, Queuing network models for computer systems. Case studies.

TOTAL: 45 PERIODS

OUTCOME:

- Learning the performance measurement techniques to evaluate the performance of computer systems

REFERENCES:

1. Raj Jain,"The Art of Computer Systems Performance Analysis: Techniques for Experimental Design, Measurement, Simulation, and Modeling", Wiley-Interscience, 1991
2. Kant K, Introduction to Computer System Perfromance Evaluation, Mc Graw- Hill Inc, !992
3. E.D. Lazowska, J. Zahorjan, G.S. Graham & K.C. Sevcik, "Quantitative System Performance", Prentice-Hall, 1984.
4. L. Kleinrock, "Queueuing Systems, Vol. 1: Theory", Wiley,1975.
5. L. Kleinrock, "Queueuing Systems, Vol. 2: Applications", Wiley 1976.
6. K.S. Trivedi, "Probability and Statistics with Reliability, Queueing and Computer Science Applications", Prentice-Hall,1982.
7. D.Ferrari, G. Serazzi & A.Zeigner, "Measurement and Tuning of Computer Systems", Prentice-Hall, 1983

SO8008 SOFTWARE TESTING AND QUALITY ASSURANCE L T P C
3 0 0 3

OBJECTIVES:

- To Know what is software and the usage of different types of software's.
- To know the Quality Metrics of various Software's.
- Plans, methods and process are executed to get a good Quality software.
- Knowing the methodologies in making Software.
- To test the product finally to check the product Quality.

UNIT I INTRODUCTION 9

Introduction to software quality - challenges – objectives – quality factors – components of SQA – contract review – development and quality plans – SQA components in project life cycle – SQA defect removal policies – Reviews

UNIT II TESTING METHODOLOGIES 9

Basics of software testing – test generation from requirements – finite state models – combinatorial designs - test selection, minimization and prioritization for regression testing – test adequacy, assessment and enhancement

UNIT III TEST STRATEGIES 9

Testing strategies – white box and black box approach – integration testing – system and acceptance testing – performance testing – regression testing - internationalization testing – ad-hoc testing – website testing – usability testing – accessibility testing Test plan – management – execution and reporting – software test automation – automated testing tools

UNIT IV SOFTWARE QUALITY 9

Hierarchical models of software quality – software quality metrics –function points -Software product quality – software maintenance quality – effect of case tools – software quality infrastructure – procedures – certifications – configuration management – documentation control.

UNIT V SQA IN PROJECT MANAGEMENT 9

Project progress control – costs – quality management standards – project process standards – management and its role in SQA – SQA unit

TOTAL :45 PERIODS

OUTCOMES:

- To analyze the product Quality by various testing methods.
- To use various testing methods for the appropriate applications.
- To assess Quality standards.

REFERENCES:

1. Daniel Galin, Software quality assurance – from theory to implementation , Pearson education, 2009.
2. Yogesh Singh, "Software Testing", Cambridge University Press, 2012.
3. Aditya Mathur, Foundations of software testing, Pearson Education, 2008
4. Ron Patton, Software testing , second edition, Pearson education, 2007
5. Srinivasan Desikan and Gopalaswamy Ramesh, Software testing – principles and practices , Pearson education, 2006
6. Alan C Gillies, “Software Quality Theory and Management”, Cengage Learning, Second edition, 2003
7. Robert Furtell, Donald Shafer, and Linda Shafer, "Quality Software Project Management", Pearson Education Asia, 2002.

SO8001 BUSINESS PROCESS MANAGEMENT L T P C
3 0 0 3

OBJECTIVE :

- To learn business process structure, framework and management

UNIT I ORGANIZATIONAL STRUCTURE 9

Structure of the Organization- Nature and Types of Organization – Organizational structures – Organizational Relationships – Formalization – Centralization – Forms and Outcomes – IT Industry and Organizational structures – Organizational Improvement – Emergence of Business Process Reengineering (BPR)

UNIT II BUSINESS PROCESS MANAGEMENT 9

Iceberg Syndrome- Change Management and performance measurement-Business Process Management – Significance of improving business process – Management of business process- Use of external BPM experts-Organization Strategy-Process architecture

UNIT III THE FRAMEWORK - I 9

Critical implementations aspects for a BPM Solution- Structured approach to implementing BPM-BPM Implementation framework-Organization approach to BPM implementations-Framework phases-Process-centric organization-Scenarios in implementing BPM-Iterative approach

UNIT IV THE FRAMEWORK - II 9

Organization strategy phase- Process architecture phase- Launch pad phase- Understand phase-Innovate phase- Develop phase – People phase - Implement phase- Realize value phase-Sustainable performance phase-Project Management- People change management-Leadership

UNIT V BPM AND THE ORGANIZATION 9

BPM maturity- BPM maturity model- Application of the BPMM model- Embedding BPM within the organization- Knowledge management and information technology

TOTAL: 45 PERIODS

OUTCOME:

- Acquire leadership/entrepreneurship qualities with respect to business processes

REFERENCES:

1. John Jeston and Johan Nelis, Business Process Management: Practical Guidelines to Successful Implementations, 2nd Edition, Butterworth-Heinemann, An imprint of Elsevier, 2009, ISBN-13: 978-0-7506-6921-4, ISBN-10: 0-7506-6921-7
2. Mathias Weske, Business Process Management: Concepts, Languages, Architectures, 2nd Edition, Springer, 20012, ISBN 978-3-642-28615-5
3. T.A. Venkatachalam, C.M. Sellappan, Business Process, PHI Learning Private Ltd, 2011

SO8005 DIGITAL ASSET MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To expose students to different aspects of digital content management.
- To explore the concepts of the creation, storage, retrieval, and presentation of digital assets.

UNIT I INTRODUCTION 9

Introduction to Digital Asset Management – Document and Content Management – Media Management –The Case for Digital Asset Management – Asset Formats.

UNIT II THE SYSTEM COMPONENTS 9

The System Components – XML - Cataloging and Indexing – Search Engines -- Databases – Disk storage and Media Servers – Mass Storage – Storage Management.

UNIT III CONTENT RELATED WORKFLOWS 9

Content Related Workflows - File Formats – Content Representation and Metadata - Content Description Standards – The Presentation Tier – The Application Server.

UNIT IV CONTENT MANAGEMENT 9

Content Management – Content Management System Infrastructure – System and Data Integration in CMS – Applications – Future Trends.

UNIT V DOCUMENT SECURITY AND DIGITAL RIGHTS MANAGEMENT 9

Document Security and Digital Rights Management – System Integration – Digital Asset Management Products – Applications.

TOTAL:45 PERIODS

OUTCOME :

- Acquire the ability to manage, control and efficient utilization of digital resources

REFERENCES:

1. Austerberry, D. (2006). Digital Asset Management 2nd Edition Burlington, MA: Focal Press.
2. Boiko, B. (2005). Content Management Bible, 2nd Edition, Wiley Publishing,
3. Mauthe, A & Thomas, P. Professional Content Management Systems: Handling Digital Media Assets. John Wiley & Sons Ltd., 2008