DEPARTMENT
OF
COMPUTER SCIENCE & ENGINEERING

Scheme of Instruction and
Syllabi

M.Tech.
COMPUTER SCIENCE & ENGINEERING
2010

M.V.S.R. ENGINEERING COLLEGE
Nadergul – 501 510
(Affiliated to Osmania University)

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Scheme of Instruction & Examination
M.E / M.Tech Four Semester Course (Regular) 2010-2011

S.No.	Subject	Periods per Week		Duration	Max. Marks	
		L/T	D/P	(Hours)	Univ.Exam	Sessional
			SEMESTER – I			
1.	Core	3	--	3	80	20
2.	Core	3	--	3	80	20
3.	Core / Elective	3	--	3	80	20
4.	Core / Elective	3	--	3	80	20
5.	Core / Elective	3	--	3	80	20
6.	Elective	3	--	3	80	20
7.	Lab – I	3	3	--	--	50
8.	Seminar – I	3	3	--	--	50
	Total	18	6	--	480	220
			SEMESTER – II			
1.	Core	3	--	3	80	20
2.	Core	3	--	3	80	20
3.	Core / Elective	3	--	3	80	20
4.	Core / Elective	3	--	3	80	20
5.	Core / Elective	3	--	3	80	20
6.	Elective	3	--	3	80	20
7.	Lab – II	3	3	--	--	50
8.	Seminar – II	3	3	--	--	50
	Total	18	6	--	480	220
			SEMESTER – III			
1.	Dissertation + Project Seminar*	--	6	--	--	100**
			SEMESTER –IV			
1.	Dissertation	--	--	Viva-voce	Grade***	--

Note: Six core Subjects and Six Elective subjects should be completed by the end of Semester – II.

* One Project Seminar presentation.

** 50 marks to be awarded by guide and 50 marks to be awarded by Viva committee with guide and two internal faculty members.

*** Excellent / Very Good /Good/ Satisfactory / Unsatisfactory.

(i) Theory question paper have total 7 questions out of which candidate has to answer 5 questions including one compulsory question of 20 marks. This compulsory question, consisting of 6 to 10 questions, which will cover the entire syllabus. Other questions will be of 15 marks each.

(ii) Sessional marks 20 are based on 2 class tests (each weightage 10 marks). Performance of both the tests will be taken into account.

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WITH EFFECT FROM THE ACADEMIC YEAR 2010-201

SCHEME OF INSTRUCTION & EXAMINATION
M.E / M.Tech Six Semester Course (Part Time) 2010-2011

S.No.	Subject	Periods per Week		Duration	Max. Marks	
		L/T	D/P	(Hours)	Univ.Exam	Sessional
			SEMESTER – I			
1.	Core –I	3	--	3	80	20
2.	Core / Elective	3	--	3	80	20
3.	Elective	3	--	3	80	20
4.	Lab – I /Seminar-I	--	3	--	--	50
			SEMESTER – II			
1.	Core –I	3	--	3	80	20
2.	Core / Elective	3	--	3	80	20
3.	Elective	3	--	3	80	20
4.	Lab – I /Seminar-I	--	3	--	--	50
			SEMESTER – III			
1.	Core –I	3	--	3	80	20
2.	Core / Elective	3	--	3	80	20
3.	Elective	3	--	3	80	20
4.	Lab – I /Seminar-I	--	3	--	--	50
			SEMESTER – IV			
1.	Core –I	3	--	3	80	20
2.	Core / Elective	3	--	3	80	20
3.	Elective	3	--	3	80	20
4.	Lab – I /Seminar-I	--	3	--	--	50
			SEMESTER – V			
1.	Dissertation + Project Seminar*	--	6	--	--	100**
			SEMESTER –VI			
1.	Dissertation	--	--	Viva-voce	Grade***	--

Note: Six core Subjects and Six Elective subjects should be completed by the end of Semester-IV.

* One Project Seminar presentation.

** 50 marks to be awarded by guide and 50 marks to be awarded by Viva committee with guide and two internal faculty members.

*** Excellent / Very Good /Good/ Satisfactory / Unsatisfactory.

1. Theory question paper have total 7 questions out of which candidate has to answer 5 questions including one compulsory question of 20 marks. This compulsory question, consisting of 6 to 10 questions, which will cover the entire syllabus. Other questions will be of 15 marks each.
2. Sessional marks 20 are based on 2 class tests (each weightage 10 marks). Performance of both the tests will be taken into account.

LIST OF CORRECTIONS
IN
M.Tech CSE & PDS Courses (2010-2011)

07-08-2010

M.Tech (CSE)

a) List of Subjects - Moved :

S. No.	Subject Name	From	To
1.	Network Security	E – 1 & 2	E – 3 & 4
2.	Machine Learning	E – 1 & 2	E – 3 & 4
3.	Human Computer Interaction	E – 3 & 4	E – 5 & 6
4.	Data Mining	E – 5 & 6	E – 1 & 2

b) List of Subjects – Added :

1. Web Engineering
2. Cloud Computing
3. Soft Computing
4. Semantic Web
5. Web Mining

M.Tech (PDS)

a) List of Subjects - Moved :

S. No.	Subject Name	From	To
1.	Natural Language Processing	E – 1 & 2	E – 3 & 4
2.	Software Reuse Techniques	E – 1 & 2	E – 5 & 6
3.	Object Oriented Software Engg.	E – 5 & 6	E – 1 & 2

b) List of Subjects – Added :

1. Data Mining
2. Cloud Computing
3. Soft Computing
4. Semantic Web
5. Web Mining

LIST OF COMMON SUBJECTS
IN
M.Tech CSE & PDS Courses (2010-2011)

07-08-2010

S. No.	Subject Name	CSE	PDS
1.	Obj. Oriented Software Engg.	CS 504	DS 517
2.	Distributed Computing	CS 551	DS 504
3.	Mobile Computing	CS 511	DS 511
4.	Real Time Systems	CS 512	DS 512
5.	Web Programming	CS 514	DS 514
6.	Parallel Computer Architecture	CS 515	DS 502
7.	Data Mining	CS 518	DS 516
8.	Network Security	CS 521	DS 521
9.	Machine Learning	CS 522	DS 522
10.	Grid Computing	CS 523	DS 506
11.	Information Retrieval Systems	CS 524	DS 524
12.	Natural Language Processing	CS 525	DS 525
13.	Software Quality Testing	CS 526	DS 526
14.	Reliability & Fault Tolerance	CS 527	DS 527
15.	Cloud Computing	CS 529	DS 529
16.	Soft Computing	CS 530	DS 530
17.	Neural Networks	CS 531	DS 531
18.	Simulation & Modeling	CS 533	DS 533
19.	Software & Project Management	CS 534	DS 534
20.	Image Processing	CS 535	DS 535
21.	Software Reuse Techniques	CS 536	DS 536
22.	Semantic Web	CS 537	DS 537
23.	Web Mining	CS 538	DS 538
24.	Human Computer Interaction	CS 539	DS 528

With effect from the academic year 2010-2011

SCHEME OF INSTRUCTION & EXAMINATION
M.Tech I YEAR (COMPUTER SCIENCE & ENGINEERING)
FACULTY OF ENGINEERING

SEMESTER-I

Sl. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction Periods per week L/T	D/P	Scheme of Examination Duration in Hrs.	Maximum Marks Univ Exam	Sessionals
		THEORY					
1.		CORE-I	3	-	3	80	20
2.		CORE-II	3	-	3	80	20
3.		CORE-III	3	-	3	80	20
4.		CORE-IV	3	-	3	80	20
5.		Elective-I	3	-	3	80	20
6.		Elective-II	3	-	3	80	20
		PRACTICALS					
6.	CS 531	Software Lab – I (Advanced Algorithms & OOSE)	-	3	-	-	50
7.	CS 532	Seminar – I	-	3	-	-	50
		TOTAL	18	6	-	480	220

Core Subjects

CS 501 Advanced Algorithms
CS 502 Advanced Operating Systems
CS 503 Artificial Intelligene
CS 504 Object Oriented Software Engineering
CS 551 Distributed Computing
CS 552 Advanced Databases

Elective – I & II

CS 511 Mobile Computing
CS 512 Real Time [illegible] Systems
CS 513 Advance Computer Graphics
CS 514 Web Engineering
CS 515 Parallel Computer Archicteture
CS 516 Multimedia Technologies
CS 517 Embedded Systems
CS 518 Data Mining

With effect from the academic year 2010-2011

SCHEME OF INSTRUCTION & EXAMINATION
M.Tech I YEAR (COMPUTER SCIENCE & ENGINEERING)
FACULTY OF ENGINEERING

SEMESTER-II

Sl. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction Periods per week L/T	D/P	Scheme of Examination Duration in Hrs.	Maximum Marks Univ Exam	Sessionals
		THEORY					
1.		CORE-V	3	-	3	80	20
2.		CORE-VI	3	-	3	80	20
3.		Elective-III	3	-	3	80	20
4.		Elective-IV	3	-	3	80	20
5.		Elective-V	3	-	3	80	20
6.		Elective-VI	3	-	3	80	20
		PRACTICALS					
6.	CS 581	Software Lab – II (Distributed Computing & Advanced Databases)	-	3	-	-	50
7.	CS 582	Seminar – II	-	3	-	-	50
		TOTAL	18	6	-	480	220

Elective – III & IV

CS 561 Network Security
CS 562 Machine Learning
CS 563 Grid Computing
CS 564 Information Retrieval System
CS 565 Natural Language Processing
CS 566 Software Quality & Testing
CS 567 Software Engineering for RTS
CS [illegible] Cloud Computing
CS 569 Soft Computing

Elective – V & VI

CS 571 Neural Networks
CS 572 Parallel Algorithms
CS 573 Simulation & Modeling
CS 574 Software Project Management
CS 575 Image Processing
CS 576 Software Reuse Techniques
CS 577 Reliability & Fault Tolerance
CS 578 Web Mining
CS 579 Human Computer Interaction

Network Security

Instruction 3 Periods per week

Duration of University Examination 3 Hours

University Examination 80 Marks

Sessional 20Marks

UNIT-I

Introduction: Attributes of Security, Integrity, Authenticity, Non-repudiation, Confidentiality, Authorization, Anonymity, Types of Attacks ,DoS, IP Spoofing, Replay, Man-in-the-Middle attacks., General Threats to Computer Network, Worms, Viruses, Trojans

UNIT-II

Secret Key Cryptography:DES, Triple DES,AES, Key distribution, Attacks

Public Key Cryptography: RSA, ECC, Key Exchange (Diffie-Hellman), Java Cryptography Extensions,Attacks

UNIT-III

Integrity, Authentication and Non-Repudiation:Hash Function (MD5, SHA5),Message Authentication Code (MAC) , Digital Signature (RSA, DSA Signatures), Biometric Authentication

UNIT-IV

PKI Interface:Digital Certificates, Certifying Authorities, PGP Key Interface, System Security using Firewalls and VPN's.

Smart Cards:Application Security using Smart Cards, Zero Knowledge Protocols and their use in Smart Cards, Attacks on Smart Cards

UNIT-V

Applications: Kerberos, Web Security Protocols (SSL), IPSec, Electronic Payments, E-cash, Secure Electronic Transaction (SET), Micro Payments, Case Studies of Enterprise Security (.NET and J2EE)

Suggested Reading:

1. Cryptography and Network Security -William Stallings, 4th Edition. pearson . 2009
2. Behrouz A Forouzan,"Cryptography and Nework Security", TMH,2009
3. Joseph Migga Kizza," A guide to Computer network security", Springer,2010
4. Dario catalano,"Contemporary Cryptalogy", Springer,2010

MACHINE LEARNING

UNIT-I

Introduction : Learning, Types of Machine Learning.
Concept learning: Introduction, Version spaces and the candidate elimination algorithm.
Learning with Trees: Constructing Decision Trees, CART, Classification Example

UNIT-II

Linear Discriminants: The Perceptron, Linear Separability, Linear Regression
Multilayer Perceptron (MLP): Going Forwards, Backwards, MLP in practices, Deriving back propagation
Support Vector Machines: Optimal Separation, Kernels

UNIT-III

Some Basic Statistics: Averages, Variance and Covariance, The Gaussian, The Bias-Variance Tradeoff
Bayesian learning: Introduction, Bayes theorem, Bayes Optimal Classifier, Naïve Bayes Classifier.
Graphical Models: Bayesian networks, Approximate Inference, Making Bayesian Networks, Hidden Markov Models, The Forward Algorithm.

UNIT-IV

Evolutionary Learning: Genetic Algorithms, Genetic Operators, Genetic Programming
Ensemble learning: Boosting, Bagging
Dimensionality Reduction: Linear Discriminant Analysis, Principal Component Analysis

UNIT-V

Clustering: Introduction, Similarity and Distance Measures, Outliers, Hierarchical Methods, Partitional Algorithms, Clustering Large Databases, Clustering with Categorical Attributes, Comparison

Suggested Readings:

1. Tom M. Mitchell. Machine Learning , Mc Graw Hill, 1997
2. Stephen Marsland. Machine Learning - An Algorithmic Perspective. CRC Press, 2009
3. Margaret H Dunham. Data Mining. Person Edition., 2003
4. Galit Shmueli, Nitin R Patel, Peter C Bruce, Data Mining for Business Intelligence, Wiley India Edition, 2007
5. Rajjan Shinghal, Pattern Recognition, Oxford University Press, 2006

GRID COMPUTING

UNIT-1

Introduction to Grid Computing: Grid Computing Concept, History of Distributed Computing Computational Grid Applications, Grid Computing Infrastructure Development, Grid Computing Software Interface

Job Submission: Introduction, Globus Job Submission, Transferring Files

UNIT-II

Schedulers: Scheduler Features, Scheduler Examples, Grid Computing Meta-Schedulers, Distributed Resource Management Application (DRMAA)

Security Concepts: Introduction, Symmetric Key Cryptography, Asymmetric Key Cryptography (Public Key Cryptography), Public Key Infrastructure, Systems/Protocols Using Security Mechanisms

Grid Security: Introduction, Grid Security Infrastructure (GSI), Delegation, Higher-Level Authorization Tools

UNIT-III

System Infrastructure I: Web Services: Service-Oriented Architecture, Web Services, and Web Service Implementation

System Infrastructure II: Grid Computing Services: Grid Computing and Standardization Bodies, .Interacting Grid Computing Components, Open Grid Services Architecture (OGSA), WSRF.

User-Friendly Interfaces: Introduction, .Grid Computing Workflow Editors, Grid Portals

UNIT-IV

Grid-Enabling Applications: Introduction, Parameter Sweep, Using an Existing Program on Multiple Grid Computers, Writing an Application Specifically for a Grid, Using Multiple Grid Computers to Solve a Single Problem

UNIT-V

Case Studies :

Globus :Overview of Globus Toolkit 4 ,Installation of Globus ,GT4 Configuration ,Main Components and programming Model ,Using Globus

gLite : Introduction ,Internal Workings of gLite ,Logging and Bookkeeping (LB) . Security Mechanism ,Using gLite

Resource management using Gridway and Gridbus

Scheduling using Condor, SGE,PBS, LSF Grid scheduling with QoS.

Suggested Reading:

1. Barry Wilkinson, Grid Computing Techniques and Applications, CRC Press, 2010.

2 Frederic Magoules, ; Jie Pan, Kiat-An Tan, Abhinit Kumar, Introduction to Grid Computing CRC Press 2009 .

3. Vladimir Silva, Grid Computing for Developers, Dreamtech Press, 2006.
4. Ian Foster , carl Kesselman , The Grid 2 :: Blueprint for a new computing Infrastructure, Elsevir Series , 2004
5. Fran Berman, Geoffrey Fox, Anthony J.G Hey , Grid Computing: Making the Global Infrastructure a Reality, Wiley, 2003.
6. Joshey Joseph, Craig Fellenstein, Grid computing IBM press, 2004.

INFORMATION RETRIEVAL SYSTEMS

UNIT-I
Introduction
Retrieval Strategies: Vector Space model, Probabilistic Retrieval Strategies
Language Models: Simple Term Weights, Non Binary Independence Model

UNIT-II
Retrieval Utilities: Relevance Feedback, Clustering, N-grams, Regression Analysis, Thesauri

UNIT-III
Retrieval Utilities: Semantic Networks, Parsing
Cross-Language Information Retrieval: Introduction, Crossing the Language Barrier

UNIT-IV
Efficiency: Inverted Index, Query Processing, Signature Files, Duplicate Document Detection

UNIT-V
Integrating Structured Data and Text: A Historical Progression, Information Retrieval as a Relational Application, Semi-Structured Search using a Relational Schema
Distributed Information Retrieval: A Theoretical Model of Distributed Retrieval, Web Search

Suggested Readings:

1. David A. Grossman, Ophir Frieder. Information Retrieval – Algorithms and Heuristics, Springer, 2nd Edition (Distributed by Universities Press), 2004.
2. Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, An Introduction to Information Retrieval, Cambridge University Press, Cambridge, England, 2009
3. Gerald J Kowalski, Mark T Maybury. Information Storage and Retrieval Systems, Springer, 2000

NATURAL LANGUAGE PROCESSING

UNIT-I
Introduction
Elementary Probability Theory
Essential Information Theory

UNIT II
Linguistic Essentials
Corpus-Based Work

UNIT III
Collocations.
Statistical Inference: Bins: Forming Equivalence Classes, Reliability vs. discrimination, n-gram models, Building n-gram models, An Information Theoretic Approach.
Word Sense Disambiguation: Methodological Preliminaries, Supervised and unsupervised learning, Pseudo words, Upper and lower bounds on performance, Supervised Disambiguation, Bayesian classification.

UNIT IV
Evaluation Measures
Markov Models: Hidden Markov Models, Use, General form of an HMM
Part-of-Speech Tagging

UNIT V
Probabilistic Context Free Grammars: Introduction
Clustering
Information Retrieval: Background, The Vector Space Model

Suggested Reading:

1. Christopher D. Manning, Hinrich Schutze, Foundations of Statistical Natural Language Processing, The MIT Press, 1999.
2. James Allan, Natural Language Understanding, Pearson Education, 1994
3. Tanveer Siddiqui, US Tiwary, Natural Language Processing and Information Retrieval, Oxford University Press, 2008

With effect from Academic year 2009-2010

CS

SOFTWARE QUALITY AND TESTING

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT-I

Software quality, quality management, software quality metrics, product quality metrics, In process quality maintenance, Examples.

UNIT-II

Quality tools in software development, Seven basis tools, Check list, Pareto diagram, histogram, run charts, scatter diagram, control chart, cause and effect diagram defect removal, defect removal effectiveness, quality planning, cost effectiveness of phase defect removal.

UNIT-III

Software testing Background, Software development process, Realities of software testing, Examining the specification, Testing the s/w with blinders on examining the code, Testing the s/w with X-ray glasses.

UNIT-IV

Configuration testing, Compatibility testing, Usability testing, Testing the documentation, Website testing, Automated testing and test tools Bug bashes & beta testing.

UNIT-V

Planning your test effort, writing & tracking Test cases, Reporting, Measuring SQA.

Suggested Readings:

1. Stepen, H.Khan, *"Metrics and Models in Software Quality Engineering"*, Pearson Education, India, 1995.
2. Ron Patton, *"Software Testing"* Sams Publishing, 2001
3. Boris Beizer *"Software Testing Techniques"*, 2nd edition, 2001
4. Allan Gillies, *"Software quality Theory & Management "*, Thomson international Press 1997.

With effect from Academic year 2009-2010

CS

SOFTWARE ENGINEERING FOR REAL TIME SYSTEMS

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT-I

Introduction: Review of Software Engineering concepts, Characteristics of Real Time Systems, Importance of including time factor.The Real Time System Life Cycle: Requirement Specifications, Statecharts.

UNIT-II

Structured Design Approaches: Event-based model, Process-based structured design, Graph- based theoretical model.Petri Net Models: Stochastic Petri Net (SPN) Model Analysis, Annotated Petri Nets, Time- augmented Petri Nets, Assessment of Petri Net Methods.

UNIT-III

Axiomatic Approaches: Weakest Precondition analysis, Real-Time Logic, Time-Related History variables, State Machines and Real-Time Temporal Logic.

UNIT-IV

Language Support and Restrictions : Real-Time Programming Discipline, Real-Time Programming Languages, Schedulability Analysis.

UNIT-V

Verification and Validation of Real-Time Software: Testing Real-Time Properties, Simulation as Verification Tool, Testing Control and Data Flow, Proof Systems, Operational Approach.

Suggested Reading:

1. Shem-Tov Levi and Ashok K.Agarwala, *Real Time System Design,* McGrawHilll International Editions,1999
2. Cooling J.E.. Jim Cooling . *Software Engineering for Real-Time Systems*, Addison Wesley, 2002.

Cloud Computing

Unit I

The Evolution of Cloud Computing : Hardware Evolution, Internet Software Evolution , Establishing a Common Protocol for the Internet , Evolution of Ipv6 , Finding a Common Method to Communicate Using the Internet Protocol , Building a Common Interface to the Internet .

Cloud Formations—From One Computer to a Grid of Many , Server Virtualization ,Parallel Processing , Vector Processing , Symmetric Multiprocessing Systems , Massively Parallel Processing Systems

Unit II

Web Services and the Cloud : Communication-as-a-Service (CaaS) , Infrastructure-as-a-Service (IaaS) , Monitoring-as-a-Service (MaaS) , Platform-as-a-Service (PaaS) , Software-as-a-Service (SaaS)

Building Cloud Networks : The Evolution from the MSP Model to Cloud,Computing and Software-as-a-Service , The Cloud Data Center ,Collaboration , Service-Oriented Architectures as a Step Toward Cloud Computing , Basic Approach to a Data Center-Based SOA

The Role of Open Source Software in Data Centers , Where Open Source Software Is Used

Case studies : Amazon web services, Google App Engine.

Unit III

Virtualization : Introduction, Types and Technologies, Accomplishing virtualization , importance of virtualization in Cloud computing ,

Case studies : Xen Virtual machine monitors- Xen API , VMware – VMware products – Vmware Features , Microsoft Virtual Server – Features of Microsoft Virtual Server

Unit IV

Federation in the Cloud ,Presence in the Cloud , Privacy and Its Relation to Cloud-Based Information System ,

Cloud Security Challenges , Software-as-a-Service Security , Security-as-a-Service -the New MSSP

Unit V

Common Standards in Cloud Computing : The Open Cloud Consortium , The Distributed Management Task Force , Standards for Application Developers , Standards for Messaging ,Internet Messaging Access

Protocol (IMAP) , Standards for Security

Examples of End-User Access to Cloud Computing

Mobile Internet Devices and the Cloud : Mobile Operating Systems for Smartphones

Mobile Platform Virtualization , Collaboration Applications for Mobile Platforms

Suggested Reading :

1. Cloud Computing: Implementation, Management, and Security
   John W. Rittinghouse ,James F. Ransome, *CRC Press 2009* .
2. Virtualization Specialist level complete certification kit – Study guide from -- www.theartof service.org
3. William von Hagen, Professional Xen Virtualization, Wrox Publications, January, 2008.
4. Chris Wolf , Erick M. Halter, Virtualization: From the Desktop to the Enterprise, APress 2005.
5. David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach Publications, 2006.

Web resources :

1. http://aws.amazon.com
2. http://code.google.com/appsengine

SOFT COMPUTING

UNIT I

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

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

UNIT II

GENETIC ALGORITHMS

Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition.

UNIT III

NEURAL NETWORKS

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

UNIT IV

FUZZY LOGIC

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

UNIT V

NEURO-FUZZY MODELING 9

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

Suggested readings :

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.
2. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995.
3. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.
4.. Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998.
5. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 1997.

NEURAL NETWORKS

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Introduction: Concept of a neural network. Human Brain. Models of a Neuron. Neural Network Viewed as Directed Graphs. Feedback. Neural Network Architectures. Knowledge Representation. Artificial Intelligence and Neural Networks. History of Neural Networks.

UNIT-II

Learning processes: Introduction. Error-Correction Learning. Memory-Based Learning. Hebbian Learning, Competitive Learning. Boltzmann Learning. Credit Assignment Problem. Learning with a Teacher. Learning without a Teacher.

UNIT-III

Single Layer Perceptrons: Introduction. Least-Mean-Square Algorithm. Learning Curves. Learning Rate Annealing Schedules. Perceptron. Perceptron Convergence Theorem.

UNIT-IV

Multilayer Perceptrons: Introduction. Some Preliminaries. Back-Propagation Algorithm. Summary of the Back-Propagation Algorithm. XOR Problem. Virtues and limitations of Back-Propagation learning.

UNIT-V

Neurodynamics: Introduction. Dynamical Systems. Stability of equilibrium States. Attractors. Neurodynamical Models. Manipulation of Attractors as a Recurrent Network Paradigm. Hopfield Models. Cohen-Grossberg Theorem.

References:

1. Simon Haykin: "Networks Networks - A Comprehensive Foundation", Pearson Education, 2nd Edition, 2001.

2.Jacek M.Zurada "Introduction to Artificial Neural Systems ", Jaico Publishing House. 2006

PARALLEL ALGORITHMS

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UNIT – I

Introduction to Parallel Algorithms and Architectures – Approaches to Design of Parallel Algorithms, Architectural Constraints and Design of Parallel Algorithms, Performance Measures of Parallel Algorithms

UNIT – II

Parallel Design Strategies – Parallel Prefix Computations, Pointer Jumping, Matrix Operations in Parallel.

UNIT – III

Parallel Sorting – Issues in Sorting on Parallel Computers, Sorting Networks, Bubble Sort and its Variants, Quicksort, Bucket and Sample Sort.

UNIT – IV

Parallel Graph Algorithms – Definitions and Representations, Minimum Spanning Tree: Prim's Algorithm, Single Source Shortest Path – Dijkstra's Algorithm, All pairs shortest path algorithms, Algorithms for Sparse Graphs.

UNIT – V

Search Algorithms for Discrete Optimization Problems – Definitions, Sequential search Algorithms, Search Overhead Factor, Parallel Depth first Search Parallel Breadth first Search, Speedup factors in Parallel Search Algorithms.

Suggested Reading:

1.Kenneth A. Berman and Jerome Paul "Algorithms " , Cengage Learning, 2002.

2. Ananth grama and Anshul gupta " Introduction to Parallel Computing", Pearson Education Second Edition, 2004

SIMULATION AND MODELING

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT-I

Introduction to simulation – Advantages and Disadvantages of simulation,– Areas of applications, Systems and system environment, Concepts of a system, Discrete and continuous systems – Models, Types of models, Steps in a simulation study –examples, Discrete-event system simulation.

UNIT-II

Overview of statistical models and queuing systems, Programming languages for Simulation: Continuous and Discrete simulation languages – FORTRAN, GPSS, SIMAN, SIMSCRIPT, SLAM and MODSIM III.

UNIT-III

Random Numbers: generation, Properties of random numbers, Generation of Pseudo random numbers, Tests for random numbers. Random variate: generation, Inverse Transformation technique, Uniform distribution, exponential distribution. Weibul's distribution, Triangular distribution, Empirical continuous distributions, Discrete distributions, Direct transformation for the normal distribution, Convolution method of Erlang distribution, Acceptance rejection techniques : Poisson distribution, Gamma distribution.

UNIT-IV

Input data analysis: Data collection : Identify the distribution, parameter & estimation
Goodness of fit tests: Chi square test – KS test; Multivariate and time series input models, Verification and validations of simulation models , Model building, Verification and validation: Verification of simulation models, Calibration and validation of models Face validity, Validation of model assumptions, Validation input/output Transformations, Input/output validation using historical input data, Input/ output validation sing Turing test.

UNIT-V

Output data analysis, Stochastic nature of output data , Types of simulation with respect to output analysis, Measures of performance and their estimation, Output analysis for terminating simulations, Output analysis for steady - State simulations. Comparison and evaluation of alternative system designs: Comparison of several system designs, Statistical models for estimating the effect of design alternatives.

Suggested Readings:

1. Jabcy Banks, John S. Cansen and Barry L.Nelson – Discrete – *Event System Simulation*- Prentice Hall of India, 2001
2. Narsing Deo – *System Simulation with digital computers* – Prentice Hall of India, 1979
3. Anerill M. Law and W. David Kelton – *Simulation modeling and analysis* - McGraw Hill, 2001.

With effect from Academic year 2009-2010

SOFTWARE PROJECT MANAGEMENT

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT-I

Conventional Software Management, Evolution of Software Economics, Improving Software Economics, Old way & new.

UNIT-II

Life – Cycle phases, Artefacts of the process, Model based Software architectures, Workflows of the process, Checkpoints of the process.

UNIT-III

Iterative Process planning, Project organizations & responsibilities, Process Automation, Project Control of process instrumentation, Tailoring the process.

UNIT-IV

Modern project profiles, Next Generation Software Economics, Modern process Transitions, Managing contacts, Managing people & organizing teams.

UNIT-V

Process improvement & mapping to the CMM, ISO 12207 – an overview, programme management.

Suggested Reading:

1. Walker Royce – *Software Project Management – A Unified frame work Pearson Education,* Addision.
2. Bob Hughes, Mike Cotterell – *Software Project Management*, Tata Mc Graw Hill 3rd Edition.
3. Watt.S. Humphery, *"Managing Software Process"*, Addison - Wesley, 1998.

With effect from Academic year 2009-2010

CS

IMAGE PROCESSING

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT-I

Image formation & description: Digital image representation – Elements of visual perception. Sampling & Quantization. Elements of digital image processing systems.

UNIT-II

Image transforms: Digital Image transforms – Fourier transform, Extension to 2D,DCT, Walsh, Hadamard transforms.

UNIT-III

Image enhancements & segmentation: Histogram modification. Image smoothing – Image sharpening. Thresholding. Edge detection. Segmentation. Point and region dependent techniques.

UNIT-IV

Image encoding: Fidelity criteria. Transform compression. KL. Fourier, DCT, Spatial compression. Run length coding. Huffman coding. Contour coding.

UNIT-V

Restoration : Restoration models. Inverse filtering. Least squares Filtering. Recursive filtering.

Suggested Reading:

1. Gonzalez R.C, Woods R.E: *Digital Image Processing,* Addison Wesley, 1992.
2. Rosenfeld A, Kak AC: *Digital Picture Processing Vol. I & II,* Acad. Press, 2nd ed. 1982.
3. Milan Sonka, Vaclav Hlavac, Roger Boyle, *Image Processing and Analysis and Machine Vision,* 2nd Edition, Thomson Learning, 1999

CS 576

SOFTWARE REUSE TECHNIQUES

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT-I

Software reuse success factors

Reuse driven software engineering business

Object oriented software engineering

Applications and Component subsystems

Use case components

Object components.

UNIT-II

Design Patterns – Introduction

Creational Patterns – Factory, factory method, abstract factory, singleton, builder prototype.

UNIT-III

Structural Patterns – Adapter, bridge, composite, decorator, facade, flyweitht, proxy.

Behavioral Patterns – Chain of responsibility, command, interpreter.

UNIT-IV

Behavioral Patterns – Iterator, mediator, momento, observer, stazte, strategy, template, visitor, other design patterns – Whole part, master-slave, view handler, forwarder – receiver, client – dispatcher-server, publisher-subscriber.

UNIT-V

Architectural Patterns – Layers, pipes and filters, black board, broker, model-view controller, presentation – abstraction-control, micro kernet, reflection.

Suggested Reading:

1. Ivar Jacobson, Martin Griss, Patrick Hohnson – *Software Resue. Architecture, Process and Organisation for Business Success,* ACM Press, 1997.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides – *Design Patterns* – Addison, 1995, Pearson Education.
3. Frank Buschmann etc. – *Pattern Oriented Software Architecture* – Volume 1, Wiley 1996.
4. James W Cooper – *Java Design Patterns, a tutorial,* Addison 2000, Pearson Education.

RELIABILITY AND FAULT TOLERANCE

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT-I
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
SOFTWARE RELIABLITY

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

SOFTWARE RELIABILITY APPROACHES

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

UNIT-III
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-IV

Fault tolerant computers - general purpose commercial systems-fault tolerant multiprocessor and VLSI based communication architecture.

Design-N-version programming recovery block - acceptance tests-fault trees- validation of fault tolerant systems.

UNIT-V

Fault types – Fault detection and containment – Redundancy – Data diversity – Reversal checks – Obtaining parameter values – Reliability models for hardware redundancy – Software error models – Clocks – Fault tolerant synchronization – Synchronization in software.

Suggested Reading:

1. John D. Musa, *"Software Reliability"*, McGraHill, 1985.
2. Patric D. T.O connor, *"Practical Reliability Engineering"*, 4th Edition, John Wesley & sons , 2003.
3. C.M. Krishna, Kang G.Shin, *"Real Time Systems"*, McGraw-Hill, 1997.

CS

Web Mining

2018-2019

Unit – I

Crawling and Indexing, Topic Directories, Clustering and Classification. Hyperlink analysis. Resource discovery and vertical portals, Structured vs Unstructured data mining

Crawling the web: HTML and HTTP basics, Crawling basics, Engineering large scale crawlers, , Putting together a crawler

Unit – II

Web Search and Information Retrieval: Boolean queries and Inverted index, Relevance Ranking, Similarity Search

Similarity and Clustering: Foundations and Approaches, Bottom-up and top-down partitioning paradigms,

Unit III

Supervised learning: Introduction, Overview, of classification strategies, Nearest Neighbor Learners, Feature Selection, Bayesian Learners, Discriminative classification, Hypertext classification

Unit IV

Expectation Maximization, Labelling Hypertext Graphs, Co-training

Social Sciences and bibliometry, Page Rank and HITS, Coarse grained graph model, Enhanced model and techniques, Evaluation of topic distillation

Unit V

Collecting Important pages, Similarity search using link topology, topical locality and focused crawling, Discovering communities

Future of Web Mining: Information Extraction, Natural Language Processing, Question Answering, Profile, Personalization, and Collaboration.

Sugested Reading:

1. Chakrabarti Soumen, 2003, Mining the Web: Discovering Knowledge From Hypertext

   Data, Boston Elsevier, ISBN 0585449996

2. Manu Konchady. Text Mining Application Programming. Cengage Learning, 2006

CS

HUMAN COMPUTER INTERACTION

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT-I

Importance of the User interface.

Characteristics of Graphical and Web User Interfaces.

User Interface Design Process - Knowing the client, understanding business function, principles of good screen design.

UNIT-II

System menus and Navigation schemes.

Kinds of windows, Device based controls. Screen based controls. Test and Messages.

UNIT-III

Feedback, guidance and Assistance.

Internationalization and Accessibility.

Graphics, Icons and Images. Colors. Layout windows and pages.

UNIT-IV

Interaction design -Introduction, goals, usability.

Conceptualizing interaction - problem space, conceptual models, interface metaphors, interaction paradigms.

Cognition, conceptual frameworks for cognition.

Collaboration and communication - Social mechanisms, conceptual frame work

UNIT-V

Affective aspects, expressive interfaces, user frustration, agents.

Process of interaction design - activities, characteristics, practical issues, life cycle models.

Design, Prototyping and Construction - prototyping, conceptual design, physical design

Evaluation - Introduction, framework.

Testing and Modeling users - kinds of tests, doing user testing, experiments, predictive models.

Suggested Reading:

1. Wilbert O. Galitz, *"The essential guide to user interface design"*, Wiley Dreamtech 2002.
2. Preece, Rogers, Sharp, *"Interaction design"*, John Wiley 2002.

With effect from Academic year 2009-2010

DS 505

PARALLEL PROGRAMMING

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT-I

Introduction to parallel computing, parallel program platform- Implicit parallelism: Trends in Microprocessor Architectures, Limitations of memory system Performance, Dichotomy of parallel computing platforms, Physical organization of parallel platforms, communication costs in parallel machines, Routing mechanism for interconnection Networks, Impact of Process-Processor Mapping and Mapping Techniques.

UNIT-II

Principles of parallel algorithm design - Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping techniques for load Balancing, Methods for containing Interaction Overheads, Parallel Algorithm Models.

UNIT-III

Communication Operations - One-to-All Broadcast and All-to-one Reduction, All-to-All Broadcast and Reduction, All-Reduce and prefix-sum Operations, All-to-all Personalized Communication, Circular shift, Improving the speed of some Communication operations.

UNIT-IV

Analytical Modeling of Parallel Programs - Sources of Overhead in parallel programs, Performance Metrics for parallel systems, The Effect of Granularity on Performance, Scalability of parallel systems, Minimum Execution Time and Minimum Cost-Optimal Execution Time, Asymptotic Analysis of parallel programs.

UNIT-V

Programming Using Message passing Paradigm - Principles of Message-Passing programming, The Building Blocks: Send and receive Operations, MPI: The Message passing Interface, Topologies and Embedding, Programming shared address space platforms - Thread Basics: Creation and Termination, Synchronization primitives in pthreads, Controlling thread and Synchronization Attributes, Thread Cancellation-Composite Synchronization constructs.Open MP: a standard for Directive Based parallel programming Model.

Suggested Reading:

1. Introduction to parallel computing, 2nd Edition, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar , Pearson publishers.
2. Gregory V.Wilson, "Practical Parallel Programming", PHI, 1998

With effect from Academic year 2009-2010

DS 512

REAL-TIME SYSTEMS

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	80	Marks
Sessional	20	Marks

UNIT-I

Introduction: Definitions, Applications and Types of Real-Time Systems, Typical case studies of Real-Time Systems, Timing Constraints.

A Reference Model for Real Time Systems: Processors and Resources, Periodic Task Model, Precedence and Data Dependency, Temporal, Functional and Resources Parameters, Scheduling Hierarchy.

UNIT-II

Real-Time Scheduling: Different approaches – Clock-driven, priority-driven, Scheduling of periodic, aperiodic and sporadic jobs in priority-driven systems.

UNIT-III

Resource Management: Resources and resource access control, critical section, priority-ceiling protocols, concurrent access to data objects.

UNIT-IV

Implementation aspects: Timing services and scheduling mechanisms, other basic operating system functions, processor reserves and resource kernel, Open System Architecture, Capabilities of Commercial Real-Time Operating Systems, Predictability of general-purpose operating systems.

UNIT-V

Case Studies – VX-Works, RT Linux.

Suggested Readings:

1. Textbook: Jane W.S. Liu, *"Real-Time Systems"*, Pearson Education, 2001.
2. C.M. Krishna and Kang G. Shin, *"Real-Time Systems"*, Mc Graw Hill Companies Inc., 1997.
3. Raymond J.A Buhr, Donald L. Bailey, *"An Introduction To Real-Time Systems"*,. Prentice Hall International, 1999.
4. K.V.K.K. Prasad, *"Embedded , Real-Time Systems, Concepts, Design and Programming"*, DreamTech, 2003.

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With effect from Academic year 2010-2011

STORAGE MANAGEMENT

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	80 Marks
Sessional	20 Marks

UNIT-I

Introduction to Information Storage and Management.
Storage System Environment.
Data Protection : RAID.
Intelligent Storage System.

UNIT-II

Direct-Attached Storage and Introduction to SCSI.
Storage Area Networks.
Network-Attached Storage.

UNIT-III

IP SAN.
Content-Addressed Storage.
Storage Virtualization.

UNIT-IV

Introduction to Business Continuity.
Backup and Recovery.
Local Replication.

UNIT-V

Remote Replication.
Securing the Storage Infrastructure
Managing the Storage Infrastructure.

Suggested Reading :

1. G. Somasundaram, Alok Shrivastava, "Information Storage and Management", Wiley Publishing Inc., 2009.

2. Ralph H. Thornburgh, Burry J Schoenborn, "Storage Area Networks", Prentice-Hall, 2000.

CS 581

SOFTWARE LAB-II
(Distributed Computing and Advanced Databases)

Distributed Computing:

1. Applications using RPC
2. Application using CORBA
3. Application using EJB
4. Application using XML, SOAP

Advanced Databases : An application involving above technologies and database has to be developed.
Note: The students have to submit a report at the end of the semester.

CS 582

Seminar–II

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for systematic independent study of state of the art topics in broad area of his/her specialization.

Seminar topics can be chosen by the students with the advice from the faculty members.

Students are to be exposed to following aspects of seminar presentations.

Literature survey
Organization of material
Preparation of OHP slides/PC presentation
Technical writing.

Each student is required to

4. Submit one page of synopsis of the seminar talk two days before for display on notice board.
5. Give 20 minutes presentation through OHP, PC, and slide projector, followed by 10 minutes discussion.
6. Submit a report on the seminar topic with a list of references and slides used within a week.

Seminars are to be scheduled from the 3rd week to the last week of the semester and any change in schedule should be discouraged.

The sessional marks will be awarded to the students by at least 2 faculty members on the basis of an oral and a written presentation as well as their involvement in the discussion.

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