Bharath UNIVERSITY

பாரத் பல்கலைக்கழகம்

BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH

(Declared as Deemed-to-be-University, u/s 3 of the UGC Act, 1956)

M. TECH - SOFTWARE ENGINEERING

CURRICULLUM & SYLLABUS

2015 ONWARDS

DEPARTMENT OF SOFTWARE ENGINEERING

BHARATH INSTITUTE OF SCIENCE AND TECHNOLOGY

No: 173, Agaram Road, Selaiyur,

Chennai 600 073, TamilNadu.

BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH
DEPARTMENT OF SOFTWARE ENGINEERING
CURRICULUM-2015
DEGREE OF MASTER OF TECHNOLOGY
(IV SEMESTER PROGRAMME)
SEMESTER-I

Theory						
SL. NO	**SUB.CODE**	**SUBJECT NAME**	**L**	**T**	**P**	**C**
1	MMA101	Advanced Mathematics in Computing	3	1	0	4
2	MSE 101	Advances in Software Engineering	3	1	0	4
3	MSE 102	Formal Models for Software Verification	3	1	0	4
4	MSE 103	Advanced Data structures and algorithms	3	1	0	4
5	MSE 104	Software Project Management	3	1	0	4
Practical						
6	MSE1L1	Advanced Data Structures Lab	0	0	6	2

Total Credits: 22

SEMESTER-II

Theory						
SL.NO	**SUB.CODE**	**SUBJECT NAME**	**L**	**T**	**P**	**C**
1	MSE 201	Software Testing	3	1	0	4
2	MSE 202	Data warehousing and Data Mining	3	1	0	4
3	MSE 203	Big Data Analytics	3	1	0	4
4	MSE 204	Software Metrics and Quality Assurance	3	1	0	4
5	MSE 205	Distributed Operating System	3	1	0	4
Practical						
6	MSE 2L1	Software Testing Lab	0	0	6	2

Total Credits: 22

SEMESTER-III

Theory						
SL.NO	**SUB.CODE**	**SUBJECT NAME**	**L**	**T**	**P**	**C**
1	MSE 301	Software Design Patterns	3	1	0	4
2	MSE 3E1	Elective – I	3	1	0	4
3	MSE 3E1	Elective – II	3	1	0	4
4	MSE 3E2	Elective – III	3	1	0	4
Project						
5	MSE 3P1	Project Phase – I	0	0	12	6

Total Credits: 22

SEMESTER-IV

SL.NO	**SUB.CODE**	**SUBJECT NAME**	**L**	**T**	**P**	**C**
Project						
1	MSE 4P2	Project Phase – II	0	0	24	12

Total Credits: 12

TOTAL NO. OF CREDITS FOR THE PROGRAMME : 78

LIST OF ELECTIVES

SUB.CODE	SUBJECT NAME	L	T	P	C
ELECTIVE -I					
MSE 111	OBJECT ORIENTED SYSTEM DESIGN	3	1	0	4
MSE 112	SOFTWARE ENGINEERING AND PROJECT MANAGEMANT	3	1	0	4
MSE 113	OBJECT ORIENTED ANALYSIS AND DESIGN	3	1	0	4
MSE 114	SOFTWARE RELIABILITY	3	1	0	4
MSE 115	SOFTWARE QUALITY MANAGEMENT	3	1	0	4
ELECTIVE -II					
MSE 116	ADVANCE DATABASE TECHNOLOGY	3	1	0	4
MSE 117	PARALLEL AND DISTRIBUTED DATABASES	3	1	0	4
MSE 118	ADVANCED DATABASE ADMINISTRATION AND TUNING	3	1	0	4
MSE 119	OBJECT ORIENTED DATABASE DESIGN	3	1	0	4
ELECTIVE -III					
MSE 120	CRYPTOGRAPHY AND COMPUTER SECURITY	3	1	0	4
MSE 121	AD HOC AND WIRELESS SENSOR NETWORKS	3	1	0	4
MSE 122	WIRELESS SENSOR NETWORKS AND PROGRAMMING	3	1	0	4
MSE 123	TCP/IP TECHNOLOGY	3	1	0	4
MSE 124	NETWORK SECURITY AND MANAGEMENT	3	1	0	4
MSE 125	TCP/IP PRINCIPLES AND ARCHITECTURE	3	1	0	4
MSE 126	WIRELESS NETWORKING AND MOBILE COMPUTING	3	1	0	4
ELECTIVE- IV					
MSE 127	INFORMATION RETRIEVAL TECHNIQUES	3	1	0	4
MSE 128	TEXT DATA MINING	3	1	0	4
MSE 129	WEB DATA MINING	3	1	0	4
MSE 130	SOCIAL NETWORK ANALYSIS	3	1	0	4
MSE 131	DIGITAL SIGNAL PROCESSING	3	1	0	4
ELECTIVE- V					
MSE 132	IMAGE PROCESSING	3	1	0	4
MSE 133	PATTERN RECOGNITION TECHNIQUES	3	1	0	4
MSE 134	MULTIMEDIA SYSTEMS	3	1	0	4
MSE 135	SECURITY PRINCIPLES AND PRACTICES	3	1	0	4
MSE 136	ADVANCED WEB DESIGN	3	1	0	4
MSE 137	E-COMMERCE	3	1	0	4
MSE 138	SPEECH RECOGNITION	3	1	0	4
MSE 139	MULTICORE ARCHITECTURE	3	1	0	4
MSE 140	STOCHASTIC PROCESSES & QUEUEING THEORY	3	1	0	4
MSE 141	REAL TIME SYSTEMS DESIGN	3	1	0	4
MSE 142	GRAPH THEORY AND OPTIMIZATION	3	1	0	4

	TECHNIQUES				
MSE 143	FUZZY AND GENETIC ALGORITHM	3	1	0	4
MSE 144	MIDDLEWARE TECHNOLOGIES	3	1	0	4
MSE 145	HUMAN COMPUTER INTERACTION	3	1	0	4
MSE 146	COMPONENT BASED SYSTEM DESIGN	3	1	0	4
MSE 147	DISTRIBUTED OPERATING SYSTEM	3	1	0	4
MSE 148	EMBEDDED SYSTEM	3	1	0	4

MMA 101 ADVANCED MATHEMATICS IN COMPUTING 3 1 0 4

OBJECTIVES:

- To understand the basics of random variables and standard distributions
- To understand the arrival process and various queuing 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.

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
- Study and design appropriate queuing model for a given problem or system situation
- To understand and simulate appropriate application and distribution problems
- Differentiate and infer the merit of sampling tests.
- Formulate and find optimal solution in the real life optimizing, allocation and assignment problems involving conditions and resource constraints.

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

QUEUING 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 PERIODS: 60

TEXT BOOKS:

1. Hamdy A. Taha, "Operations Research: An Introduction", Prentice Hall of India Pvt., Ltd. New Delhi, Eighth Edition, 2007.
2. Johnson, R.A. Miller and Freund's," Probability and Statistical for Engineers, Prentice Hall of India Pvt., Ltd., New Delhi, Seventh Edition, 2005.

REFERENCES:

1. Jay L. Devore," Probability and Statistics for Engineering and the Sciences", Cengage Learning,Seventh Edition, 2009.
2. Winston, W.L., "Operations Research", Thomson – Brooks/Cole, Fourth Edition,2003.
3. J.Medhi," Stochastic models of Queuing Theory", Academic Press, Elsevier, Amsterdam, 2003.
4. Ross. S.M., "Probability Models for Computer Science", Academic Press, 2002.

MSE101 ADVANCES IN SOFTWARE ENGINEERING 3 1 0 4

OBJECTIVES:

- To have a clear understanding of Software Engineering concepts.
- To gain knowledge of the Analysis and System Design concepts.
- To learn how to manage change during development.
- To learn the SOA and AOP concepts.

OUTCOMES:

- A clear understanding of Software Engineering concepts.
- Knowledge gained of Analysis and System Design concepts.
- Ability to manage change during development.
- Basic idea of the SOA and AOP concepts.

UNIT I INTRODUCTION 12

System Concepts – Software Engineering Concepts - Software Life Cycle– Development Activities – Managing Software Development – Unified Modelling Language – Project Organization – Communication.

UNIT II ANALYSIS 12

Requirements Elicitation – Use Cases – Unified Modelling Language, Tools – Analysis Object Model (Domain Model) – Analysis Dynamic Models – Non-functional requirements – Analysis Patterns.

UNIT III SYSTEM DESIGN 12

Overview of System Design – Decomposing the system -System Design Concepts – System Design Activities – Addressing Design Goals – Managing System Design.

UNIT IV IMPLEMENTATION AND MANAGING CHANGE 12

Programming languages and coding- Human computer interaction-Reusing Pattern Solutions – Specifying Interfaces – Mapping Models to Code – Testing Rationale Management – Configuration Management – Project Management -Real time interface design(eg: mobile design)

UNIT V ASPECT ORIENTED SOFTWARE DEVELOPMENT 12

AO Design Principles -Separations of Concerns, Subject Oriented Decomposition, Traits, Aspect Oriented Decomposition, Theme Approach, Designing Base and Crosscutting Themes, Aspect-Oriented Programming using Aspect-J.

TOTAL PERIODS: 60

TEXT BOOKS:

1. Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd edition, Pearson Education, 2004.
2. Craig Larman, Applying UML and Patterns, 3rd ed, Pearson Education, 2005.
3. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007.

REFERENCES:

1. AspectJ in Action, RamnivasLaddad, Manning Publications, 2003
2. Aspect-Oriented Software Development, Robert E. Filman, TzillaElrad, Siobhan Clarke, and Mehmet Aksit, October 2006.
3. Aspect-Oriented Software Development with Use Cases, (The Addison-Wesley Object Technology Series), Ivar Jacobson and Pan-Wei Ng, December 2004
4. Aspect-Oriented Analysis and Design: The Theme Approach, (The Addison-Wesley Object Technology Series), Siobhàn Clarke and Elisa Baniassad, March 2005.
5. Mastering AspectJ: Aspect-Oriented Programming in Java, Joseph D. Gradecki and Nicholas Lesiecki, March 2003.

MSE102 FORMAL MODELS OF SOFTWARE SYSTEMS 3 1 0 4

OBJECTIVES:

- Successful completion of this course will provide you with the knowledge and skills to understand the strengths and weaknesses of certain models and logics, including state machines, algebraic and trace models, and temporal logics.
- Apply your understanding to select and describe abstract formal models for certain classes of systems Reason formally about the elementary properties of modeled systems.

OUTCOMES:

Upon completion of the course, students would have obtained:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to identify, formulate, and solve engineering problems
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.

UNIT I FOUNDATIONS OF Z 12

Understanding formal methods – motivation for formal methods – informal requirements to formal specifications – validating formal specifications – Overview of Z specification – basic elements of Z – sets and types – declarations – variables – expressions – operators – predicates and equations.

UNIT II STRUCTURES IN Z 12

Tuples and records – relations, tables, databases – pairs and binary relations – functions – sequences – propositional logic in Z – predicate logic in Z – Z and Boolean types – set comprehension – lambda calculus in Z – simple formal specifications – modeling systems and change.

UNIT III Z SCHEMAS AND SCHEMA CALCULUS 12

schemas – schema calculus – schema conjunction and disjunction – other schema calculus operators – schema types and bindings – generic definitions – free types – formal reasoning – checking specifications – precondition calculation – machine-checked proofs.

UNIT IV CASE STUDIES 1 2

Case Study: Text processing system – Case Study: Eight Queens – Case Study: Graphical User Interface – Case Study: Safety critical protection system – Case Study: Concurrency and real time systems.

UNIT V Z REFINEMENT 1 2

Refinement of Z specification – generalizing refinements – refinement strategies – program derivation and verification – refinement calculus – data structures – state schemas – functions and relations – operation schemas – schema expressions – refinement case study.

TOTAL PERIODS: 60

TEXT BOOKS:

1. Jonathan Jacky, "The way of Z: Practical programming with formal methods", Cambridge University Press, 1996.
2. Antony Diller, "Z: An introduction to formal methods", Second Edition, Wiley, 1994.
3. Jim Woodcock and Jim Davies, "Using Z – Specification, Refinement, and Proof", Prentice Hall,1996.

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REFERENCES:

1. J. M. Spivey, "The Z notation: A reference manual", Second Edition, Prentice Hall, 1992.
2. M. Ben-Ari, "Mathematical logic for computer science", Second Edition, Springer, 2003.
3. M. Huth and M. Ryan, "Logic in Computer Science – Modeling and Reasoning about systems", Second Edition, Cambridge University Press, 2004

MSE103 ADVANCED DATA STRUCTURES AND ALGORITHMS 3 1 0 4

OBJECTIVES:

- To understand the principles of iterative and recursive algorithms.
- To learn the graph search algorithms.
- To study network flow and linear programming problems.
- To learn the hill climbing and dynamic programming design techniques.
- To develop recursive backtracking algorithms.
- To get an awareness of NP completeness and randomized algorithms.
- To learn the principles of shared and concurrent objects.
- To learn concurrent data structures.

OUTCOMES:

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

- Design and apply iterative and recursive algorithms.
- Design and implement optimization algorithms in specific applications.
- Design appropriate shared objects and concurrent objects for applications.
- Implement and apply concurrent linked lists, stacks, and queues.

UNIT I ITERATIVE AND RECURSIVE ALGORITHMS 12

Iterative Algorithms: Measures of Progress and Loop Invariants-Paradigm Shift: Sequence of Actions versus Sequence of Assertions- Steps to Develop an Iterative Algorithm-Different Types of Iterative Algorithms--Typical Errors-Recursion-Forward versus Backward- Towers of Hanoi-Checklist for Recursive Algorithms-The Stack Frame-Proving Correctness with Strong Induction- Examples of Recursive Algorithms-Sorting and Selecting Algorithms-Operations on Integers- Ackermann's Function- Recursion on Trees-Tree Traversals- Examples- Generalizing the Problem - Heap Sort and Priority Queues-Representing Expressions.

UNIT II OPTIMISATION ALGORITHMS 12

Optimization Problems-Graph Search Algorithms-Generic Search-Breadth-First Search-Dijkstra's Shortest-Weighted-Path -Depth-First Search-Recursive Depth-First Search-Linear Ordering of a Partial Order- Network Flows and Linear Programming-Hill Climbing-Primal Dual Hill Climbing- Steepest Ascent Hill Climbing-Linear Programming-Recursive Backtracking-Developing Recursive Backtracking Algorithm- Pruning Branches-Satisfiability

UNITIII DYNAMIC PROGRAMMING ALGORITHMS 12

Developing a Dynamic Programming Algorithm-Subtle Points- Question for the Little Bird-Subinstances and Subsolutions-Set of Subinstances-Decreasing Time and Space-Number of Solutions-Code. Reductions and NP-Completeness-Satisfiability-Proving NP-Completeness- 3-Coloring- Bipartite Matching. Randomized Algorithms-Randomness to Hide Worst Cases-Optimization Problems with a Random Structure.

UNIT IV SHARED OBJECTS AND CONCURRENT OBJECTS 12

Shared Objects and Synchronization -Properties of Mutual Exclusion-The Moral- The Producer–Consumer Problem -The Readers–Writers Problem-Realities of Parallelization-Parallel Programming-Principles- Mutual Exclusion-Time- Critical Sections--Thread Solutions-The Filter Lock-Fairness-Lamport's Bakery Algorithm-Bounded Timestamps-Lower Bounds on the Number of Locations-

Concurrent Objects- Concurrency and Correctness-Sequential Objects- Quiescent Consistency- Sequential Consistency-Linearizability- Formal Definitions- Progress Conditions- The Java Memory Model.

UNIT V CONCURRENT DATA STRUCTURES 12

Practice-Linked Lists-The Role of Locking-List-Based Sets-Concurrent Reasoning- Coarse- Grained Synchronization-Fine-Grained Synchronization-Optimistic Synchronization- Lazy Synchronization-Non-Blocking Synchronization-Concurrent Queues and the ABA Problem- Queues-A Bounded Partial Queue-An Unbounded Total Queue-An Unbounded Lock-Free Queue-Memory Reclamation and the ABA Problem- Dual Data Structures- Concurrent Stacks and Elimination- An Unbounded Lock-Free Stack-Elimination-The Elimination Backoff Stack.

TOTAL PERIODS: 60

TEXT BOOKS:

1. Jeff Edmonds, "How to Think about Algorithms", Cambridge University Press, 2008.
2. M. Herlihy and N. Shavit, "The Art of Multiprocessor Programming", Morgan Kaufmann,2008.
3. Steven S. Skiena, "The Algorithm Design Manual", Springer, 2008.

REFERENCES:

1. Peter Brass, "Advanced Data Structures", Cambridge University Press, 2008.
2. S. Dasgupta, C. H. Papadimitriou, and U. V. Vazirani, "Algorithms" , McGrawHill, 2008.
3. J. Kleinberg and E. Tardos, "Algorithm Design", Pearson Education, 2006.
4. T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein, "Introduction to Algorithms", PHI Learning Private Limited, 2012.
5. Rajeev Motwani and Prabhakar Raghavan, "Randomized Algorithms", Cambridge University Press, 1995.
6. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "The Design and Analysis of Computer Algorithms**",** Addison-Wesley, 1975.
7. A. V. Aho, J. E. Hopcroft, and J. D. Ullman,"Data Structures and Algorithms", Pearson,2006.

MSE104 SOFTWARE PROJECT MANAGEMENT 3 1 0 4

OBJECTIVES:

- The students should develop all the necessary requirements based on IEEE standards or any other standardized standards and should prepare requirement document and design document after completion.
- Use any open source software for requirements elicitation, requirements analysis and requirements validation.
- Use any open source software for performing software design based on the Requirements obtained in 2 for each system.

OBJECTIVES:

- The students should develop all the necessary requirements based on IEEE standards or any other standardized standards and should prepare requirement document and design document after completion.
- Use any open source software for requirements elicitation, requirements analysis and requirements validation.
- Use any open source software for performing software design based on the requirements obtained in 2 for each system.

UNIT-I: Introduction and Software Project Planning 12

Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

UNIT-II 12

Project Organization and Scheduling Project Elements, Work Breakdown Structure (WBS),
Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

UNIT-III
Project Monitoring and Control 12
Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

UNIT-IV: Software Quality Assurance and Testing 12
Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA

Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.

UNIT-V

Project Management and Project Management Tools **12**

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

TOTAL PERIODS: 60

TEXT BOOKS:

1. M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
2. Royce, Software Project Management, Pearson Education,2010

REFERENCES:

1. Kieron Conway, Software Project Management, Dreamtech Press
2. S. A. Kelkar, Software Project Management, PHI Publication.

M**SE1L1** **ADVANCED DATA STRUCTURES LABORATORY** **0 0 6 2**

OBJECTIVES:

- To learn to implement iterative and recursive algorithms.
- To learn to design and implement algorithms using hill climbing and dynamic programming techniques.
- To learn to implement shared and concurrent objects.
- To learn to implement concurrent data structures.

OUTCOMES:

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

- Design and apply iterative and recursive algorithms.
- Design and implement algorithms using the hill climbing and dynamic programming and Recursive backtracking techniques.
- Design and implement optimization algorithms for specific applications.
- Design and implement randomized algorithms.
- Design appropriate shared objects and concurrent objects for applications.
- Implement and apply concurrent linked lists, stacks, and queues.

LAB EXERCISES:

- Implementation of graph search algorithms.
- Implementation and application of network flow and linear programming problems.
- Implementation of algorithms using the hill climbing and dynamic programming design techniques.
- Implementation of recursive backtracking algorithms.
- Implementation of randomized algorithms.
- Implementation of various locking and synchronization mechanisms for concurrent linked lists, concurrent queues, and concurrent stacks.
- Developing applications involving concurrency.

TOTAL PERIODS: 45

SEMESTER-II

MSE201 SOFTWARE TESTING 3 1 0 4

OBJECTIVES:

- To know the behavior of the testing techniques to detect the errors in the software
- To understand standard principles to check the occurrence of defects and its removal.
- To learn the functionality of automated testing tools
- To understand the models of software reliability.

OUTCOMES:

- Test the software by applying testing techniques to deliver a product free from bugs
- Evaluate the web applications using bug tracking tools.
- Investigate the scenario and the able to select the proper testing technique
- Explore the test automation concepts and tools
- Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma
- Evaluate the estimation of cost, schedule based on standard metrics

UNIT I TESTIING ENVIRONMENT AND TEST PROCESSES 12

World-Class Software Testing Model – Building a Software Testing Environment - Overview of Software Testing Process – Organizing for Testing – Developing the Test Plan – Verification Testing – Analyzing and Reporting Test Results – Acceptance Testing – Operational Testing – Post Implementation Analysis.

UNIT II TESTING TECHNIQUES AND LEVELS OF TESTING 12

Using White Box Approach to Test design - Static Testing Vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs –Using Black Box Approaches to Test Case Design – Random Testing – Requirements based testing – Decision tables –State-based testing – Cause-effect graphing – Error guessing – Compatibility testing – Levels of Testing - Unit Testing - Integration Testing - Defect Bash Elimination. System Testing - Usability and Accessibility Testing – Configuration Testing - Compatibility Testing - Case study for White box testing and Black box testing techniques.

UNIT III INCORPORATING SPECIALIZED TESTING RESPONSIBILITIES 12

Testing Client/Server Systems – Rapid Application Development Testing – Testing in a Multiplatform Environment – Testing Software System Security - Testing Object-Oriented Software – Object Oriented Testing – Testing Web based systems – Web based system – Web Technology Evolution – Traditional Software and Web based Software – Challenges in Testing for Web-based Software –Testing a Data Warehouse - Case Study for Web Application Testing.

UNIT IV TEST AUTOMATION 12

Selecting and Installing Software Testing Tools - Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Tracking the Bug – Debugging – Case study using Bug Tracking Tool.

UNIT V SOFTWARE TESTING AND QUALITY METRICS 12

Testing Software System Security - Six-Sigma – TQM - Complexity Metrics and Models – Quality Management Metrics - Availability Metrics - Defect Removal

Effectiveness - FMEA - Quality Function Deployment – Taguchi Quality Loss Function – Cost of Quality. Case Study for Complexity and Object Oriented Metrics.

TOTAL PERIODS : 60

REFERENCES:

1. William Perry, "Effective Methods of Software Testing", Third Edition, Wiley Publishing 2007
2. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2007.
3. NareshChauhan, "Software Testing Principles and Practices" Oxford University Press, New Delhi, 2010.
4. Dale H. Besterfiled et al., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint (2006).
5. Stephen Kan, "Metrics and Models in Software Quality", Addison – Wesley, Second Edition, 2004.
6. LleneBurnstein, " Practical Software Testing", Springer International Edition, Chennai, 2003
7. RenuRajani,Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill,2004.
8. Edward Kit, "Software Testing in the Real World – Improving the Process", Pearson Education, 1995.

MSE202 DATA WAREHOUSING AND DATA MINING 3 1 0 4

OBJECTIVES:

- To expose the students to the concepts of Data warehousing Architecture and
- Implementation
- To Understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence
- To learn to use association rule mining for handling large data
- To understand the concept of classification for the retrieval purposes
- To know the clustering techniques in details for better organization and retrieval of data
- To identify Business applications and Trends of Data mining

OUTCOMES:

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

- Store voluminous data for online processing
- Preprocess the data for mining applications
- Apply the association rules for mining the data
- Design and deploy appropriate classification techniques. Cluster the high dimensional data for better organization of the data
- Discover the knowledge imbibed in the high dimensional system
- Evolve Multidimensional Intelligent model from typical system
- Evaluate various mining techniques on complex data objects

UNIT I DATA WAREHOUSE 12

Data Warehousing - Operational Database Systems vs. Data Warehouses - Multidimensional Data Model - Schemas for Multidimensional Databases – OLAP Operations – Data Warehouse Architecture – Indexing – OLAP queries & Tools.

UNIT II DATA MINING & DATA PREPROCESSING 12

Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Pre-processing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT III ASSOCIATION RULE MINING 12

Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-Based Association Mining.

UNIT IV CLASSIFICATION & PREDICTION 12

Classification vs. Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT V CLUSTERING 12

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint- Based Cluster Analysis – Outlier Analysis.

TOTAL PERIODS: 60

REFERENCES:

1. Jiawei Han and MichelineKamber, "Data Mining Concepts and Techniques" Second Edition, Elsevier, Reprinted 2008.
2. K.P. Soman, ShyamDiwakar and V. Ajay, "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. BERSON, ALEX & SMITH, STEPHEN J, Data Warehousing, Data Mining, and OLAP, TMH Pub. Co. Ltd, New Delhi, 2012
5. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Pearson Education, 2007
6. PRABHU Data Warehousing, PHI Learning Private Limited, New Delhi, 2012, ,
7. PONNIAH, PAULRAJ, Data Warehousing Fundamentals, John Wiley & Sons, New Delhi, 2011
8. MARAKAS, GEORGE M, Modern Data Warehousing, Mining, and Visualization, Pearson Education, 2011.
9. Boris Beizer, " Software Testing Techniques" – 2nd Edition, Van Nostrand Reinhold, New York, 1990
10. Adithya P. Mathur, "Foundations of Software Testing – Fundamentals algorithms and techniques", Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

MSE203 BIG DATA ANALYTICS 3 1 0 4

OBJECTIVES:

- To explore the fundamental concepts of big data analytics
- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques.
- To learn to use various techniques for mining data stream.
- To understand the applications using Map Reduce Concepts.

OUTCOMES:

At the end of this course the students will be able to:

- Work with big data platform and its analysis techniques.
- Analyze the big data for useful business applications.
- Select visualization techniques and tools to analyze big data
- Implement search methods and visualization techniques
- Design efficient algorithms for mining the data from large volumes.
- Explore the technologies associated with big data analytics such as NoSQL, Hadoop and Map Reduce.

UNIT I INTRODUCTION TO BIG DATA 12

Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

UNIT II DATA ANALYSIS 12

Regression Modeling - Multivariate Analysis – Bayesian Methods – Bayesian Paradigm - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction - Fuzzy Logic: Extracting Fuzzy Models from Data - Fuzzy Decision Trees

UNIT III SEARCH METHODS AND VISUALIZATION 12

Search by simulated Annealing – Stochastic, Adaptive search by Evaluation – Evaluation Strategies – Genetic Algorithm – Genetic Programming – Visualization – Classification of Visual Data Analysis Techniques – Data Types – Visualization Techniques – Interaction techniques – Specific Visual data analysis Techniques.

UNIT IV MINING DATA STREAMS 12

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT V FRAMEWORKS 12

Map Reduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed File Systems– Case Study.

TOTAL PERIODS: 60

REFERENCES:

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
6. Jiawei Han, MichelineKamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.
7. Da Ruan,Guoquing Chen, Etienne E.Kerre, Geert Wets, Intelligent Data Mining, Springer,2007
8. Paul Zikopoulos ,Dirk deRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles , David Corrigan, Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, 2012

M**SE 204 SOFTWARE METRICS AND QUALITY ASSURANCE 3 1 0 4**

OBJECTIVES:

- To understand software metrics and measurement.
- To emphasize the use of product and quality metrics.
- To explain quality assurance and various tools used in quality management.
- To learn in detail about various quality assurance models.
- To understand the audit and assessment procedures to achieve quality.

OUTCOMES:

- Knowledge on how to choose which metrics to collect and use them to make predictions.
- Ken on product and quality metrics.
- Understand how to detect, classify, prevent and remove defects.
- Choose appropriate quality assurance models and develop quality.
- Ability to conduct formal inspections, record and evaluate results of inspections.

UNIT I INTRODUCTION TO SOFTWARE METRICS 12

Fundamentals of measurement-Scope of software metrics-Measurement theory-Software measurement validation software metrics data collection – Analysis methods.

UNIT II PRODUCT AND QUALITY METRICS 12

Measurement of internet product attributes-size and structure-external product attributes-measurement of quality- Software quality metrics-product quality-process quality- metrics for software maintenance.

UNIT III FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE 12

SQA basics-Software quality in business context – Planning for software quality assurance – Product quality and process quality – Software process models -Total Quality Management- 7 QC Tools and Modern Tools.

UNIT IV QUALITY ASSURANCE MODELS 12

Models for Quality Assurance-ISO-9000 – Series- CMM- CMMI-Test Maturity Models, SPICE, Malcolm Baldrige Model- P-CMM.

UNIT V SOFTWARE QUALITY ASSURANCE TRENDS 12

Software Process- PSP and TSP - OO Methodology, Clean-room software engineering, Defect injection and prevention -Internal Auditing and Assessments-Inspections & Walkthroughs.

TOTAL PERIODS: 60

REFERENCES:

1. Norman E-Fentor and Share Lawrence Pflieger.” Software Metrics”. International Thomson Computer Press, 1997.

2. Stephen H.Kan,”Metric and Models in software Quality Engineering”, Addison QWesley1995.

3. S.A.Kelkar,”Software quality and Testing, PHI Learing, Pvt, Ltd., New Delhi 2012.

4. Watts S Humphrey, “Managing the Software Process”, Pearson Education Inc, 2008.

5. Mary Beth Chrissis, Mike Konrad and Sandy Shrum, “CMMI”, Pearson Education(Singapore) Pte Ltd, 2003

6. Philip B Crosby, " Quality is Free: The Art of Making Quality Certain ", Mass Market, 1992.

MSE205 DESIGN OF DISTRIBUTED SYSTEMS 3 1 0 4

OBJECTIVES:

- To explore the fundamental concepts
- To learn to analyze the distributed operating systems.
- To understand the various search methods and models.
- To learn to use various techniques designing distributed operating systems.
- To understand the applications of OS.

UNIT – I **12**

Introduction – Examples of Distributed Systems – Resource Sharing and the Web – Challenges- System Models - Introduction – Architectural Models – Functional Models Characterization of Distributed Systems – Client-Server Communication – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications.

UNIT - II **12**

Distributed Operating Systems - Introduction – Issues – Communication Primitives – Inherent Limitations - Lamport's Logical Clock; Vector Clock; Causal Ordering; Global State; Cuts; Termination Detection. Distributed Mutual Exclusion – Non-Token Based Algorithms – Lamport's Algorithm - Token-Based Algorithms – Suzuki-Kasami's Broadcast Algorithm – Distributed Deadlock Detection – Issues – Centralized Deadlock-Detection Algorithms - Distributed Deadlock-Detection Algorithms. Agreement Protocols – Classification - Solutions –Applications.

UNIT- III **12**

Distributed Resource Management - Distributed File systems – Architecture – Mechanisms – Design Issues – Distributed Shared Memory – Architecture – Algorithm – Protocols - Design Issues. Distributed Scheduling – Issues – Components – Algorithms.

UNIT- IV **12**

Introduction to Distributed Algorithms, Kinds of Distributed Algorithm, Timing Models. Synchronous Network Algorithms: Synchronous Network Model, Leader Election in a synchronous Ring, Algorithms in a General Synchronous Networks, Distributed Consensus with Link Failures, Distributed Consensus with Process failures, More Consensus problems.

UNIT-V **12**

Resource Security and Protection - Introduction – The Access Matrix Model – Implementation of Access Matrix Model – Safety in the Access Matrix Model – Advanced Models of protection – Data Security.

TOTAL PERIODS: 60

REFERENCES

1. George Coulouris, Jean Dellimore and Tim KIndberg, "Distributed Systems Concepts and Design", Pearson Education, 4th Edition, 2005 [Unit-I] 2. Mukesh Singhal and N. G. Shivaratri, "Advanced Concepts in Operating Systems", 3. McGraw-Hill, 2001 [Units II - IV] 4. Joshy Joseph and Craig Fellenstein, "Grid Computing", IBM Press, 2004. [Unit –V] 5. Ajay D. Kshemkalyani and Mukesh Singhal, " Distributed Computing – Principles, 6. Algorithms and Systems", Cambridge University Press, 2008. 7. Pradeep K. Sinha, Distributed Operating Systems, PHI, 2005. 8. Nancy A. Lynch, Distributed Algorithms, Morgan Kaufmann Publishers, 2000.

CASE STUDY 1

Cause Effect Graph Testing for a Triangle

Perform cause effect graph testing to find a set of test cases for the following program specification: Write a program that takes three positive integers as input and determine if they represent three sides of a triangle, and if they do, indicate what type of triangle it is. To be more specific, it should read three integers and set a flag as follows:

- If they represent a scalene triangle, set it to 1.
- If they represent an isosceles triangle, set it to 2.
- If they represent an equilateral triangle, set it to 3.
- If they do not represent a triangle, set it to 4.

CASE STUDY 2

Boundary Value Analysis for a Software Unit

The following is a specification for a software unit. The unit computes the average of 25 floating point numbers that lie on or between bounding values which are positive values from
1.0 (lowest allowed boundary value) to 5000.0 (highest allowed boundary value). The bounding values and the numbers to average are inputs to the unit. The upper bound must be greater than the lower bound. If an invalid set of values is input for the boundaries an error message
appears and the user is reported. If the boundary values are valid the unit computes the sum and the average of the numbers on and within the bounds. The average and sum are output by
the unit, as well as the total number of inputs that lie within the boundaries. Derive a set of equivalence classes for the averaging unit using the specification, and complement the classes using boundary value analysis. Be sure to identify valid and invalid classes.

Design a set of test cases for the unit using your equivalence classes and boundary values. For each test case, specify the equivalence classes covered, input values, expected outputs, and test case identifier. Show in tabular form that you have covered all the classes and boundaries. Implement this module in the programming language of your choice. Run the module with your test cases and record the actual outputs. Save an uncorrected version of the program for future use.

CASE STUDY 3

Cyclomatic Complexity for Binary Search

Draw a control flow graph for the given binary search code and clearly label each node so that it is linked to its corresponding statement. Calculate its cyclomatic complexity.intbinsearch (intx,int v[], int n)

```
{
int low, high, mid;
low =0;
high  = n-1;
while (low <=high) {
mid
=(low+high)
```

```
/2 if (x <
v[mid]
high =
mid&ndash;1;
else if (x >
v[mid]) low =
mid+1;
else /* found match*/
return mid;
}
return–1; /* no match*/
}
```

CASE STUDY 4

Data Flow Testing for Gregorian Calendar

A program was written to determine if a given year in the Gregorian calendar is a leap year. The well-known part of the rule, stipulating that it is a leap year if it is divisible by 4, is implemented correctly in the program. The programmer, however, is unaware of the exceptions: A centenary year, although divisible by 4, is not a leap year unless it is also divisible by 400. Thus, while year
2000 was a leap year, the years 1800 and 1900 were not. Determine if the following test-case selection criteria are reliable or valid.

(a) C1(T) ≡ (T = {1, 101, 1001,

10001}) (b) C2(T) ≡ (T = {t|1995

≥ t ≥ 2005})

(c) C3(T) ≡ (T = {t|1895 ≥ t ≥ 1905})
(d) C4(T) ≡ (T = {t} ∧ t ∋ {400, 800, 1200, 1600, 2000, 2400})

(e) C5(T) ≡ (T = {t, t + 1, t + 2, t + 3, t + 4} ∧ t ∋ {100, 200, 300, 400,500})

(f) C6(T) ≡ (T = {t, t + 1, t + 2, . . . , t + 399} ∧ t ∋ D)

(g) C7(T) ≡ (T = {t1, t2, t3} ∧ t1, t2, t3 ∋ D)

CASE STUDY 5

State based Testing for an Assembler

Suppose you were developing a simple assembler whose syntax can be described as follows :
<statement_ :: = <label field><op code><address>
<label field> :: = ‘‘none’’ |
<identifier> :
<op code> :: = MOVE |
JUMP
<address> :: = <identifier> | <unsigned
integer>

A stream of tokens is input to the assembler. The possible states for such an assembler are:
S1, prelabel; S2, label; S3, valid op code; S4, valid address; S5, valid numeric address. Start, Error, and Done. A table that describes the inputs and actions for the assembler is as follows:

Inputs
Actions

no more tokens A1: Put the label in the symbol table.

Identifier A2: Look up the op code and store its binary value in op code

field. MOVE, JUMP A3: Look up symbol in symbol table and store its value in

address field. colon A4: Convert number to binary, and store that

value in address field.

Integer A5: Place instruction in the object module, and print a line in the listing.

A6: Print error message and put all zeroes in the instruction.

Using this information and any assumptions you need to make, develop a state transition diagramfor the assembler. From the state transition diagram develop a set of test cases that will cover allof the state transitions. Be sure to describe the exact sequence of inputs as well as the expected Sequence of state changes and actions.

CASE STUDY 6

Stress Testing of a Map-Aided Vehicle Tracking and Scheduling System

The American package courier and freight business faced the double pressures of consolidation and unstoppable increases in fuel costs. In mid-2008, pump prices were already double those prevailing in early 2007. As well, the recent decision of long-time price leader DHL to "co-locate" dozens of routes with erstwhile competitor UPS revealed just how fragile are market positions built through decades of promotions.
In Omaha, regional freight leader Red Ball Trucking1 was keener than most to maximize operating efficiencies out of its substantial fleet of trucks and vans and thereby maintain margins
in the face of low-cost rivals. In March 2008, a brand-new map-based adjunct to the company's proprietary logistics and routing system neared rollout. Extensive "white box", line-by-line testing
had eliminated most ofthe gross errors but the Red Ball CEO was concerned about the scalability of the program test bed.

Find out whether the map-enhanced vehicle tracking and scheduling system would remain stable at benchmarks of 50, 100 and 1000 concurrent users. Clean up any remaining bugs not caught by in-house.

CASE STUDY 7

Model Based Testing
Design and develop a scientific calculator program using various GUI components and events. Build the test model for the same. Determine the inputs that can be given to the model. Calculate expected output for the model. Run the test cases. Compare the actual output with the expected output. Any model based technique can be used for building the test model.

CASE STUDY 8

Web Application Testing for Student Grade System

With educational organizations under increasing pressure to improve their performance to secure funding for future provision of programmes, it is vital that they have accurate, up-to-date information. For this reason, they have MIS systems to record and track student enrolment and results on completion of a learning programme. In this way they can monitor achievement statistics. All student assignment work is marked and recorded by individual module tutors using a spreadsheet, or similar, of their own design. In the computing department these results are input into a master spreadsheet to track a student's overall progress throughout their programme of study. This is then made available to students through the web portal used in college. Perform web application testing for this scenario.

TOTAL PERIODS: 45

MSE301 SOFTWARE DESIGN PATTERNS 3 1 0 4

OBJECTIVES:

- How to add functionality to designs while minimizing complexity.
- What code qualities they need to maintain to keep code flexible.
- Understanding the common design patterns.
- Identifying the appropriate patterns for design problems.
- Refactoring the badly designed program properly using patterns.

OUTCOMES:

- Be able to Design and implement codes with higher performance and lower complexity
- Be aware of code qualities needed to keep code flexible
- Understand core design principles and be able to assess the quality of a design with respect to these principles.
- Be capable of applying these principles in the design of object oriented systems.
- Demonstrate an understanding of a range of design patterns. be capable of comprehending a design presented using this vocabulary.
- Be able to select and apply suitable patterns in specific contexts.
- Understand and apply refactoring techniques in the context of design patterns.

UNIT I INTRODUCTION 12

Introduction – Design Patterns in Smalltalk MVC – Describing Design patterns –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 – What makes a pattern? – Pattern Categories – Relationship between Patterns – Patterns and Software Architecture

UNIT II DESIGN PATTERNS FROM POSA1 12

Whole Part – Master Slave –Command Processor – View Handler – Forward Receiver – ClientDispatcher Server

UNIT III CREATIONAL AND STRUCTURAL DESIGN PATTERNS 12

Abstract Factory - Factory Method – Prototype - Singleton – Builder Adapter Pattern – Decorator – Façade – Proxy - Bridge

UNIT IV BEHAVIORAL DESIGN PATTERNS AND IDIOMS 12

Chain of Responsibility – Mediator – Observer – Strategy– Memento Idioms – Pattern Systems

UNIT V CASE STUDY 1 2

Case Study Designing a Document Editor - What to expect from Design Patterns – A brief History of Design Patterns – The Pattern Community – Where will Patterns Go? – The Past, Present and the Future of Patterns - Anti Patterns.

TOTAL PERIODS: 60

TEXT BOOKS:

1. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, “Design patterns: Elements of Reusable object-oriented software”, Addison-Wesley, 1995.

REFERENCES:

1. Frank Bachmann, Regine Meunier, Hans Rohnert “Pattern Oriented Software Architecture” – Volume 1, 1996.
2. William J Brown et al., "Anti-Patterns: Refactoring Software, Architectures and Projects in
3. Crisis", John Wiley, 1998.

ELECTIVE –I

MSE 111 **OBJECT ORIENTED SYSTEM DESIGN** **3 1 0 4**

OBJECTIVE:

- The objective of this course is to expose the students to the Fundamentals and benefits of software reuse and some reuse problems.
- To provide a clear understanding of the advance concepts in developing different types of reusable component and processes for reuse.

OUTCOMES:

- To prepare object oriented design for small and medium scale problem.
- To evaluate the appropriate life cycle model for the system under consideration.
- To apply the various tools and patterns while developing software
- Testing the software against usability, deployment, maintenance.

UNIT -I **12**

Review of the traditional methodologies, Object oriented methodology, Advantage of Object oriented methodology.

UNIT- II **12**

Fundamental concepts of Object Orientation: Object, Class, Abstraction, Interface, Implementation, Aggregation, Composition, Generalization, Sub-Class and Polymorphism, Architecture Style, Object –oriented software engineering, application & component systems, use case components, object components, layered architecture.

UNIT- III **12**

Sub- Systems, Services, Coupling, Cohesion and Layering, Static and dynamic aspects of collaborations Reuse processes, Object oriented business engineering, applying business engineering to define processes & organization, application family engineering, component system engineering, application system engineering

UNIT - IV **12**

Organizing a reuse business: Its transaction, Management, working Component based software development: component definition, component meta model, component engineering vs application engineering.

UNIT -V **12**

Visual Modeling, Object Oriented Modeling, Component based and Model driven development using UML:, UML Basics, Component specification, context realization Mapping Design (Models) to Code – Testing - Usability – Deployment – Configuration Management – Maintenance

TOTAL HOURS: 60

TEXT BOOKS:

1. Alistair Cockburn, “Agile Software Development” 2nd edition, Pearson Education, 2007.

2. Bernd Bruegge, Alan H Dutoit, “Object-Oriented Software Engineering”, 2nd edition, Pearson Education, 2003.

MSE 112 SOFTWARE ENGINEERING AND PROJECT MANAGEMANT 3 1 0 4

OBJECTIVE:

- To provide students with a clear understanding of the unique risks, issues, and critical success factors associated with technology projects.
- To introduce students to the role and function of project management.

OUTCOMES:

- It Enables the students understand what is a product, project and process is.
- It enables students understand the lifecycle for a software project.
- It enables students understand how the quality of a software product is calculated.

UNIT -I **12**

Exposure to Software Project Management: Software development as a project, Stakeholders in software project, Software product, process, resources, quality, and cost, Objectives, issues, and problems relating to software projects.

UNIT -II **12**

Overview of Project Planning: Steps in project planning; Defining scope and objectives; work breakdown structure; Deliverables and other products

UNIT -III **12**

Software Effort Estimation: Problem in software estimation; Effort estimation techniques COCOMO model.

Risk Analysis and Management: Nature and categories of risk in software development; risk Identification; Risk assessment; Risk mitigation, monitoring, and management;

UNIT -IV **12**

Selection of Appropriate Project Approach: Rapid application development; Waterfall model; V-process model; Spiral model; Prototyping, Incremental delivery.

UNIT -V **12**

Software Quality Assurance : Planning for quality; Product versus process quality management; Procedural and quantitative approaches; Defect analysis and prevention; Statistical process control; Pareto analysis; Causal analysis; Quality standards; ISO 9000; Capability Maturity Model; Quality audit.

TOTAL HOURS: 60

TEXT BOOKS:

1. Bob Hughes and Mike Cotterell," Software Project Management", Tata McGraw-Hill Edition,2010
2. Joel Henry ,"Software Project Management" , Pearson Education,2009.
3. Pankaj Jalote ,"Software Project Management in practice" , Pearson Education.2005

REFERENCE:

1. S. A. Kelkar ,"Software Project Management" , ,PHI,2012.

MSE113 OBJECT ORIENTED ANALYSIS AND DESIGN 3 1 0 4

OBJECTIVES:

- To enable the students to design UML diagrams and to develop applications.
- To help the students to visualize the structure of the system and to reduce the system development time thereby increasing the productivity according to the industrial standards.

OUTCOMES:

The student will be able to

- Understand the importance of systems analysis and design in solving complex problems.
- Construct various UML models using the appropriate notation.
- Apply the rational software suit for the construction of UML models and expressing the appropriate notation associated with each model.

UNIT- I **12**

INTRODUCTION

Object Basics - Classes and Objects - Inheritance - Object relationship - Dynamic binding - OOSD Life Cycle - Analysis - Design - Implementation - Testing.

UNIT -II **12**

METHODOLOGY AND UML

Overview of methodologies - OMT, Booch methodology, Jacobson methodology; Patterns - Frameworks - Unified Approach - UML - Static and Dynamic Modeling, UML diagrams.

UNIT -III **12**

ANALYSIS

Use case model; Approaches for identifying classes - Noun Phrase approach - Responsibilities - collaborators - Identifying Object relationships - case study.

UNIT -IV **12**

DESIGN

Design Process - Design Axioms, Class Design, Object Storage and Object Interoperability; Access Layer - OODBMS, View Layer; case study.

UNIT -V **12**

SOFTWARE QUALITY

Testing Strategies - Test cases - Test plan - Continuous testing - debugging principles - case study.

TOTAL HOURS: 60

TEXT BOOKS:

1 .Booch G., "Object Oriented Analysis and Design", Addison Wesley Publishing Company, 3rd Edition, 2009.
2.Ali Bahrami, "Object Oriented System Development", McGraw Hill International Edition,2008.
3.Mike O'docherty, ., "Object Oriented Analysis and Design", Addison Wesley Publishing Company, 2nd Edition, 2005.

REFERENCES:

1. Michael Blaha,"Object Oriented Modeling and Design", Pearson, 2012.
2. B.S.Ainapure, ,"Object Oriented Modeling and Design",Pearson,2005.

MSE114 SOFTWARE RELIABILITY 3 1 0 4

OBJECTIVES:

To provide knowledge in

- Design principles for creating safe and reliable systems
- Reliability modelling
- Current trends in software reliability.

OUTCOMES:

- Understand common principles of software and system reliability engineering and also system safety.
- Learn about software reliability measures.
- Study software test methodology.
- Learn about modeling software reliability growth.
- Analyze the reliability of multi-component systems.

UNIT -I **12**

INTRODUCTION TO RELIABILITY ENGINEERING

Reliability - Repairable and Non Repairable systems - Maintainability and Availability - Designing for higher reliability - Redundancy - MTBF - MTTF MDT - MTTR- k out of in systems

UNIT -II **12**

SOFTWARE RELIABILITY

Software reliability - Software reliability Vs Hardware reliability - Failures and Faults - Classification of Failures - Counting - System Configuration - Components and Operational Models - Concurrent Systems - Sequential Systems - Standby Redundant systems

UNIT -III **12**

SOFTWARE RELIABILITY APPROACHES

Fault Avoidance - Passive Fault detection - Active Fault Detection - Fault Tolerance - Fault Recovery - Fault Treatment

UNIT IV **12**

SOFTWARE RELIABILITY MODELING

Introduction to Software Reliability Modeling - Parameter Determination and Estimation - Model Selection - Markovian Models - Finite and Infinite failure category Models - Comparison of Models - Calendar Time Modeling

UNIT V **12**

SPECIAL TOPICS IN SOFTWARE RELIABILITY

Management Techniques for reliability - Organization and Staffing - Programming Languages and Reliability - Computer Architecture and Reliability - Proving Program correctness & Reliability Design - Reliability Testing - Reliability Economics

TOTAL HOURS: 60

TEXT BOOKS

1. John D. Musa, "Software Reliability", McGraw Hill, 2004.
2. Patric D. T.O Connor, "Practical Reliability Engineering", 4th Edition, John Wesley & sons, 2003

REFERENCES

1. Doron Peled, “Software Reliability Methods”,Springer,2011.
2. Alessandro Birolini, "Reliability Engineering", Springer ,2010.

MSE115 SOFTWARE QUALITY MANAGEMENT 3 1 0 4

OBJECTIVES:

- To understand how to choose appropriate quality goals and to select, to plan, and to execute quality assurance activities throughout development and evolution to predictably meet quality and schedule goals.
- To study the software quality engineering metrics and models
-

OUTCOMES:

The student will be able to

- employ software metrics and models in software development
- select the best quality assurance plan during development

UNIT -I **12**

INTRODUCTION

Concepts of Quality Control, Quality Assurance, Quality Management - Total Quality Management; Cost of Quality; QC tools - 7 QC Tools and Modern Tools; Other related topics - Business Process Re-engineering - Zero Defect, Six Sigma, Quality Function Deployment, Benchmarking, Statistical process control.

UNIT -II **12**

SOFTWARE ENGINEERING PRINCIPLES

Software Engineering Principles, Software Project Management, Software Process, Project and Product Metrics, Risk Management.

UNIT -III **12**

SOFTWARE QUALITY ASSURANCE MODELS

Software Quality Assurance; Statistical Quality Assurance - Software Reliability, Models for Quality Assurance - ISO-9000 - Series, CMM, SPICE, Malcolm Baldrige Award.

UNIT -IV **12**

SOFTWARE PROCESSES & TESTING

Software Process - Definition and implementation; internal Auditing and Assessments; Software testing - Concepts, Tools, Reviews, Inspections & Walkthroughs; P-CMM.

UNIT -V **12**

TQM

Total Quality Management - Introduction, Software reuse for TQM, Software testing method for TQM, Defect Prevention and Total Quality Management, Zero Defect Software Development, Clean room Engineering.

TOTAL HOURS: 60

TEXT BOOKS

1.Allan Gillies, "Software quality Theory & Management ", Thomson international Press ,2011.

2.Amitava Mitra, ”Fundamentals of Quality Control and Improvement” ,Wiley, 2008.

REFERENCES:

1.Roger Pressman, "Software Engineering ", 6th edition, McGraw Hill, 2005.

2. Kim H. Pries, Jon M. Quigley, "Total Quality Management for Software", CRC Press, 2005.

ELECTIVE II

MSE 116 ADVANCE DATABASE TECHNOLOGY 3 1 0 4

OBJECTIVE:

- The objective of this course is to expose the students to the implementation techniques of database system.
- This course explains techniques for query processing and optimization with transaction and concurrency control techniques

OUTCOMES:

- It enables the students to understand the concept of relational databases and relational operations.
- It enables the students to understand the concept of Object Oriented Databases and its Operations.
- It enables the students to understand the concept of Parallel and Distributed Databases.

UNIT- I

RELATIONAL DATABASES **12**

Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Multi valued and Join Dependency, Normal Forms, Rules about functional dependencies.

UNIT -II

QUERY PROCESSING AND OPTIMIZATION **12**

Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.

UNIT -III

OBJECTED ORIENTED AND OBJECT RELATIONAL DATABASES **12**

Modelling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

UNIT - IV

PARALLEL AND DISTRIBUTED DATABASES **12**

Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modelling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, Parallel Query Evaluation.

UNIT -V

ADVANCED TRANSACTION PROCESSING **12**

Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors. Multimedia databases, Databases on the Web and Semi–Structured Data Case Study: Oracle 10g and 11i.

TOTAL HOURS: 60

TEXT BOOKS:

1. Dietrich, and Urban, "An Advanced Course in Database Systems", Pearson, 2008.
2.Elmarsi, Navathe, Somayajuu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
3.Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007.

REFERENCES:

1.Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007.
2. Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3. Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006.

MSE117 PARALLEL AND DISTRIBUTED DATABASES 3 1 0 4

OBJECTIVES :

- To realize the need of parallel processing, to cater the applications that require a system capable of sustaining trillions of operations per second on very large data sets
- To understand the need of data integration over data centralization

OUTCOMES:

- Students Get good knowledge on the need, issues ,design and application of both parallel and distributed databases.
- Students know how to write optimal queries to cater applications of that need these forms of databases.
- Students be able to fragment, replicate and localize their data as well as their queries to get their work done faster.
- Students Get idea on other similar trends of optimal data processing

UNIT I **12**

INTRODUCTION TO PARALLEL DATABASES

Need of Parallelism - Forms of parallelism – architecture – Analytical models. Basic Query Parallelism – Parallel Search- Parallel sort and Group By- Parallel Join

UNIT II **12**

ADVANCED QUERY PROCESSING IN PARALLEL DATABASES

Parallel indexing. Parallel Universal Qualification – Collection Join Queries. Parallel Query Scheduling – Optimization, Applications

UNIT III **12**

INTRODUCTION TO DISTRIBUTED DATABASES

Overview - Promises of DDB –Design Issues – DDB Design – DDB Integration – Data and Access Control.

UNIT IV **12**

QUERY PROCESSING IN DISTRIBUTED DATABASES

Overview- of Query Processing – Query Decomposition and Data Localization – Optimization of Queries, Multi-database Query Processing.

UNIT V **12**

TRANSACTION MANAGEMENT AND OTHER ADVANCED SYSTEMS

Introduction – Concurrency Control - Distributed DBMS Reliability – Data Replication – DDB Applications, Distributed Object Database Management – Peer -to-Peer Data Management – Web Data Management – Streaming Data and Cloud Computing.

TOTAL PERIODS: 60

TEXT BOOKS :

1. Sandro Fiore, Giovanni Aloisio ,"Grid and Cloud Database management",ACM,2011.

2. David Taniar, Clement H.C.Leung, Wenny Rahayu, Sushant Goel , "High performance parallel Database processing and Grid databases" , John Wiley & Sons, 2008.

REFERENCES:

1. M. Tamer Ozsu and Patrick Valduriez, "Principles of Distributed Database Systems", Springer Science + Business Media , 3rd Edition, 2011.

MSE118 ADVANCED DATABASE ADMINISTRATION AND TUNING 3 0 1 4

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

OUTCOMES:

- Students understands advanced features of databases in design, administration, and applications
- Aspires to improve the performance of a database
- Students learn about optimization of existing resources usage within the database environment.

UNIT I **12**

INTRODUCTION TO DATABASE ADMINISTRATION

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 **12**

DATABASE SECURITY, BACKUP AND RECOVERY

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 **12**

FUNDAMENTALS OF TUNING

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 **12**

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 **12**

TROUBLESHOOTING

Query Plan Explainers – Performance Monitors – Event Monitors – Finding "Suspicious" Queries – Analyzing a Query's Access Plan – Profiling a Query Execution – DBMS Subsystems.

TOTAL PERIODS: 60

TEXT BOOK :

1.Dennis Shasha and Philippe Bonnet, "Database Tuning, Principles, Experiments and Troubleshooting Techniques", Elsevier Reprint 2005.
2.Craig S. Mullins, "Database Administration: The Complete Guide to Practices and Procedures", Addison-Wesley Professional, 2002.

REFERENCES:

1. Silberschatz, Korth, Database System Concepts, McGraw hill, 6th edition, 2010.
2. Thomas Connoly and Carlolyn Begg, Database Systems, A Practical Approach to Design, implementation and Management, Fourth Edition, Pearson Education 2008.

MSE119 OBJECT ORIENTED DATABASE DESIGN 3 1 0 4

OBJECTIVES:

- To introduce basic and fundamental concepts of DBMS & ER model.
- To introduce the concepts of extended ER model and object oriented programming database concepts

OUTCOMES:

- Students will be able to gain basic knowledge on DBMS .
- Students will be equipped with basic knowledge of OOPS with DBMS
- Apply objects and classes concepts in real time applications

UNIT-I **12**

Database management systems - The concepts of the database- levels of representation, using a DBMS. Relational systems - toward the relational model, The relational model, using a relational system, Advantages & limitations of relational systems. A new generation of systems - A new computing context, New Applications.

UNIT-II **12**

Fundamental Aspects - The role of the data model general principles, Data manipulation languages, some important models - ER, SDM, IFO, RM/T, Daplex, Type systems - Concept of type. Data abstraction. Polymorphism, sub typing Integrating models & type system-Abstract types and modeling, concepts of inheritance, classes & relations, views & desired data constants & transaction.

UNIT-III **12**

Extended relational models and system - different approaches, model with structured values, Deductive models and logic programming, models with object identity. Extensible systems. Database programming language - Two approaches Integration into an existing languages. Persistent programming languages.

UNIT-IV **12**

Object oriented systems - Principles & technology databases. The 02 system - origins & objective Data model, Data manipulation, interface generator, the programming environment. Implementation of the 02 system.

UNIT-V **12**

Object manager architecture - Introduction, Problems encountered, Addressing mechanisms, Virtual memory, Two address levels, distributed architecture, Data management - Data representation, Large sets & long strings, Representing inheritance. Indexing, clustering, transactions & versions.

TOTAL HOURS: 60

TEXT BOOKS:

1.C.S.R. Prabhu,"Object-Oriented Database Systems: Approaches and Architectures", 2nd edition., Prentice-Hall Of India Pvt. Limited, 2005.
2. Jan L. Harrington,"Object-oriented Database Design Clearly Explained",,Morgan Kaughman,2000.

REFERENCES:

1. Abraham Silberschatz, Henry F.Korth, S. Sudharson, "Database System Concepts", 6th Edition, Tata McGraw Hill, 2011.
2. Ramez Elmasri, ShamKant B.Navathe,"Fundamentals of Database Systems", 5th Edition, Pearson Education, 2008.
3.M. Tamer Ozsu and Patric Valduriea, "Principles of Distributed Database systems", Pearson Education, 2000.

ELECTIVE III

MSE120 CRYPTOGRAPHY AND COMPUTER SECURITY 3 1 0 4

OBJECTIVES:

- To learn the concepts of trust categories
- To understand trust architecture and formalization of security properties
- To learn trusted computing and administration

OUTCOMES:

- Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer based systems of varying complexity .
- Critically analyze a problem, identify, formulate and solve problems in the field of computer science and Engineering considering current and future trends .
- Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, and sustainability in the field of computer engineering

UNIT I
INTRODUCTION 12

Introduction – Trust and Computing – Instantiations – Design and Applications –Progression – Motivating scenarios – Attacks. Design goals of the trusted platform modules. Introduction to simulators – Implementation of attacks.

UNIT II 12
ARCHITECTURE, VALIDATION AND APPLICATION CASE STUDIES

Foundations – Design challenges – Platform Architecture – Security architecture – erasing secrets – sources – software threats – code integrity and code loading. Outbound Authentication – Problem – Theory – Design and Implementation - Validation – Process – strategy – Formalizing security properties – Formal verification – other validation tasks – reflection. Application case studies – Basic building blocks – Hardened web servers – Right's management for Big Brother's computer – Private Information – Other projects TCPA/TCG.

UNIT III –
PROGRAMMING INTERFACES TO TCG 12

Experimenting with TCPA/TCG – Desired properties- Lifetime mismatch – Architecture – Implementation – Applications. Writing a TPM device driver- Low level software – Trusted boot – TCG software stack – Using TPM keys. Implementation using simulator tools.

UNIT IV
TSS CORE SERVICE AND SECURE STORAGE 12

TSS core service – Public key cryptography standard – Architecture – Trusted computing and secure storage – Linking to encryption algorithms – encrypting files and locking data to specific

PCs-content protection – secure printing and faxing. Simulation analysis of symmetric and public key cryptographic standards - performance evaluation of these trust models.

UNIT V

TRUSTED COMPUTING AND SECURE IDENTIFICATION 12

Trusted Computing and secure identification – Administration of trusted devices – Secure /backup maintenance – assignment of key certificates-secure time reporting-key recovery – TPM tools- Ancillary hardware.

TOTAL HOURS: 60

TEXT BOOKS:

1. Challener D., Yoder K., Catherman R., Safford D., Van Doorn L.. "A Practical Guide to Trusted Computing". IBM press, 2008.
2. Sean W.Smith, "Trusted Computing Platforms: Design and Applications".Springer Science and Business media, 2005.

REFERENCES

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Prentice Hall of India, Third Edition, 2003.
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, pearson Education, 2003.
4. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.

MSE121 AD HOC AND WIRELESS SENSOR NETWORKS 3 1 0 4

OBJECTIVES:

- To learn about the issues in the design of wireless ad hoc networks
- To understand the working of protocols in different layers of mobile ad hoc and sensor networks
- To expose the students to different aspects in sensor networks
- To understand various security issues in ad hoc and sensor networks and solutions to the issues.

OUTCOMES:

- Identify different issues in wireless ad hoc and sensor networks
- To analyze protocols developed for ad hoc and sensor networks
- To identify and understand security issues in ad hoc and sensor networks

UNIT- I **12**

MAC & ROUTING IN AD HOC NETWORKS

Introduction – Issues and challenges in ad hoc networks – MAC Layer Protocols for wireless ad hoc networks – Contention-Based MAC protocols – MAC Protocols Using Directional Antennas – Multiple- Channel MAC Protocols – Power-Aware MAC Protocols – Routing in Ad hoc Networks – Design Issues – Proactive, Reactive and Hybrid Routing Protocols

UNIT- II **12**

TRANSPORT & QOS IN AD HOC NETWORKS

TCP's challenges and Design Issues in Ad Hoc Networks – Transport protocols for ad hoc networks – Issues and Challenges in providing QoS – MAC Layer QoS solutions – Network Layer QoS solutions – QoS Model

UNIT -III **12**

MAC & ROUTING IN WIRELESS SENSOR NETWORKS

Introduction – Applications – Challenges – Sensor network architecture – MAC Protocols for wireless sensor networks – Low duty cycle protocols and wakeup concepts – Contention-Based protocols – Schedule-Based protocols – IEEE 802.15.4 Zig bee – Topology Control – Routing Protocols

UNIT -IV **12**

TRANSPORT & QOS IN WIRELESS SENSOR NETWORKS

Data-Centric and Contention-Based Networking – Transport Layer and QoS in Wireless SensorN Networks – Congestion Control – In-network processing – Operating systems for wireless sensor networks – Examples.

UNIT -V **12**

SECURITY IN AD HOC AND SENSOR NETWORKS

Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Antitamper techniques – Water marking techniques – Defense against routing attacks - Secure Ad hoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS

TOTAL HOURS: 60

TEXT BOOKS:

1. Erdal Çayirci , Chunming Rong, "Security in Wireless Ad Hoc and Sensor Networks", John Wiley and Sons, 2009.
2. Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, "Ad Hoc Mobile Wireless Networks", Auerbach Publications, 2008.
3. Holger Karl, Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, Inc., 2005.
4. C.Siva Ram Murthy and B.S.Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols",Pearson Education, 2004.

REFERENCES:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition)", World Scientific Publishing, 2011.
2. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks Theory and Practice", John Wiley and Sons, 2010.
3. Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.

MSE122 WIRELESS SENSOR NETWORKS AND PROGRAMMING 3 1 0 4

OBJECTIVES:

- Gain knowledge of mobile ad hoc networks, design and implementation issues, and available solutions.
- Gain knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid.
- Knowledge of the 802.11 Wireless Lan (WiFi) and Bluetooth standards.
- Knowledge of sensor networks and their characteristics. This includes design of MAC layer protocols, understanding of power management, query processing, and sensor databases.
- Hands-on experience in designing and implementing ad hoc network functionality using network simulation tools and Pocket PCs.

OUTCOMES:

- Apply knowledge of wireless sensor networks to various application areas.
- Design, implement and maintain wireless sensor networks.
- Formulate and solve problems creatively.

UNIT – I **12**

INTRODUCTION TO WSN

Introduction and Overview of Wireless Sensor Networks Introduction, Brief Historical Survey of Sensor Networks, and Background of Sensor Network Technology, Ah-Hoc Networks, Applications of Wireless Sensor Networks: Sensor and Robots, Reconfigurable Sensor Networks, Highway Monitoring, Military Applications, Civil and Environmental Engineering Applications, Wildfire Instrumentation, Habitat Monitoring, Nanoscopic Sensor Applications, Another Taxonomy of WSN Technology, Basic Sensor Network Architectural Elements, Home Control, Medical Applications, Basic Wireless Sensor Technology : Introduction, Sensor Node Technology, Sensor Taxonomy, WN Operating Environment, WN Trends, Wireless Network Standards: IEEE 802.15.4, ZigBee, IEEE 1451

UNIT – II

MEDIUM ACCESS CONTROL **12**

Medium Access Control Protocols for Wireless Sensor Networks Introduction, Background, Fundamentals of MAC Protocols, MAC Protocols for WSNs: Schedule-Based Protocols, Random Access-Based Protocols, Coordination, Schedule Synchronization, Adaptive Listening, Access Control and Data Exchange (BMAC,Box-MAC, Bit-MAC, H-MAC, I-MAC, O-MAC, S-MAC. Ri-MAC, T-MAC, QMAC (Querry MAC), Q-MAC (QoS MAC), X-MAC)

UNIT – III **12**

ROUTING IN WSN

Routing Protocols for Wireless Sensor Networks Introduction, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Sensor Networks Network Scale and Time-Varying Characteristics, Resource Constraints, Sensor Applications Data Models, Routing Strategies in Wireless Sensor Networks: WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Geographical Routing,

UNIT -IV **12**

TCP AND UDP

Transport Control Protocols and Middle wares for Wireless Sensor Networks Traditional Transport Control Protocols: TCP (RFC 793), UDP (RFC 768), MobileIP, Introduction, WSN Middleware Principles, Middleware Architecture: Existing Middleware: MiLAN (Middleware Linking Applications and Networks), IrisNet (Internet-Scale Resource-Intensive Sensor Networks Services),

UNIT- V **12**

OPERATING SYSTEMS IN WSN

Operating Systems for Wireless Sensor Networks Introduction, Examples of Operating Systems: TinyOS,Mate, MagnetOS

TEXT BOOKS:

1. KazemSohraby, Daniel Minoli, TaiebZnati ,"Wireless Sensor Network," Wiley,2007.

2. Ananthram Swami, Qing Zhao, Yao-Win Hong, Lang Tong ,"Wireless Sensor Networks Signal Processing and Communications"John Wiley & Sons,2007.

REFERENCES:

1. Sridhar S. Iyengar, NandanParameshwaran, Vir V. Phoha, N. Balakrishnan, Chuka D. Okoye, " Fundamentals of Sensor Network Programming: Applications and Technology" Wiley,2011.

2. C. S. Raghavendra ,"Wireless sensor networks" Springer,2007.

3. Murthy ,"Ad Hoc Wireless Networks: Architectures And Protocols ", Pearson Education,2004.

MSE123 TCP/IP TECHNOLOGY 3 1 0 4

OBJECTIVES:

• To learn the basics of socket programming using TCP Sockets.
• To learn about Socket Options127
• To learn to develop Macros for including Objects In MIB Structure
• To understand SNMPv1, v2 and v3 protocols & practical issues.

OUTCOMES:

At the end of this course the student will be able to
• Understand the internals of the TCP/IP protocols
• Understand how TCP/IP is actually implemented
• Understand the interaction among the protocols in a protocol stack

UNIT I

FUNDAMENTALS **12**

Internetworking concepts - IP and datagram forwarding - TCP services - Interactive data flow - Timeout and retransmission - Bulk data flow - Persist timer – Keep-alive timer.

UNIT II **12**

ARP AND IP Structure of TCP/IP in OS - Data structures for ARP - Cache design and management - IP software design and organization - Sending a datagram to IP

UNIT III **12**

IP ROUTING IMPLEMENTATION Routing table - Routing algorithms - Fragmentation and reassembly - Error processing (ICMP) - Multicast Processing (IGMP).

UNIT IV **12**

TCP I/O PROCESSING AND FSM

Data structure and input processing - Transmission control blocks - Segment format - Comparison - Finite state machine implementation - Output processing - Mutual exclusion - Computing TCP data length

UNIT V

TCP TIMER AND FLOW CONTROL **12**

Timers - Events and messages - Timer process - Deleting and inserting timer event - Flow control and adaptive retransmission - Congestion avoidance and control - Urgent data processing and push function

TOTAL HOURS : 60

TEXT BOOKS

1.Behrouz A. Forouzan, “TCP/IP Protocol Suite”, 4th edition, McGraw Hill, 2013.
2.Douglas E. Comer, “Internetworking with TCP/IP: principles, protocols and architecture” (Volume1), 6th Edition, PHI Learning, 2013.

REFERENCES:

1. Douglas E. Comer, David L. Stevens, “Internetworking with TCP/IP, design, implementation and internals Volume 2, 3rd Edition, PHI Learning, 2009.
2. Ed Tittel, Laura Chappell, “TCP/IP”, 1st Edition, Cengage Learning, 2008.
3. Dr. Sidnie Feit, TCP/IP, architecture, protocols and implementation with IPv6 and IP Security, Tata McGraw-Hill, 2008.

MSE124 NETWORK SECURITY AND MANAGEMENT 3 1 0 4

OBJECTIVES:

- The objective of this course is to identify the different network security measures and to analyze each of them.
- To study protocols, issues related to implementation of network security.

OUTCOMES:

The student will be able to

- put into practice the various symmetric and asymmetric key algorithms.
- understand the importance of network security.
- handle different kinds of attacks

UNIT -1 12

CRYPTOGRAPHY

Classical Cryptography, Various types of Cipher, Cryptanalysis, Computer Security, Threats to security, History of Computer security, Computer System Security and Access Controls (System access and data access). Threats- Viruses, worms, Trojan horse, bombs, trap doors, spoofs, email virus, macro Viruses, remedies, Intruders, Malicious software, Firewalls, vulnerabilities & Threats, Network Denial of service attack.

UNIT- II 12

SWITCHING AND ROUTING

Technologies - Switching Design, Switching Types - Layer 2 and 3 Switching, Spanning Tree Protocol, Redundancy in Layer 2 Switched Networks, STP Terminology and Operation, Virtual LANs – Trunks - Inter-VLAN Routing - Multilayer Switching, Switching Security and Switching Design Considerations IPv4 Routing Design.IPv4 Address Design - Private and Public Addresses – NAT - Subnet Masks - Hierarchical IP Address Design -IPv4 Routing Protocols – Classification - Metrics - Routing Protocol Comparison - IPv4 Routing Protocol.
Selection.

UNIT III 12

VULNERABILITIES

Network Security Design, Hacking – Vulnerabilities - Design Issues - Human Issues - Implementation Issues –Threats - Reconnaissance Attacks - Access Attacks - Information Disclosure Attacks - Denial of Service Attacks- Threat Defense - Secure Communication - Network Security Best Practices - SAFE Campus Design.

UNIT IV 12

NETWORK SECURITY

Network Security-Kerberos, X.509, some network security projects - SDNS, DISNet, Project MAX, Secure NFS Security- E-Mail Security, IP security, Web security, Server security-security for network server, web servers, mobile technologies (java and Java script etc)

UNIT V **12**

CASE STUDY

Network Management Design: ISO Network Management Standard - Protocols and Tools – SNMP – MIB –RMON - Cisco NetFlow – Syslog – Cisco Works - Network Management Strategy - SLCs and SLAs – IP Service-Level Agreements – Content Networking Design – Case Study – Venti Systems.

TOTAL HOURS: 60

TEXT BOOKS:

1.Introduction to computer Security- Mathew Bishop, Addison-Wisley,2006.
2.Diane Tiare and Catherine Paquet, ―Campus Network Design Fundamentals, Pearson education, 2006.
3. William Stallings, "Cryptography and Network Security – Principles and Practices", PHI,3rd Edition.
4. Atul Kahate, "Cryptography and Network Security", TMH, 2003

REFERENCES:

1 . William Stallings; Network Secuirty Essentials, Pearson publication, 2005.
1. William Stallings" Cryptography and Network Security, Pearson publication, 4th edition, 2004.
2. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003.
3. Mathew Bishop ,"Computer Security: Art and Science" , Addison-Wisley,2003.
4. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.
5. Craig Zacker, "The Complete Reference: Upgrading and Troubleshooting Networks", Tata McGraw-Hill, 2000.

MSE125 TCP/IP PRINCIPLES AND ARCHITECTURE 3 1 0 4

OBJECTIVES:

- To provide a solid foundation for understanding the communication process of the Internet
- Provide exposure to fundamental concepts of computer networking in the context of the TCP/IP model and protocols.

OUTCOMES:

- Understand the functionality of reference model thoroughly.
- Have a good understanding of various protocols in different layers and how they are working.
- Get an exposure to various next generation protocols in internetworking.

UNIT -I 12

INTRODUCTION

Protocols and standards - OSI model - TCP/ IP protocol suite - addressing - versions - underlying technologies.

UNIT -II 12

IP ADDRESSES, ROUTING, ARP AND RARP

Classful addressing - other issues - subnetting - supernetting - classless addressing - routing methods - delivery - table and modules - CIDR - ARP package - RARP.

UNIT -III 12

IP, ICMP, TGMP AND UDP

Datagram - fragmentation - options - checksum - IP package - ICMP - messages, formats - error reporting - query - checksum - ICMP package - IGMP - messages, operation - encapsulation - IGMP package - UDP - datagram - checksum - operation - uses - UDP package.

UNIT- IV 12

TCP, UNICAST AND MULTICAST ROUTING PROTOCOLS

Services - flow, congestion and error control - TCP package and operation - state transition diagram - unicast routing protocols - RIP - OSPF - BGP - multicast routing - trees - protocols - MOSPF - CBT - PIM.

UNIT -V 12

APPLICATION LAYER, SOCKETS

Client server model - concurrency - processes - sockets - byte ordering - socket system calls - TCP and UDP client-server programs - BOOTP -DHCP - DNS - name space, resolution - types of records - concept - mode of operation - Rlogin.

TOTAL HOURS: 60

TEXT BOOKS:

1.Behrouz A. Forouzan, "TCP/IP Protocol Suite", 4th edition, McGraw Hill, 2013.
2.Douglas E. Comer, "Internetworking with TCP/IP: principles, protocols and architecture" (Volume1), 6th Edition, PHI Learning, 2013.

REFERENCES:

1. Douglas E. Comer, David L. Stevens, "Internetworking with TCP/IP, design, implementation and internals Volume 2, 3rd Edition, PHI Learning, 2009.
2. Ed Tittel, Laura Chappell, "TCP/IP", 1st Edition, Cengage Learning, 2008.
3. Dr. Sidnie Feit, TCP/IP, architecture, protocols and implementation with IPv6 and IP Security, Tata McGraw-Hill, 2008.

MSE126 WIRELESS NETWORKING AND MOBILE COMPUTING 3 1 0 4

OBJECTIVES:

- Data communications and resource management,
- Network protocols and distributed computing,
- Information management, user interfaces, applications/services, and security.

OUTCOMES:

On successful completion of this module, the student should:

- Have knowledge and understanding of basic mobile network architecture
- Have knowledge and understanding of some basic technologies that are in use
- Be able to make critical assessment of mobile systems
- Be able to analyze and propose broad solutions for a range of mobile scenarios

UNIT I **12**

Wireless transmission – Frequencies for radio transmission ,signals, Antennas, Signal propagation, Multiplexing, Modulation, Spread spectrum , Cellular system Telecommunication systems – GSM, Digital enhanced cordless telecommunications(DECT)

UNIT II **12**

Wireless Medium Access control and CDMA- based communication – Medium access control, Introduction to CDMA-based systems, Spread spectrum in CDMA systems, coding methods in CDMA

UNIT III **12**

Wireless LAN – Infra red vs radio transmission, infrastructure and ad hoc networks, IEEE 802.11, Bluetooth

UNIT IV **12**

Mobile network layer – Mobile IP, Dynamic host configuration protocol, Mobile ad-hoc networks, Wireless sensor networks 6. Mobile transport layer – Traditional TCP, Classical TCP improvements, snooping TCP, Mobile TCP, TCP over 2.5/3G wireless networks

UNIT V **12**

Mobile internet connectivity – WAP 1.1, Layers of WAP, Wireless Application Environment, WML and WML Script , wireless telephony application, WAP 2.0 architecture , XHTMLMP(Extensible Hypertext Markup Language Mobile profile) Mobile Operating System ,Mobile file system, Security in mobile computing, Wireless network simulator such as ns2

TOTAL HOURS: 60

TEXT BOOKS:

1.Raj Kamal," Mobile Computing" ,Oxford, 2012.
2. Jochen Schiller ,"Mobile Communication", Pearson Education, ,2009

REFERENCES:

1. Asoke K. Talukdar,"Mobile Computing", 2nd edition, Tata McGrawHill,2010.

2. Stojmenovic," Handbook of Wireless Networks and Mobile Computing",Wiley ,2006.

ELECTIVE IV

MSE 127 INFORMATION RETRIEVAL TECHNIQUES 3 1 0 4

OBJECTIVES:

- To understand the basics of Information Retrieval with pertinence to modelling, query operations and indexing
- To get an understanding of machine learning techniques for text classification and clustering
- To understand the various applications of Information Retrieval giving emphasis to Multimedia IR, Web Search
- To understand the concepts of digital libraries

OUTCOMES:

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

- Build an Information Retrieval system using the available tools
- Identify and design the various components of an Information Retrieval system
- Apply machine learning techniques to text classification and clustering which is used for efficient Information Retrieval
- Analyze the Web content structure
- Design an efficient search engine

UNIT I

INTRODUCTION: MOTIVATION 12

Basic Concepts – Practical Issues - Retrieval Process – Architecture - Boolean Retrieval –Retrieval Evaluation – Open Source IR Systems–History of Web Search – Web Characteristics–The impact of the web on IR —IR Versus Web Search–Components of a Search engine

UNIT II

MODELING 12

Taxonomy and Characterization of IR Models – Boolean Model – Vector Model - Term Weighting – Scoring and Ranking –Language Models – Set Theoretic Models - Probabilistic Models – Algebraic Models – Structured Text Retrieval Models – Models for Browsing

UNIT III

INDEXING 12

Static and Dynamic Inverted Indices – Index Construction and Index Compression. Searching - Sequential Searching and Pattern Matching. Query Operations -Query Languages – Query

Processing - Relevance Feedback and Query Expansion - Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency

UNIT IV

TEXT CLASSIFICATION AND NAIVE BAYES **12**

Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering –Matrix decompositions and latent semantic indexing – Fusion and Meta learning

UNIT V SEARCHING THE WEB **12**

Searching the Web –Structure of the Web –IR and web search – Static and Dynamic Ranking – Web Crawling and Indexing – Link Analysis - XML Retrieval Multimedia IR: Models and Languages – Indexing and Searching Parallel and Distributed IR – Digital Libraries

TOTAL HOURS: 60

TEXT BOOKS:

1. Ricardo Baeza – Yates, BerthierRibeiro – Neto, "Modern Information Retrieval: The concepts and Technology behind Search ",ACM Press Books, Second Edition 2011.
2. Ricardo Baeza – Yates, BerthierRibeiro – Neto, "Modern Information Retrieval", Pearson Education, Second Edition, 2005.

REFERENCES:

1. Christopher D. Manning, Prabhakar Raghavan, Hinrich Schutze, "Introduction to Information Retrieval", Cambridge University Press, First South Asian Edition 2012.
2. Stefan Buttcher, Charles L. A. Clarke, Gordon V. Cormack, "Information Retrieval Implementing and Evaluating Search Engines", The MIT Press, 2010.

MSE128 TEXT DATA MINING 3 1 0 4

OBJECTIVES:

- To understand the basic issues and types of text mining
- To appreciate the different aspects of text categorization and clustering
- To understand the role played by text mining in Information retrieval and extraction
- To appreciate the use of probabilistic models for text mining
- To appreciate the current trends in text mining

OUTCOMES:

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

- Identify the different features that can be mined from text and web documents
- Use available open source classification and clustering tools on some standard text data sets
- Modify existing classification/clustering algorithms in terms of functionality or features used
- Design a system that uses text mining to improve the functions of an existing open source search engine
- Implement a text mining system that can be used for an application of your choice

UNIT I 12

INTRODUCTION

Overview of text mining- Definition- General Architecture– Algorithms– Core Operations – Pre processing–Types of Problems- basics of document classification- information retrieval-clustering and organizing documents- information extraction- prediction and evaluation-Textual information to numerical vectors -Collecting documents- document standardization-tokenization- lemmatization vector generation for prediction- sentence boundary determination - evaluation performance.

UNIT II

TEXT CATEGORIZATION AND CLUSTERING 12

Text Categorization – Definition – Document Representation –Feature Selection - Decision Tree Classifiers - Rule-based Classifiers - Probabilistic and Naive Bayes Classifiers - Linear Classifiers- Classification of Linked and Web Data - Meta-Algorithms– Clustering –Definition-Vector Space Models - Distance-based Algorithms- Word and Phrase-based Clustering -Semi-Supervised Clustering - Transfer Learning

UNIT III

TEXT MINING FOR INFORMATION RETRIEVAL AND INFORMATION EXTRACTION 12

Information retrieval and text mining- keyword search- nearest-neighbor methods- similarity-webbased document search- matching- inverted lists- evaluation. Information extraction-Architecture - Co-reference - Named Entity and Relation Extraction- Template filling and database construction – Applications. Inductive -Unsupervised Algorithms for Information

Extraction. Text Summarization Techniques - Topic Representation - Influence of Context - Indicator Representations – Pattern Extraction - Apriori Algorithm – FP Tree algorithm

UNIT IV

PROBABILISTIC MODELS **12**

Probabilistic Models for Text Mining -Mixture Models - Stochastic Processes in Bayesian Nonparametric Models - Graphical Models - Relationship Between Clustering, Dimension Reduction and Topic Modelling - Latent Semantic Indexing - Probabilistic Latent Semantic Indexing –Latent Dirichlet Allocation- Interpretation and Evaluation - Probabilistic Document Clustering and Topic Models - Probabilistic Models for Information Extraction - Hidden Markov Models - Stochastic Context- Free Grammars - Maximal Entropy Modelling - Maximal Entropy Markov Models -Conditional Random Fields.

UNIT V RECENT TRENDS **12**

Visualization Approaches - Architectural Considerations - Visualization Techniques in Link Analysis - Example- Mining Text Streams - Text Mining in Multimedia - Text Analytics in Social Media – Opinion Mining and Sentiment Analysis - Document Sentiment Classification Opinion Lexicon Expansion - Aspect-Based Sentiment Analysis - Opinion Spam Detection Text Mining Applications and Case studies

TOTAL HOURS: 60

TEXT BOOKS:

1. Sholom Weiss, Nitin Indurkhya, Tong Zhang, Fred Damerau "The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data", Springer, paperback 2010.

REFERENCES:

1. Charu C. Aggarwal ,ChengXiang Zhai**, "**Mining Text Data", Springer; 2012.
2. Ronen Feldman, James Sanger -" The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data",Cambridge University press, 2006.

MSE129 WEB DATA MINING 3 1 0 4

OBJECTIVES:

- To focus on a detailed overview of the data mining process and techniques, specifically those that are relevant to Web mining
- To Understand the basics of Information retrieval and Web search with special emphasis on web Crawling
- To appreciate the use of machine learning approaches for Web Content Mining
- To understand the role of hyper links in web structure mining
- To appreciate the various aspects of web usage mining

OUTCOMES:

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

- Build a sample search engine using available open source tools
- Identify the different components of a web page that can be used for mining
- Apply machine learning concepts to web content mining
- Implement Page Ranking algorithm and modify the algorithm for mining information
- Process data using the Map Reduce paradigm
- Design a system to harvest information available on the web to build recommender systems
- Analyze social media data using appropriate data/web mining techniques
- Modify an existing search engine to make it personalized

UNIT I 12

INTRODUCTION

Introduction – Web Mining – Theoretical background –Algorithms and techniques – Association rule mining – Sequential Pattern Mining -Information retrieval and Web search – Information retrieval Models-Relevance Feedback- Text and Web page Pre-processing – Inverted Index – Latent Semantic Indexing – Web Search – Meta-Search – Web Spamming

UNIT II 12

WEB CONTENT MINING

Web Content Mining – Supervised Learning – Decision tree - Naïve Bayesian Text Classification - Support Vector Machines - Ensemble of Classifiers. Unsupervised Learning - K-means Clustering - Hierarchical Clustering –Partially Supervised Learning – Markov Models - Probability-Based Clustering - Evaluating Classification and Clustering – Vector Space Model – Latent semantic Indexing – Automatic Topic Extraction - Opinion Mining and Sentiment Analysis – Document Sentiment Classification

UNIT III 12

WEB LINK MINING

Web Link Mining – Hyperlink based Ranking – Introduction -Social Networks Analysis- Co Citation and Bibliographic Coupling - Page Rank -Authorities and Hubs -Link-Based Similarity Search - Enhanced Techniques for Page Ranking - Community Discovery – Web Crawling -A

Basic Crawler Algorithm- Implementation Issues- Universal Crawlers- Focused Crawlers- Topical Crawlers- Evaluation - Crawler Ethics and Conflicts - New Developments

UNIT IV **12**

STRUCTURED DATA EXTRACTION

Structured Data Extraction: Wrapper Generation – Preliminaries- Wrapper Induction- Instance-Based Wrapper Learning ·- Automatic Wrapper Generation: Problems - String Matching and Tree Matching -. Multiple Alignment - Building DOM Trees - Extraction Based on a Single List Page and Multiple pages- Introduction to Schema Matching - Schema-Level Match -Domain and Instance-Level Matching – Extracting and Analyzing Web Social Networks.

UNIT V

WEB USAGE MINING **12**

Web Usage Mining - Click stream Analysis -Web Server Log Files - Data Collection and Pre-Processing - Cleaning and Filtering- Data Modeling for Web Usage Mining - The BIRCH Clustering Algorithm -Affinity Analysis and the A Priori Algorithm – Binning. Discovery and Analysis of Web Usage Patterns – Modeling user interests –Probabilistic Latent Semantic Analysis – Latent Dirichlet Allocation Model– Applications- Collaborative Filtering-Recommender Systems – Web Recommender systems based on User and Item – PLSA and LDA Models

TOTAL HOURS : 60

TEXT BOOKS:

1. Guandong Xu ,Yanchun Zhang, Lin Li, “Web Mining and Social Networking: Techniques and Applications”, Springer; 1st Edition.2010.
1. Bing Liu, “ Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (Data-2entric Systems and Applications)”, Springer; 2nd Edition 2009.
3. Zdravko Markov, Daniel T. Larose, “Data Mining the Web: Uncovering Patterns in Web Content, Structure, and Usage”, John Wiley & Sons, Inc., 2007.

REFERENCES:

1. Min Song, Yi Fang and Brook Wu, “Handbook of research on Text and Web mining technologies”, IGI global, information Science Reference – imprint of :IGI publishing, 2008.
2. Adam Schenker, “Graph-Theoretic Techniques for Web Content Mining”, World Scientific Pub Co Inc ,2005.
3. Soumen Chakrabarti, “Mining the Web: Discovering Knowledge from Hypertext Data”, Morgan Kaufmann; edition 2002.

MSE130 SOCIAL NETWORK ANALYSIS 3 1 0 4

OBJECTIVES:

- To gain knowledge about the current Web development and emergence of Social Web.
- To study about the modelling, aggregating and knowledge representation of Semantic Web.
- To learn about the extraction and mining tools for Social networks.
- To gain knowledge on Web personalization and Web Visualization of Social networks.

OUTCOMES:

- To apply knowledge for current Web development in the era of Social Web.
- To model, aggregate and represent knowledge for Semantic Web.
- To design extraction and mining tools for Social networks.
- To develop personalized web sites and visualization for Social networks.

UNIT I **12**

INTRODUCTION TO SOCIAL NETWORK ANALYSIS

Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web - Network analysis - Development of Social Network Analysis- Key concepts and measures in network analysis - Electronic sources for network analysis - Electronic discussion networks, Blogs and online communities, Web-based networks - Applications of Social Network Analysis.

UNIT II **12**

MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION

Ontology and their role in the Semantic Web - Ontology-based Knowledge Representation – Ontology languages for the Semantic Web – RDF and OWL - Modelling and aggregating social network data - State-of-the-art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, Aggregating and reasoning with social network data, Advanced Representations.

UNIT III **12**

EXTRACTION AND MINING COMMUNITITES IN WEB SOCIAL NETWROKS

Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Definition of Community - Evaluating Communities - Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Tools for Detecting Communities Social Network Infrastructures and Communities - Decentralized Online Social Networks- Multi- Relational Characterization of Dynamic Social Network Communities.

UNIT IV **12**

PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES

Understanding and Predicting Human Behaviour for Social Communities - User Data Management, Inference and Distribution - Enabling New Human Experiences - Reality Mining - Context-Awareness - Privacy in Online Social Networks - Trust in Online Environment - Trust Models Based on Subjective Logic - Trust Network Analysis - Trust Transitivity Analysis - Combining Trust and Reputation – Trust Derivation Based on Trust Comparisons - Attack Spectrum and Countermeasures.

12

UNIT V

VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS

Graph Theory- Centrality- Clustering - Node-Edge Diagrams, Matrix representation, Visualizing Online Social Networks, Visualizing Social Networks with Matrix-Based Representations- Matrix + Node-Link Diagrams, Hybrid Representations - Applications - Covert Networks - Community Welfare - Collaboration Networks - Co-Citation Networks.

TOTAL HOURS: 60

TEXT BOOKS:

1. Guandong Xu , Yanchun Zhang and Lin Li, “Web Mining and Social Networking Techniques and applications”, Springer, 1st edition, 2011.
2. Borko Furht, “Handbook of Social Network Technologies and Applications”, Springer, 1st edition, 2010.
3. Peter Mika, “Social networks and the Semantic Web”, Springer, 1st edition 2007.

REFERENCES:

1. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, “Collaborative and social information retrieval and access: techniques for improved user modelling”, IGI Global snippet, 2009.
2. John G. Breslin, Alexandre Passant and Stefan Decker, “The Social Semantic Web”, Springer,2009.
3. Dion Goh and Schubert Foo, “Social information retrieval systems: emerging technologies and applications for searching the Web effectively”, IGI Global snippet, 2008.

MSE131 DIGITAL SIGNAL PROCESSING 3 1 0 4

OBJECTIVE:

This course will introduce the basic concepts and techniques for processing signals on a computer. By the end of the course, you be familiar with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors. The course emphasizes intuitive understanding and practical implementations of the theoretical concepts.

OUTCOMES:

By the end of the course the student will be able to:

- Represent discrete-time signals analytically and visualize them in the time domain
- .• Understand the meaning and implications of the properties of systems and signals.
- Understand the Transform domain and its significance and problems related to
- computational complexity.
- Be able to specify and design any digital filters using MATLAB.

UNIT I DISCRETE – TIME SIGNALS AND SYSTEMS : 12

Sampling of Analogue signals – aliasing – standard discrete time signals – classification – discrete time systems – Linear time invariant stable casual discrete time systems – classification methods – linear and circular convolution – difference equation representation – DFS, DTFT, DFT – FFT computations using DIT and DIF algorithms. Time response and frequency response analysis of discrete time systems to standard input signals.

UNIT II INFINITE IMPULSE RESPONSE DIGITAL FILTERS: 12

Review of design of analogue Butterworth and Chebyshev Filters, Frequency transformation in analogue domain – Design of IIR digital filters using impulse invariance technique – Design of digital filters using bilinear transform – pre warping – Frequency transformation in digital domain – Realization using direct, cascade and parallel forms.

UNIT III FINITE IMPULSE RESPONSE DIGITAL FILTERS: 12

Symmetric and Anti symmetric FIR filters – Linear phase FIR filters – Design using Frequency sampling technique – Window design using Hamming, Hanning and Blackmann Windows – Concept of optimum equiripple approximation – Realisation of FIR filters – Transversal, Linear phase and Poly phase realization structures.

UNIT IV FINITE WORD LENGTH EFFECTS **12**

Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representations – Comparison – Overflow error – truncation error – coefficient quantization error – limit cycle oscillations- signal scaling – analytical model of sample and hold operations.

UNIT V SPECIAL TOPICS IN DSP: **12**

Discrete Random Signals- Mean, Variance, Co-variance and PSD – Periodiogram Computation – Principle of Multi rate DSP – decimation and Interpolation by integer factors – Time and frequency domain descriptions – Single, Multi stage, poly phase structures – QMF filters – Subband Coding

TOTAL HOURS: 60

TEXT BOOKS:

1. Alan V Oppenheim, Alan S. Willsky, Hamid Nawab, "Signals & Systems", Pearson Education, 2nd Edition ,2000.
2. John Proakis, Dimitris G Manolakis, "Digital Signal Processing Principles, Algorithms and Application", PHI, 3rd Edition ,2000.

REFERENCES:

1. S.K. Mitra, "Digital signal processing-A Computer based approach", Tata McGraw-Hill, 3rd Edition,2004.
2. Simon Haykin and Barry Van Veen, "Signals & Systems", John Wiley and Sons, 2nd Edition,2002.
3. S. Salivahana, A.Vallavaraj, Gnanapriya, "Digital Signal Processing", McGraw-Hill, 2nd Edition,2000.

MSE 132 IMAGE PROCESSING 3 1 0 4

OBJECTIVES:

- To understand the basic concepts of digital image processing and various image transforms.
- To familiarize the student with the image processing facilities in MAT Lab
- To expose the student to a broad range of image processing techniques and their applications, and to provide the student with practical experience using them.
- To appreciate the use of current technologies those are specific to image processing systems.
- To expose the students to real-world applications of image processing.

OUTCOMES:

- Upon Completion of the course, the students Should have a clear impression of the breadth and practical scope of digital image processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field.
- Implement basic image processing algorithms using MATLAB tools
- Explore advanced topics of Digital Image Processing.
- Ability to Apply and develop new techniques in the areas of image enhancement-restoration segmentation- compression-wavelet processing and image morphology.
- Make a positive professional contribution in the field of Digital Image Processing.

UNIT I

FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS 12

Introduction – Steps in Digital Image Processing – Image sampling and Quantization – Basic relationships between pixels – Color Fundamentals – File Formats – Image Transforms: DFT, DCT, Haar, SVD and KL- Introduction to Mat lab Toolbox.

UNIT II

IMAGE ENHANCEMENT AND IMAGE RESTORATION 12

Image Enhancement in the Spatial Domain: Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Spatial Filtering , Fuzzy sets for spatial filters – Image Enhancement in the Frequency Domain: Frequency Domain Filters – Image Restoration: Model of Image Degradation/Restoration Process, Noise Models, Linear and non linear image restoration techniques, Blind Deconvolution.

UNIT III

MULTI RESOLUTION ANALYSIS AND IMAGE COMPRESSION 12

Multi Resolution Analysis: Image Pyramids – Multi resolution expansion – Fast Wavelet Transforms, Lifting scheme. Image Compression: Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression-wavelet based image compression techniques – Compression standards-JPEG/MPEG, Video compression.

UNIT IV 12

IMAGE SEGMENTATION AND DESCRIPTION

Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Based Segmentation, Basic Morphological Algorithms, Morphological Water Sheds - Description: Boundary Descriptors, Regional Descriptors.

UNIT V 12

CURRENT TRENDS AND APPLICATIONS OF IMAGE PROCESSING

Applications: Image Classification, Object Recognition, Image Fusion, Steganography – Current Trends: Color Image Processing, Wavelets in Image Processing.

TOTAL HOURS: 60

TEXT BOOKS:

1.S. Sridhar, "Digital Image Processing", Oxford University Press, 2011.
2. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing", Pearson Education, 3rd Edition, 2008.
3. Anil K.Jain, "Fundamentals of Digital Image Processing", PHI, 2006.

REFERENCES:

1. Rafael C.Gonzalez, Richard E.Woods, and Eddins, "Digital Image Processing Using MATLAB",Tata McGraw-Hill, 2nd Edition, 2009.
2. Sanjit K. Mitra, & Giovanni L. Sicuranza, "Non Linear Image Processing", Elsevier, 2007.

MSE 133 PATTERN RECOGNITION TECHNIQUES 3 1 0 4

OBJECTIVES:

- To study the fundamental algorithms for pattern recognition.
- To instigate the various classification techniques.
- To originate the various structural pattern recognition and feature extraction techniques

OUTCOMES:

- Understand and apply various algorithms for pattern recognition
- Realize the clustering concepts and algorithms
- Bring out structural pattern recognition and feature extraction techniques

UNIT – I

PATTERN CLASSIFIER 12

Overview of Pattern Recognition-Discriminate Functions-Supervised Learning-Parametric Estimation-Maximum Likelihood Estimation-Bayesian Parameter Estimation-Perception Algorithm-LNSE Algorithm-Problems with Bayes Approach-Pattern Classification by Distance Functions-Minimum Distance Pattern Classifier.

UNIT – II

UNSUPERVISED CLASSIFIER 12

Clustering for Unsupervised Learning and Classification-Clustering Concept-C Means Algorithm-Hierarchical Clustering Procedures-Graph Theoretic Approach to Pattern Clustering-Validity of Clustering Solutions.

UNIT – III

STRUCTURAL PATTERN RECOGNITION 12

Elements of Formal Grammars-String Generation as Pattern Description-Recognition of Syntactic Description-Parsing-Stochastic Grammars and Applications-Graph Based Structural Representation.

UNIT – IV

FEATURE EXTRACTION AND SELECTION 12

Entropy Minimization-Kahunen-Loeve Transformation-Feature Selection through functions Approximation-Binary Feature Selection.

UNIT – V

RECENT ADVANCES **12**

Neural Network Structures for Pattern Recognition-Neural Network based Pattern Associators-Unsupervised Learning in Neural Pattern Recognition-Self Organizing Networks-Fuzzy Logic-Fuzzy Pattern Classifiers-Pattern Classification using Genetic Algorithms.

TOTAL HOURS: 60

TEXT BOOKS:

1. Ariel,Franscisco,Kittler“ Advances in Pattern recognization,Springer,2010.
2. Robert J. Schalkoff, “Pattern Recognition: Statistical, Structural and Neural Approaches”, John Wiley & Sons Inc., New York, 2007.

REFERENCES:

1. Christopher M.Bishop,”Pattern Recognition and Machine Learning”,Springer,2006.
2. Duda R.O , Hart P.E., “Pattern Classification”, Wiley, 2001.

MSE134 MULTIMEDIA SYSTEMS 3 1 0 4

OBJECTIVES:

- To present a step-by-step approach to multimedia systems design.
- To introduce multimedia standards and compression and decompression technologies.
- To provide a detailed analysis of the various storage technologies.

OUTCOMES:

- Understand different realizations of multimedia tools and their usage.
- Implement various multimedia standards and compression technologies.
- Analyze various storage technologies.

UNIT -I **12**

Introduction: Motivation, evolution of multimedia, structure and components of multimedia, application domain, Internet and multimedia, hypertext, hypermedia, browser and helper application overview, user interface design issues.

UNIT -II **12**

Sound and Audio Technology

Psychoacoustics: frequency and amplitude sensitivity of hearing, music and noise, stereo effects, masking; Frequency domain compression of analog signal, digitization of audio signal: sampling and coding, digital audio signal processing, architecture of sound card, electronic music and synthesizer, MIDI: Interface, protocol and data format.

UNIT -III **12**

Image and Graphics: Principles of raster graphics: visual display concept, resolution, colors and pallets, refresh rate and graphics accelerators; digital image representation and format, graphic drafting tools, image enhancement, colour printer principles, image scanner principles, digital still camera principles, file formats.

UNIT-IV **12**

Video Technology: Analog video principles and broadcast standards, CCD Camera, recording formats and standard; digital video principles, TV cards, frame grabber principles, IDTV and HDTV principles Animation and Special Effects: History of animation, animation principles, animation techniques, shockwave animation, survey of animation tools and file formats, special visual effects

.

UNIT -V **12**

Storage Media: Magnetic media principles and storage density, principles of CD technology: CDROM, CDRW and CDDA format and principles, IDE, SCSI and USB interfaces to storage devices. Data Compression: Information theory based and frequency domain based compression, basic compression techniques (DPCM,RLE, Huffman Coding etc), JPEG/ISO, H261,H263, MPEG-1,2,4,7, DVI. Multimedia Document Interchange Formats: Hypertext, HTML, MHEG, SGML, Open Document Architecture, Open Media Framework. Authoring Tools and Metaphors: Authoring tools: Productivity and Creativity, survey of authoring tools: book metaphor, slideshow metaphor, time-line metaphor, network and icon metaphor.

TOTAL HOURS: 60

TEXT BOOKS:

1.Tay Vahun,"Multimedia Making It Work, Eighth Edition, Tata McGraw Hill,2010.
2 R. Steinmetz and K.Nashtedt, "Multimedia Computing, Communication& Applications",PHI,2009.

REFERENCES:

1. Vic Costello, "Multimedia Foundations",British Library2012.
2. Buford K., "Multimedia Systems", Pearson Education,2010.

MSE135 SECURITY PRINCIPLES AND PRACTICES 3 1 0 4

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

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

UNIT I **12**

INTRODUCTION AND MATHEMATICAL FOUNDATION

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

UNIT II **12**

ENCRYPTION – SYMMETRIC TECHNIQUES

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

12

UNIT III

ENCRYPTION – ASYMMETRIC TECHNIQUES AND DATA TECHNIQUES

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 **12**

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 **12**

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

TOTAL PERIODS: 60

TEXT BOOKS:

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.

REFERENCES:

1. Charlie Kaufman, Radia Perlman and Mike Speciner, “ Network Security Private Communication in a Public World”, PHI, Second Edition, 2012.
2. W. Mao, “Modern Cryptography Theory and Practice”, Pearson Education, 2nd Edition, 2007.
3. Charles P. Pfleeger, Shari Lawrence Pfleeger, “Security in computing”, 3rd Edition, Prentice Hall of India, 2006.
4. Wenbo Mao, “Modern Cryptography – Theory and Practice”, Pearson Education, 2006.

MSE136 ADVANCED WEB DESIGN 3 1 0 4

OBJECTIVES:

- To build web applications using ASP and client side script technologies use with Microsoft's IIS.
- To build XML applications with DTD and style sheets that span multiple domains ranging from finance to vector graphics to genealogy for use with legacy browsers.

OUTCOMES:

The student will be able to

- Create richly interactive environments natively within browsers.
- Build web application frameworks which facilitate rapid application development.
- Integrate web applications easily into other server-side web procedures, such as email and searching.

UNIT - 1

FUNDAMENTALS 12

Introduction to the Web-Web enabling Technologies-Web Service Protocol-web Design Concepts- Examining Good and Bad Web Design-Page Design Resources.

UNIT – 2

SIMPLE DESIGN ISSUES 12

Page Design-HTML-Web Page Style Considerations-Page composition-Type Faces-Tag Parameters-Color and Graphics for web Pages-WYSIWYG web Page Editor-Dream Weaver.

UNIT - 3

ADVANCE DESIGN ISSUES 12

Advanced Page Design-Tables and Frames-Preparing Graphics and animations Forms-Cascading Sheets-User interface Design-Page grid-Page Templates-Usability Testing.

UNIT - 4

SCRIPTING IN DESIGN 12

Typography and Graphic Design for the Web-Creating Transparent GIP- Lean Graphics-Image Maps-Palette Map-web Programming-Web Site Garage-W3C HTML Validation Services-Net Mechanic-DHTML-XML.

UNIT - 5

TOOLS AND APPLICATIONS 12

Online Applications-Developing an Online Shopping application-Database Design Issues-Connecting Database with tools such as Java, ASP, Cold fusion-Designing Portals and Vortals.

TOTAL PERIODS: 60

TEXT BOOKS:

1. Deitel and Deitel, “Internet and World Wide Web-How to Program”, 3rd Edition, Pearson Education, 2005.

REFERENCES:

1.N.P.Gopalan & J.Akilandeswari, “Web Technology: A Developer’s Perspective”, PHI Learning,2008

2.Jeff Frantzen and Sobotka, “Java Script”, Tata McGraw Hill, 2002.

3.Justin Hunter,William Crawford, ”Java Servlet Programming”, O’Reilly Publications, 2nd Edition, 2001.

4.DHTML, O’ Reiley Publications, 2000.

MSE137 **E-COMMERCE** **3 1 0 4**

OBJECTIVES:

- To have an awareness about role of IT in business.
- To have knowledge of basic concepts of ecommerce.
- To have in depth knowledge in security and legal issues in ecommerce.

OUTCOMES:

- Identify the type of ecommerce and security mechanism to be used for particular Application.
- Build virtual book store based on requirements.

UNIT-I **12**

ELECTRONIC COMMERCE

Electronic Commerce, Electronic Data Interchange (EDI), E-Commerce Types – PC and networking: Networking, Communication media – Computer Communication Systems: ISO model, Electronic mail, X.400 Message Handling System, E-mail security, Light weight directory access protocol – Internet: Introduction, Communication protocols, Issues of concern.

UNIT-II **12**

ELECTRONIC DATA INTERCHANGE

EDI: Introduction, Cost and Benefits, Components of EDI System, Implementation Issues – UN/EDIFACT Standard: Introduction, An EDIFACT Message, Interchange Structure, Message Directories - EDI Over Internet, Commerce Over Extranets, Identification and Tracking Tools

UNIT-III **12**

REENGINEERING

Business process reengineering – Approach to BPR, BPR methodology – Change management: Change management in the Government, Implementation plan.

CONCERNS FOR E-COMMERCE GROWTH

Legal issues, Risks: Paper document versus electronic document, Technology for authenticating an electronic document, Laws for e-commerce, EDI interchange agreement.

UNIT-IV **12**

CYBER SECURITY: Cyber Attacks, Hacking, Firewalls, IDS, Secure Sockets Layer, Symmetric and asymmetric crypto systems, Guidelines for Cryptography Policy, Developing a Security Policy.

CYBER CRIMES: Cyber crimes and the Information Technology Act, 2000, Cyber forensics

UNIT-V **12**

CASE STUDIES

E-Commerce: Case Studies: ITC's e-Choupal - E-Governance: Case Studies: Indian customs EDI System, Indian Railways, Government of Andhra Pradesh – eSeva.

COMPUTER EMERGENCY RESPONSE TEAM (CERT): Introduction, CERT-In, CERT-In Activities

TOTAL PERIODS: 60

TEXT BOOKS:

1.Kamlesh K Bajaj, Debjani Nag, "E-Commerce – The Cutting Edge of Business", Tata McGraw Hill, Second Edition, 2006.

2.David Whitley, "E-Commerce: Strategy, Technologies and applications", McGraw Hill, 2000.

REFERENCE:

1.Ravi Kalakota and Andrew B.Whinston, "Frontiers of Electronic commerce", Pearson Education, 2005.

MSE138 SPEECH RECOGNITION 3 1 0 4

OBJECTIVES:

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

- Understand the fundamentals of speech processing
- Understand the basics of Speech Models

OUTCOMES:

- Students understand the advanced features of databases in design, administration, and applications
- Aspires to improve the performance of a database
- Students learn about optimization of existing resources usage within the database environment.

UNIT- I **12**

FUNDAMENTALS OF SPEECH PROCESSING

Introduction to Speech processing - applications - Fundamentals of speech processing - Analysis tools - z - Fourier - DFT transforms - FIR - IIR filters - sampling.

UNIT- II **12**

SPEECH MODELS

Digital models - Vocal tract analog and digital models - Time Domain models - Useful Performance measures - zero - crossings - voiced - unvoiced - pitch periods - correlation Functions - smoothing.

UNIT III **12**

DIGITAL REPRESENTATION AND ANALYSIS

Digital representations of speech waveform - Encoding of speech using delta modulation - PCM - differential PCM - other systems - Short-time Fourier analysis - Short term analysis Effects - filter banks - pitch detection - vocoders.

UNIT- IV **12**

HOMOMORPHIC SPEECH PROCESSING AND LINEAR PREDICTIVE CODING

Homomorphic speech processing - Cepstrum - pitch detection - formant estimation - vocoders - Linear predictive coding of speech - LPC methods and parameters - relations between speech parameters.

UNIT -V **12**

DIGITAL SPEECH PROCESSING AND RECOGNITION

Digital speech processing for man - machine communication by voice - Speech and speaker recognition - voice response systems.

TOTAL PERIODS: 60

TEXT BOOKS :

1.Amy Neustein,"Advances in Speech Recognition"Springer,2010.
2.Claudio,Klucio,"Speech Recognition",Wiley 2008

REFERENCES:

1. Dorothea Kolossa, Reinhold Haeb-Umbach,,"Robust Speech Recognition of Uncertain or Missing Data: Theory and Applications", Springer,2011.
2. Wai C.Chu, "Speech Coding Algorithm", Wiley, 2004.

MSE139 MULTICORE ARCHITECTURE 3 1 0 4

OBJECTIVES:

- Review theoretical background covering multicore processor architecture, concurrent programming, and parallel programming concepts and considerations.
- Cover critical concepts such as implicit and explicit parallelism, atomicity, synchronization, shared memory, cache coherency, Amdahl's Law, Flynn's processor classifications, and Little's law in detail.
- Recognize the best parallelism opportunities and explain the advantages of using threads to obtain concurrency using various analysis techniques, compositional approaches, and parallel design patterns.
- Learn how to avoid synchronization pitfalls such as starvation, deadlock, live lock, and data races.

OUTCOMES:

- Understand and use threads with specific technologies and programming methods, such as the Windows API, POSIX pthreads, Intel TBB, and Open MP using C/C++ and the Intel Compiler.
- Gain hands-on experience with the Intel Compiler to build and run multithreaded programs during the laboratories.
- Learn best practices to deal with MT-unsafe libraries and how to write new thread-safe libraries.

UNIT -I **12**

Fundamentals of SuperScalar Processor Design, Introduction to Multicore Architecture – Chip Multiprocessing, homogeneous Vs heterogeneous design - SMP – Multicore Vs Multithreading.

UNIT -II **12**

Shared memory architectures– synchronization – Memory organization – Cache Memory – Cache Coherency Protocols - Design of Levels of Caches.

UNIT- III **12**

Multicore programming Model – Shared memory model, message passing model, transaction model – OpenMP and MPI Programming.

UNIT -IV **12**

PowerPC architecture – RISC design, PowerPC ISA, PowerPC Memory Management Power 5 Multicore architecture design, Power 6 Architecture.

UNIT -V **12**

Cell Broad band engine architecture, PPE (Power Processor Element), SPE (Synergistic processing element), Cell Software Development Kit, Programming for Multicore architecture.

TOTAL PERIODS: 60

TEXT BOOKS:

1. Shameem Akhter and Jason Roberts, "Multi-core Programming", Intel Press,2006.
2.Wesley Petersen and Peter Arbenz, "Introduction to Parallel Computing", Oxford University Press, 2004.

REFERENCES:

1.John L. Hennessey and David A. Patterson, " Computer architecture – A quantitative approach", Morgan Kaufmann/Elsevier Publishers, 4th edition, 2007.
2.David E. Culler, Jaswinder Pal Singh, "Parallel computing architecture : A hardware/ software approach" , Morgan Kaufmann/Elsevier Publishers, 2004.
3.Michael J Quinn, "Parallel programming in C with MPI and OpenMP", Tata McGraw Hill, 2003.

MSE140 STOCHASTIC PROCESSES & QUEUEING THEORY 3 1 0 4

OBJECTIVES:

To impart knowledge on probability concepts to study their applications in stochastic processes & queueing theory

OUTCOMES:

1. Compute the characteristics of the random variable given the probabilities
2. Understand and apply various distribution
3. Solve cases of different Stochastic processes along with their properties.
4. Use discrete time finite state Markov chains
5. Gain sufficient knowledge in principles of queueing theory

UNIT I **12**

RANDOM VARIABLES

One dimensional and two dimensional Random Variables – Characteristics of Random Variables :Expectation, Moments.

12

UNIT II

THEORETICAL DISTRIBUTIONS

Discrete : Binomial, Poisson, Negative Binomial, Geometric, Uniform Distributions. Continuous: Uniform, Exponential, Erlang and Gamma, Weibull Distributions.

UNIT III **12**

STOCHASTIC PROCESSES

Classification of Stochastic Processes – Bernoulli process – Poisson process – Pure birth process – Birth and Death process.

UNIT IV

MARKOV CHAINS **12**

Introduction – Discrete-Parameter Markov Chains – Transition Probability Matrix – Chapman Kolmogorov Theorem – State classification and limiting distributions.

UNIT V **12**

QUEUING THEORY

Introduction – Characteristics of Markovian Single server and Multi server queuing models [(M/M/1) : (∞ / FIFO), (M/M/1) : (N / FIFO), (M/M/s) : (∞ /FIFO)] – M/G/1 Queuing System – Pollaczek Khinchin formula.

TEXT BOOKS:

1. Kishore.S.Trivedi, "Probability & Statistics with Reliability, Queuing and Computer Science Applications", PHI, New Delhi, 2008.
2. Veerajan T, "Probability, Statistics and Random Processes", 3rd Edition Tata McGraw Hill, New Delhi, 2008.

REFERENCES:

1. Sundarapandian, "Probability, Statistics and Queuing Theory", PHI,2009.
2. 1. Gupta S.C and Kapoor V.K, "Fundamentals of Mathematical Statistics", 9th revised edition, Sultan Chand & Co., New Delhi 2003.

MSE141 REAL TIME SYSTEMS DESIGN 3 1 0 4

OBJECTIVES :

- To learn real time operating system concepts and the associated issues & techniques.
- To explain and apply the fundamental concepts and terminology of real-time systems;
- To explain and address the fundamental problems of real-time systems;
- To analyze real-time systems designs;
- To design a real-time system (at least partially); and
- To identify and assess the relevant literature and research trends of real-time systems.

OUTCOMES:

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

UNIT I

REAL TIME SPECIFICATION AND DESIGN TECHNIQUES 12

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 12

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

UNIT III

INTERTASK COMMUNICATION AND SYNCHRONIZATION 12

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 12

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 **12**

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 HOURS: 60

TEXT BOOKS:

1.Samarjit Chakraborty, Jorg Eberspacher," Advances in Real Time Systems,Springer,2012

2.C.M. Krishna, Kang G. Shin, "Real Time Systems", McGraw Hill ", 2010.

3.Rajib Mall, "Real-time systems: theory and practice", Pearson Education, 2007.

REFERENCES:

1. Philip.A.Laplante, "Real Time System Design and Analysis", Prentice Hall of India, 3rd Edition,April 2004.

2. Allen Burns, Andy Wellings, "Real Time Systems and Programming Languages", Pearson Education, 2003.

MC142 GRAPH THEORY AND OPTIMIZATION TECHNIQUES 3 1 0 4

OBJECTIVES:

- To develop analytical capability and to impart knowledge in graphs, linear programming problem and statistical methods and their applications in Engineering & Technology
- To apply their concepts in engineering problems they would come across

OUTCOMES:

- Students should be able to understand graphs ,linear programming problems and statistical concepts.
- Students should be able to apply the concepts in solving the Engineering problems

UNIT I **12**

BASICS OF GRAPH THEORY

Graphs - Data structures for graphs – Sub graphs - Operations on Graphs Connectivity – Networks and the maximum flow - Minimum cut theorem - Trees - Spanning trees - Rooted trees – Matrix representation of graphs.

UNIT II **12**

CLASSES OF GRAPHS

Eulerian graphs and Hamiltonian graphs - Standard theorems - Planar graphs - Euler's formula - Five colour theorem - Coloring of graphs - Chromatic number (vertex and edge) properties and examples - Directed graphs.

UNIT III- **12**

GRAPH ALGORITHM

Computer Representation of graphs - Basic graph algorithms - Minimal spanning tree algorithm - Kruskal and Prim's algorithm - Shortest path algorithms - Dijsktra's algorithm - DFS and BFS algorithms.

UNIT IV **12**

OPTIMIZATION TECHNIQUES

Linear programming – Graphical methods – Simplex method (Artificial variables not included) – Transportation and assignment problems.

UNIT V **12**

STATISTICS

Tchebyshev's inequality – Maximum likelihood estimation – Correlation – Partial correlation – Multiple correlations.

TOTAL PERIODS: 60

TEXT BOOKS:

1.Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science", PHI,2004.

REFERENCES :

1. R. Balakrishnan, K. Ranganathan, "A Textbook of Graph Theory",Springer,2012.
2. Ashay Dharwadker,Shariefuddin Pirzada,"Graph Theory",2011
3.G.Suresh Singh,"Graph Theory",PHI,2010.

MSE143 FUZZY AND GENETIC ALGORITHM 3 1 0 4

OBJECTIVES:

- To introduce the ideas of Neural Networks, fuzzy logic and use of heuristics based on human experience.
- To introduce the concepts of Genetic algorithm and its applications to soft computing using some applications.

OUTCOMES:

- Students will be able to gain basic knowledge on soft computing and in depth knowledge on Neural Networks.
- Students will be equipped with basic knowledge of fuzzy set theory and its impact on fuzzy system Design, genetic algorithm approach and the soft computing applications.

UNIT-I 12

INTRODUCTION:

Uncertainty and Imprecision-Statistics and Random process - Uncertainty in information - Fuzzy sets and Membership - Chance versus ambiguity, classical Sets and Fuzzy Sets : Classical Sets - Fuzzy sets - Sets as points in hypercube, Classical Relations and Fuzzy Relations Cartesian product -Crisp Relations - Fuzzy Relations - Tolerance and Equivalence Relations - Value Assignments.

UNIT-I I 12

Membership Functions: Features of Membership function - Standard forms and boundaries – Fuzzification - Membership value assignments. -Fuzzy to Crisp conversions: Lambda cuts for fuzzy sets - Lambda cuts for fuzzy relations- Defuzzification Methods.

UNIT-III 12

Fuzzy Arithmetic, Numbers, Vectors and the Extension Principle: Extension Principle- Fuzzy numbers - Internal analysis in arithmetic - Approximate methods of extension. Classical logic and fuzzy logic: Classical predicate logic - Fuzzy logic - Approximate reasoning - Fuzzy Tautologies - Other forms of the implication & composition operation.

UNIT-IV 12

Fuzzy Rule Based Systems: Natural language - Linguistic hedges - Rule based systems - Graphical techniques of inference, Fuzzy Nonlinear Simulation: Fuzzy Relational Equations - Partitioning - Nonlinear Simulation using fuzzy rule based systems - FAMs. Fuzzy decision making.

UNIT-V **12**

Fuzzy Classification: Classification by equivalence relations- Cluster analysis - Cluster validity - Classification metric - Hardening the fuzzy - Partition, Fuzzy Pattern Recognition : Feature analysis-Partitions of the feature space - Single sample identification - Image processing syntactic recognition.

TOTAL HOURS: 60

TEXT BOOKS

1. S. Rajasekaran and G.A.V.Pai, ,"Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2011.

2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill International Edition 2009.

REFERENCES

1. J. Harris,"An Introduction to Fuzzy Logic Applications", Springer, 2001

MSE144 MIDDLEWARE TECHNOLOGIES 3 1 0 4

OBJECTIVES:

- The course provides details about the modern component platforms.
- Based on practical examples, details about modern middleware technologies will be analyzed.
- Students get the chance to gain in-depth knowledge about their favorite middleware platform.
-

OUTCOMES:

• Thoroughly, individually, describe the most important aspects when using middleware technologies

• Be able to, in group, develop a component-based application based on middleware technology.

• Be able to individually judge existing or new middleware frameworks in comparison to historical and today's solutions

. • Individually, in detail describe differences and similarities in different middleware platforms.

UNIT I **12**

CLIENT / SERVER CONCEPTS

Client – Server – File Server, Database server, Group server, Object server, Web server .Middleware – General middleware – Service specific middleware. Client / Server Building blocks – RPC – Messaging – Peer – to- Peer.

UNIT II **12**

EJB ARCHITECTURE

EJB – EJB Architecture – Overview of EJB software architecture – View of EJB – Conversation – Building and Deploying EJBs – Roles in EJB.

UNIT III **12**

EJB APPLICATIONS

EJB Session Beans – EJB entity beans – EJB clients – EJB Deployment – Building an application with EJB.

UNIT IV **12**

CORBA

CORBA – Distributed Systems – Purpose - Exploring CORBA alternatives – Architecture overview – CORBA and networking model – CORBA object model – IDL – ORB - Building an application with CORBA.

UNIT V **12**

COMPONENT OBJECT MODEL

COM – Data types – Interfaces – Proxy and Stub – Marshalling – Implementing Server / Client – Interface Pointers – Object Creation, Invocation , Destruction – Comparison COM and CORBA – Introduction to .NET – Overview of .NET architecture – Marshalling - Remoting.

TOTAL HOURS: 60

TEXT BOOKS:

1. Robert Orfali, Dan Harkey and Jeri Edwards, "The Essential Client/Server Survival Guide", Galgotia Publications Pvt. Ltd., 2002.
2. Tom Valesky,"Enterprise Java Beans", Pearson Education, 2002.

REFERENCES:

1.Jesse Liberty, "Programming C#", 2nd Edition, O'Reilly Press, 2002.
2. Mowbray,"Inside CORBA", Pearson Education, 2002.
3.Jason Pritchard,"COM and CORBA side by side", Addison Wesley, 2000.

MSE145 HUMAN COMPUTER INTERACTION 3 1 0 4

OBJECTIVES:

- Determine the need for computers and evaluate the use of computers,
- identify the stages in software engineering that need to be modified for effectiveness of interacting with computers
- discover the various models that can be used for designing systems
- evaluate the design techniques by applying the apt statistical approach
- design dialogue for representation to computers
-

OUTCOMES:

- To Learn the basic fundamentals of the Human Computer Interaction
- To Learn the various aspects of managing the human interface design
- To Understand the various aspects involved in virtual environment and manipulation
- To be familiar with various interfaces available

UNIT I

DESIGN PROCESS 12

Humans – Information process – Computer – Information Process – Differences and Similarities between them – Need for Interaction – Models – Ergonomics – Style – Context – Paradigms – Designing of Interactive systems – Usability – Paradigm shift – Interaction design basics – Design Process – Scenarios – Users need – Complexity of design

UNIT II 12

DESIGN AND EVALUATION OF INTERACTIVE SYSTEMS

Software Process – Usability engineering – Issue based Information systems – Iterative design practices – Design rules – maximum usability – Principles – Standards and guidelines – design patterns – Programming Tools – Windowing systems – Interaction tool kit – User 97 Interface management system – Evaluation techniques – evaluation design – Evaluating implementations – Observational Methods .

UNIT III

MODELS 12

Universal design principles – Multimodal systems – User Support – Presentation and Implementation Issues – types – requirements – approaches – Cognitive model – Hierarchical model – Linguistic model – physical and device models – Socio-technical models – Communication and Collaboration models – Task models – Task analysis and design.

UNIT IV **12**

EXPERIMENTAL DESIGN AND STATISTICAL ANALYSIS OF HCI

Basic Design structure – Single independent variable – multiple independent variable – factorial design – split-plot design – random errors – experimental procedure – Statistical analysis.

T tests – Analysis of Variance test – Regression – Chi-Square test – Survey – Probabilistic sampling – Non-probabilistic sampling – developing survey questions

UNIT V **12**

THEORIES Dialogue notations and design – Dialogue need – dialogue design notations – Graphical – Textual - representing dialogue – formal descriptions – Dialogue analysis – System models – Interaction models – relationship with dialogue – Formalisms – Formal notations – Interstitial behavior – Virtual reality – Modeling rich interaction – Status Event analysis – Properties – Rich contexts – Sensor-based systems – Groupware – Applications – Ubiquitous computing – Virtual reality

TOTAL PERIODS: 60

TEXT BOOKS:

1. Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, "Research Methods in HumanComputer Interaction", Wiley, 2010.

2. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale "Human Computer Interaction", 3rd Edition Prentice Hall, 2004.

REFERENCE:

1. Ben Shneiderman and Catherine Plaisant "Designing the User Interface: Strategies for Effective Human-Computer Interaction ",Addison-Wesley ,5th Edition,2009.

MSE146 COMPONENT BASED SYSTEM DESIGN 3 1 0 4

UNIT I **12**

BASIC CONCEPTS

Software Components - Component models and Component Services-myths in Component Based Technology - Risk Factors - Success Factors, Component Based Software Development.

UNIT I I **12**

COMPONENTS, ARCHITECTURE AND PROCESS

Component Architecture, Component Frameworks, Component Development, Component distribution and acquisition, Component assembly, markets and components.

UNIT I I I **12**

DESIGN OF SOFTWARE COMPONENT

Software Components and the UML Component Infrastructures - Business Components - Components and Connectors - Designing Models of Modularity & Integration

UNIT IV **12**

MANAGEMENT OF COMPONENT BASED SOFTWARE SYSTEMS

Measurement and Metrics for Software Components - Selecting the right Components - Software Component Project Management - Trouble with Testing Components - Configuration Management and Component Libraries - Evolution Maintenance of Management of Component based Systems.

UNIT V **12**

COMPONENT TECHNOLOGIES

Overview of the Following Component Models: CORBA, COM+, Enterprise Java Beans, Software Agents.

TOTAL HOURS: 60

TEXT BOOKS:

1. Clemens Szyperski, "Component Software - Beyond object oriented programming", Pearson Education, 2nd edition, 2004.
2. GeorgeT.Heinemen, William T. Councill, "Component Based Software Engineering",2001.

REFERENCES:

1. Thomas J..Mowbray, William A.Ruh, "Inside CORBA Distributed Object Standards and Applications", Addison - Wesley, 2001.
2.Dale Rojerson, "Inside COM", Microsoft Press, 2001.
3.Andreas Vogel, Keith Duddy "Java Programming with CORBA" John Wiley & Sons,3rd edition,2001.

MSE147 DISTRIBUTED OPERATING SYSTEM 3 1 0 4

OBJECTIVES:

- To provide hardware and software issues in modern distributed systems.
- To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.
- To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.

OUTCOMES:

- The student will gain enough understanding of distributed operating systems, be able to explain the principles underlying the functioning of distributed systems as well as how these principles are applied in distributed systems and what the problems and challenges are.
- The student will understand and estimate the impact of different design choices, system features on distributed systems

UNIT I **12**

Modes of communication, System Process, Interrupt Handling, Handling Systems calls, Protection of resources &Resources Management Micro-Kernel Operating System.

UNIT II **12**

Review of Network Operating System and Distributed Operating System, Issue in the design of Distributed Operating System, Overview of Computer Networks. Inter process communication, Linux, IPC Mechanism, Remote Procedure calls, RPC exception handling,
security issues, RPC in Heterogeneous Environment (case study Linux RPC)

UNIT III **12**

Clock Synchronization, Logical clocks, Physical clocks, clock synchronization algorithms, Mutual Exclusion, Election Algorithms, Dead locks in Distributed Systems. Thrashing, Heterogeneous DSM, Resource Management (Load Balancing approach, Load Sharing approach), Process Management: process Migration, Thread.

UNIT IV **12**

Overview of shared memory, consistency model, Page based Distributed Shared Memory, Shared –variable Distributed Memory, Object -based Distributed Memory.

UNIT -V **12**

File models, File access, File sharing, file-caching, File Replication, fault Tolerance, Network File System, (Case study, 8NFS on Linux Directory Services, Security in Distributed File system).

TOTAL HOURS: 60

TEXT BOOKS:

1.M. Beck et al," Linux Kernal Programming",3rd edition, 2002.
2.B.W. Kernighan and R Pide, "The Unix Programming Environment ",Prentice Hall of India-2000.

REFERENCE:

1. Silberschatz,P.B.Garvin,Gagne," Operating System Concepts", 2009.

MSE148 EMBEDDED SYSTEM 3 1 0 4

OBJECTIVES:

- To study the software designing used in embedded systems.
- To study the object oriented analysis and design for real time systems.
- To study the development activities of real time system using UML.

OUTCOMES:

- Apply Object Structure and Behavior analysis in real time design
- Apply the concept of architectural design in practical applications
- Apply objects and classes concepts in real time applications

UNIT I 12

REVIEW OF EMBEDDED HARD WARE

Gates - Timing Diagram - Memory - Microprocessor - Buses - Direct Memory Access - Interrupts - Built ins on the Microprocessor - Convention Used on Schematic - Schematic - Interrupts Microprocessor Architecture - Interrupt Basics - Shared Data Problem - Interrupt Latency.

UNIT I I 12

MICROCHIP PIC MICRO CONTROLLER

Introduction - CPU Architecture - Registers - Instruction Sets - Addressing Modes - Loop Timing - Timers - Interrupts Timing - I/O Exception - I2 C Bus Operation - Serial EEPROM - Analog to Digital Converter - UART - Baud Rate - Data Handling - Initialization - Special features - Serial Programming - Parallel Slave Port.

UNIT I I I 12

EMBEDDED MICROCOMPUTER SYSTEM

Motorola MC68H11 Family Architecture - Registers - Addressing Modes Programs - Interfacing Methods - Parallel I/O Interface - Parallel Port Interface - Memory Interfacing - High Speed I/O Interfacing - Interrupts- Interrupt Service Routine - Features of Interrupts - Interrupt Vector - Priority - Timing Generation & Measurement - Input capture - Output Compare - Frequency measurement - Serial I/O Devices - RS 232, RS485 - Analog Interfacing - Applications.

UNIT IV 12

SOFTWARE DEVELOPMENT

Round Robin - Round Robin with Interrupts - Function - Queue Scheduling Architecture & Algorithms - Introduction to - Assemblers, Compliers, Cross Compliers, Integrated Development environment(IDE) - Object Oriented Interfacing - Recursion - Debugging Strategies - Simulators .

UNIT V **12**

REAL TIME OPERATING SYSTEM

Task & Task States - Tasks & Data - Semaphores & Shared Data - Operating System Services - Message Queues - Timer Functions - Event Memory Management - Interrupt Routines & RTOS Environment - Basic design Using RTOS.

TOTAL HOURS: 60

TEXT BOOKS:

1. David E. Simon, "An Embedded Software Primer", Pearson Education, 2004
2. Jonartthan W. Valvano, "Embedded Micro Computer System: Real Time Interfacing", Thomson Learning, 2001.

REFERENCES:

1.Laplante,Ovaska,"Real-Time Systems Design and Analysis: Tools for the Practitioner", 4th Edition,Wiley,2013.
2.Bruce Schneier, Niels Ferguson, "Practical Cryptography", Wiley Dream tech India Pvt. Ltd., 2003.

MSE149 SPEECH TECHNOLOGY 3 1 0 4

OBJECTIVES:

- To provide knowledge in fundamentals of speech processing
- To get knowledge in speech models.

OUTCOMES:

- The student will gain enough understanding of speech models
- The student will understand and estimate the impact of different digital speech recognition models

UNIT I 12

FUNDAMENTALS OF SPEECH PROCESSING

Introduction to Speech processing - applications - Fundamentals of speech processing - Analysis tools - z - Fourier - DFT transforms - FIR - IIR filters - sampling.

UNIT II 12

SPEECH MODELS

Digital models - Vocal tract analog and digital models - Time Domain models - Useful Performance measures - zero - crossings - voiced - unvoiced - pitch periods - correlation Functions - smoothing.

UNIT III 12

DIGITAL REPRESENTATION AND ANALYSIS

Digital representations of speech waveform - Encoding of speech using delta modulation - PCM - differential PCM - other systems - Short-time Fourier analysis - Short term analysis Effects - filter banks - pitch detection - vocoders.

UNIT IV 12

HOMOMORPHIC SPEECH PROCESSING AND LINEAR PREDICTIVE CODING

Homomorphic speech processing - Cepstrum - pitch detection - formant estimation - vocoders - Linear predictive coding of speech - LPC methods and parameters - relations between speech parameters.

UNIT V **12**

DIGITAL SPEECH PROCESSING AND RECOGNITION

Digital speech processing for man - machine communication by voice - Speech and speaker recognition - voice response systems.

TOTAL HOURS: 60

TEXT BOOKS:

1.L. R. Rabiner & R. W. Schafer, "Digital Processing of Speech Signals", Prentice Hall, 2008.
2.Amy Neustein,"Advances in Speech Recognition"Springer,2010.
3.Claudio,Klucio,"Speech Recognition",Wiley 2008

REFERENCES:

1.Wai C. Chu,,"Speech Coding Algorithms: Foundation and Evolution of Standardized Coders", John Wiley & Sons,2003.
2.Javier Ramírez, Juan Manuel Górriz," Recent Advances in Robust Speech Recognition Technology", ,2011.

MSE150 INFORMATION TECHNOLOGY AND CYBER LAWS 3 1 0 4

OBJECTIVES:

- To provide with a thorough understanding of the issues associated with the design, provision and management of security services for information systems.
- To learn the different aspects of information security, security attacks and the defense strategies used to combat them.

OUTCOMES:

- Describe the fundamental concepts of information system security cyber laws
- Understand the basic security terms such as encryption, authentication, firewall and intrusion detection.

UNIT I **12**

Crimes of this millennium – checks and balances against arbitrary arrests –concept of cyber crime and the IT Act- Hacking – Teenage Web Vandals – Cyber Fraud and Cyber Cheating – Virus on the Internet-other IT Act offences – Network service providers-Criminal justice in India and Implications

UNIT II **12**

Contracts in the Infotech World – Click Wrap and Shrink Wrap contracts – contract formation under the Indian context – contract formation on the Internet – Terms and conditions of the Contract – jurisdiction and information technology act – foreign judgements in India – IPR disputes – misuse of the law of jurisdiction – jurisdictional disputes with respect to the internet in USA.

UNIT III **12**

Concept of Domain Name and Reply to Cyber squatters – meta-tagging – copyright ownership and assignment – License of copyright – copyright term and respect for foreign works – copyright infringement remedies and offences – copyright protection of content on the Internet – computer software piracy

UNIT IV **12**

Concept of permanent Establishment – PE in cross border E-Commerce - the United Nations model Tax treaty – law of double taxation avoidance agreements – Tax Agents of non-residents under the Income tax act and the relevance to E commerce – impact of the internet on customs duties – taxation policies in India

UNIT V **12**

Digital signatures – Digital signature certificate – certifying authorities and liability in the event of Digital signature compromise – status of Electronic records as Evidence – proving Digital signatures – proof of Electronic agreements – proving electronic messages – goods and services – consumer complaint – defect in goods and deficiency in services restrictive and unfair trade – practices – reliefs under CPA – consumer for as, jurisdictions and implications on cyber consumers in.

TOTAL HOURS:60

TEXT BOOKS:

1. R. K. Chaubey, “An Introduction to cyber crime and cyber law”, Kamal Law House, second edition 2012.
2. Vivek Sood, “Cyberlaw Simplified”, Tata McGraw Hill, 2001.

REFERENCES:

1.John W. Rittinghouse, William M. Hancock, “Cybersecurity Operations Handbook”, 2005.
2.John R. Vacca, “Computer forensics: Computer Crime Scene Investigation”, 2nd Edition, Charles River Media, Inc. Boston, 2005.

MSE151 PHP PROGRAMMING 3 1 0 4

OBJECTIVES:

- It gives all students exposure to basics of PHP
- It gives knowledge on session tracking and graphics using PHP

OUTCOMES:

• Recognize the difference between HTML, XHTML, MySQL & PHP.
• Differentiate between PHP Web & HTML Controls
• Understand different Web controls
• Understand connecting Web pages with DB.

UNIT I **12**

PHP Introduction: PHP Basics - Evolution of PHP - Introduction to PHP Programming Variables, Operators, and Constants: Introduction to Variables – Operators – Type Juggling - Type Casting - Variable Variables - function for Determining and Setting Variable- Types - Constants. Control Structures: Conditional Expressions- Arrays: Introduction to Arrays- Initializing Arrays - Working with Arrays. Functions: Introduction to Functions - Passing Arguments to Functions - Returning Values from Functions - Understanding the Scope of a Variable within a Function, Variable Functions and Variable Argument Functions

UNIT II **12**

Understanding Classes: Classes – Constructors - Extending a class.Form Parsing in PHP: Parsing HTML Posted Values in PHP - Form Validation- Printing the Confirmation Page - Printing Hidden Fields - Putting Theory into Practice. Handling Files: Working with Files - Putting Theory into Practice.

UNIT III **12**

Handling Data Storage: An Introduction to Database Concepts - Database Management System - Relational Database Management System - Database Normalization - PHP Support to various Databases - Web Database Architecture -MySQL Database Programming. Using PHP with SQL Databases: Working with MySQL - Using Multiple Databases Simultaneously - Important PHP-MySQL Functions - Error handling in MySQL – Error Types in PHP - Creating Customized Error Handlers.

UNIT IV **12**

Session Tracking: An Overview of Sessions - Tracking Sessions. Input Validators in PHP: Validation Basics - Performing Validations in an HTML Web Page - Performing Validations in PHP - Functions for Validating User Input - Validating Email Addresses. Cookies: What Is a Cookie? Implementing Cookies in PHP - Are Cookies Harmful?

UNIT V **12**

Graphics in PHP: Graphics on the web - Creating Images in PHP. Understanding CVS: CVS an Overview – The CVS Repository – Environment Variables in CVS - CVS Command Options.PEAR: Introduction to PEAR – Coding Standards in PEAR – PEAR and CVS – Contributing Codes to PEAR – Requirements to Make Changes in PEAR – Help in PEAR.

TOTAL HOURS: 60

TEXT BOOKS:

1. Matt Doyle," Beginning PHP 5.3",Wiley,2011.

2.Ashish Wilfred,Meeta Gupta and Kartik Bhatnagar with NIIT, "PHP Professional Projects**",** Prentice Hall of India, 2002.

REFERENCES:

1. Kevin Tatroe, Peter MacIntyre, Rasmus Lerdorf ,"Programming PHP",O'Rielley,2013.

2.Rasmus Lerdorf and Kevin Tatroe, "Programming in PHP", O'Reilly and Associates, 2002.

MSE152 QUANTUM THEORY & ALGORITHM DESIGN 3 1 0 4

OBJECTIVES:

- It gives all students exposure to important concepts in quantum theory
- It gives knowledge in matrices, tensor products
- It gives knowledge in dynamic programming and various algorithms using data structure

OUTCOMES:

By the end of this course student should be able to:

• Understand Quantum Computing

• Understand the Quantum theory algorithms

- Understand how to apply algorithms using various data structure for real time applications

UNIT I **12**

Qubit & Quantum States: The Qubit, Vector Spaces. Linear Combination Of Vectors, Uniqueness of a spanning set, basis & dimensions, inner Products, orthonormality, gram-schmidt ortho gonalization, bracket formalism, the Cauchy-schwarez and triangle Inequalities.

UNIT II **12**

Matrices & Operators: Observables, The Pauli Operators, Outer Products, The Closure Relation, Representation of operators using matrices, outer products & matrix representation, matrix representation of operators in two dimensional spaces, Pauli Matrix, Hermitian unitary and normal operator, Eigen values & Eigen Vectors, Spectral Decompostion, Trace of an operator, important properties of Trace, Expectation Value of Operator, Projection Operator, Positive Operators, Commutator Algebra, Heisenberg uncertainty principle, polar decomposition & singular values, Postulates of Quantum Mechanics.

UNIT III **12**

Tensor Products: Representing Composite States in Quantum Mechanics, Computing inner products, Tensor products of column vectors, operators and tensor products of Matrices.

UNIT IV **12**

Density Operator: Density Operator of Pure & Mix state, Key Properties, Characterizing Mixed State, Practical Trace & Reduce Density Operator, Density Operator & Bloch Vector.

Quantum Measurement Theory : Distinguishing Quantum states & Measures, Projective Measurements, Measurement on Composite systems, Generalized Measurements, Positive Operator- Valued Measures.

UNIT V **12**

Introduction Mathematics for Algorithmic: Sets, Functions and Relations. Amortized Analysis: Properties of Matrices, Solving systems of linear Equations, Linear programming, general linear

programs, an overview of linear programming The Greedy Methods: Optimization problems, the greedy method, 0/1 knapsack problem, topological sorting, Single source shortest path, minimum cost spanning tree. Divide & Conquer: The method. Application: merge sort. Dynamic programming: The method, Application: 0/1 knapsack problem Skip lists and hashing. Priority Queues: Huffman Codes. Binary Search Trees: Binary search trees, indexed binary search trees, binary search tree operations and implementation. Graphs. Basic Data Structures: Tree, The tree Abstract Data type, Tree Traversal, Binary tree.

TOTAL HOURS: 60

TEXT BOOKS:

1. Zdzis_law Meglicki," Quantum Computing without Magic",The MIT Press,2008.
2. David McMahon, "Quantum Computing Explained",Wiely,2008.
3. Marco Lanzagorta, Jeffrey Uhlmann," Quantum Computer Science",2009.

REFERENCES:

1. Michael T. Goodrich ,"Algorithm Design and Applications",Wiley,2014.
2. Thomas H. Cormen, Leiserson, Rivest & Stein ,"Introduction to Algorithms",2009.
3. Phillip Kaye, Raymond Laflamme, Michele Mosca, "An Introduction to Quantum Computing", Oxford,2007.

MSE153 INFORMATION SECURITY 3 1 0 4

OBJECTIVES:

- To provide an understanding of principal concepts, major issues, technologies, and basic approaches in information security.
- To provide concept-level hands-on experience in specific topic area.
- To provide the ability to examine and analyze real-life security cases.

OUTCOMES:

At the end of the semester, the students will be able to:

• Harden servers and clients.
• Recognize common attack patterns.
• Evaluate vulnerability of an information system and establish a plan for risk management
• Demonstrate how to detect and reduce threats in Web security.
• Evaluate the authentication and encryption needs of an information system.
• Explain the Public Key Infrastructure process
• Demonstrate how to secure a wireless network
• Evaluate a company's security policies and procedures

UNIT – I **12**

Cryptography and Data Security Information assurance issues -Threats to authentication, privacy and integrity, Generating MD5 hash collisions -Approaches to cryptography -Symmetric vs. asymmetric ciphers, Issues for secret key encryption

UNIT – II **12**

Public key fixes to secret key problems, Hashing and digital signatures, Generating and exchanging keys -Authentication via key ownership, Non-repudiation using digital signatures, Digital signatures in the real world, Key distribution and management, E-voting.

UNIT – III **12**

Intrusion Detection Overview, Host based intrusion detection systems, Network based intrusion detection systems, IDS as part of the overall Security System

UNIT – IV **12**

IDS Signatures and Analysis Schemes for Intrusion Detection Systems, Anomaly detection, Expert Systems, Tools for packet analysis and intrusion detection, Some intrusion detection tools(Snort,Windump,Ethereal etc.).

UNIT V **12**

Case Reports of various attack strategies, Implementation Issues , Future directions

TOTAL PERIODS: 60

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", Prentice Hall of India, Third Edition, 2003.
2. Atul Kahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003.

REFERENCES:

1 . William Stallings; Network Secuirty Essentials, Pearson publication, 2005.

4. William Stallings; Cryptography and Network Security, Pearson publication, 4th edition, 2004.

5. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003.

4. Bruce Schneier, "Applied Cryptography", John Wiley & Sons Inc, 2001.

MSE154 INTERNET TECHNOLOGY 3 1 0 4

OBJECTIVES:

- Be able to use the basic features of web browsers, such as Internet Explorer and Firefox;
- Be able to use such Internet tools as email, ftp, and search engines;
- Understand the implications of Internet on society, primarily in the aspects of communication, commerce, crime, ethics, and privacy;
- Understand the generic principles of computer programming as applied to implementing basic web-based applications;
- Use the knowledge both of algorithmic functions and of computer programming in web-based application settings;

OUTCOMES:

On successful completion of this unit, students are expected to be able to:

- Apply client web technologies;
- Design and implement website using XHTML and CSS;
- Apply JavaScript to provide better website user experience;

UNIT – I **12**

Introduction: Introduction to Internet, History of Internet, Internet Standards, Practical uses of Internet. Component of the Internet: Connection requirements and options, Internet addressing, Internet standards, Web browser basics.

UNIT – II **12**

Building Blocks: Understanding protocols, Transmission Control Protocol/Internet Protocol, Name resolution protocols, Client-side protocols, Internet client infrastructure.

UNIT –III **12**

Components of web page: HTML, DHTML, CSS, JavaScript, XML; Website Design, Overview of Web Servers , Core Components: Hardware platforms, Internet server components, Web servers, E-mail servers, FTP servers, Proxy servers, News servers, Directory servers, Mirrored servers.

UNIT – IV **12**

Networking Hardware and Software Components: Network Interface Cards, Network Cables, Network Connecting Devices etc.

UNIT – V **12**

How Web Applications Work, Web Objects, Building a Simple internet Program- case study.

TOTAL HOURS: 60

TEXT BOOKS:

1. Douglas E Comer ,"Computer Networks and Internets With Internet Applications", Pearson , 2008.
2. B.Forouzan ,"Data Communication and Networking ",McGraw Hill,2007.
3. William Stallings ,"Computer Network with Internet Protocols",Pearson ,2003.

REFERENCES:

1. Deitel And Deitel ,"Internet & World wide Web :How to Program",Pearson,2012.
2. Danny Goodman ,"Dynamic HTML: The Definitive Reference (2nd Edition)",O'reilly, 2008.
3. Bryan Pfaffenberger, Bill Karrow," HTML 4 Bible", Wiley,2000.

4 Stuart Conway ," HTML 4.01 Programmer's Reference", Wrox Press 2001.

MSE155 BIO-INSPIRED ARTIFICIAL INTELLIGENCE 3 1 0 4

OBJECTIVES:

- To appreciate the use of biological aspects in building intelligent systems
- To understand the algorithms, programming and applications of Evolutionary and genetic algorithms and neural and fuzzy systems
- To appreciate the adaptation of cellular and developmental systems
- To focus on the understanding of artificial immune systems and its applications
- To understand issues in developing collective and behavioral systems.
-

OUTCOMES:

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

- Use existing open source tools to build an application using genetic approaches
- Identify different applications suitable for different types of neural networks giving justifications
- Critically analyze the use of cellular systems
- Differentiate the different models of immune systems
- Do a literature survey on applications of artificial immune systems
- Implement the Particle swarm and Ant colony algorithms within a framework and build applications

UNIT I 12

EVOLUTIONARY SYSTEMS

Evolutionary Systems – Artificial Evolution - Genetic Representations - Evolutionary Measures - Types of Evolutionary Algorithms - Schema Theory. Evolutionary Computation- Representation- Selection- Reproduction. Genetic Algorithms - Canonical Genetic Algorithm – Crossover- Mutation - Control Parameters – Applications. Genetic Programming - Tree-Based Representation – Building Block Genetic Programming –Applications. Evolutionary Programming – Basics –Operators –Strategy Parameters -Evolutionary Programming Implementations

UNIT II 12

NEURAL AND FUZZY SYSTEMS

Neural Networks - Biological Nervous Systems - Artificial Neural Learning - Architecture. Unsupervised Learning - Self-Organizing Feature Maps. Supervised Learning – Types- Learning Rules. Radial Basis Function Networks. Reinforcement Learning – Model Free - Neural Networks and Reinforcement Learning. Fuzzy Systems- Fuzzy Sets – Logic and Reasoning – Controllers- Rough Sets.

UNIT III 12

CELLULAR AND DEVELOPMENT SYSTEMS

Cellular Systems - The Basic Ingredients - Cellular Automata -Modelling - Classic Cellular Automata – Other Cellular Systems – Computation - Artificial Life - Complex Systems - Analysis and Synthesis of Cellular Systems. Developmental Systems - Potential Advantages of a Developmental Representation -Rewriting Systems - Synthesis of Developmental Systems -

Evolution and Development – Defining Evolutionary Developmental Systems -Evolutionary Rewriting Systems –Developmental Programs and Processes

UNIT IV **12**

IMMUNE SYSTEMS AND COLLECTIVE SYSTEMS

Natural Immune systems - Classical View -Working -Constituents of Biological Immune Systems - Immunity Types - Learning the Antigen Structure - The Network Theory - The Danger Theory –Artificial Immune Systems - Algorithms - Classical View Models - Clonal Selection Theory Models – Network Theory Models - Danger Theory Models - Applications and Other AIS models Applications- Biological Self-Organization - Particle Swarm Optimization - Basics - Social Network Structures – Variations - Basic PSO Parameters - Optimization - Applications. Ant Colony Optimization – Cemetery Organization and Brood Care - Division of Labor – Applicati

UNITV **12**

BEHAVIORAL SYSTEMS

Behavioral Systems - Behavior in Cognitive Science - Behavior in Artificial Intelligence – Behavioral Systems – Behavior Based Robots –Evolution - Co-evolution - Learning and Self Reproduction of Behavioral Systems. Cultural Algorithms - Culture and Artificial Culture - Cultural Algorithm – Belief Space – Fuzzy Cultural Algorithms – Applications. Co-evolution – Types - Competitive and Cooperative Co-evolution.

TOTAL PERIODS: 60

TEXT BOOKS:

1. Claudio Mattiussi, Dario Floreano "Bio-Inspired Artificial Intelligence: Theories, Methods, and Technologies" (Intelligent Robotics and Autonomous Agents series), MIT Press, 2008.

REFERENCES:

1. Andries P. Engelbrecht, "Computational Intelligence: An Introduction", 2nd Edition , Wiley; 2007.
2. Russell C. Eberhart, Yuhui Shi "Computational Intelligence: Concepts to Implementations", Morgan Kaufmann; first edition 2007.