With effect from 2013-14

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SCHEME OF INSTRUCTION AND EXAMINATION

M.TECH (REGULAR) I YEAR

I - SEMESTER

Sl. No	Code	Subject	L	T	P	Maximum Marks		Credits
						Univ. Exam	Sessionals	
THEORY								
1	CS 511	Advanced Algorithms	3	1	-	75	25	3
2	CS 512	Advanced Operating Systems	3	1	-	75	25	3
3	CS 513	Advanced Database Systems	3	1	-	75	25	3
4	CS 514	Object Oriented Software Engineering (OOSE)	3	1	-	75	25	3
5	CS XXX	ELECTIVE-I	3	1	-	75	25	3
6	CS XXX	ELECTIVE-II	3	1	-	75	25	3
PRACTICALS								
1	CS 531	ADBS + OOSE Lab	-	-	3		50	2
2	CS 532	Soft Skills Lab	-	-	3		50	2
		TOTAL	**18**	**06**	**06**	**450**	**250**	**22**

Elective – I, II, III, IV, V, VI			
CS 551	Mobile Computing	CS 565	Pattern Recognition & Computer Vision
CS 552	Business Intelligence	CS 566	Adhoc Sensor Networks
CS 553	Distributed Computing	CS 567	Intelligent Agents
CS 554	Real Time Systems	CS 568	Information Retrieval Systems
CS 555	Artificial Intelligence	CS 569	Neural Networks
CS 556	Image Processing	CS 570	Software Architecture & Design Patterns
CS 557	Embedded Systems	CS 571	Middleware Systems
CS 558	Internetworking Technologies	CS 572	Parallel Algorithms
CS 559	Soft Computing	CS 573	Reliability & Fault Tolerance
CS 560	Machine Learning	CS 574	Human computer Interaction
CS 561	Software Quality Assurance & Testing	CS 575	Pervasive Computing
CS 562	Cloud Computing	CS 576	Semantic Web
CS 563	Wireless and Mobile Networks	CS 577	Information Security Audit & Assurance
CS 564	Distributed Algorithms	CS 578	Research Methodologies in Computer Science

With effect from 2013-14

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

SCHEME OF INSTRUCTION AND EXAMINATION

M.TECH (REGULAR) I YEAR

II - SEMESTER

Sl. No	Code	Subject	L	T	P	Maximum Marks		Credits
						Univ. Exam	Sessionals	
THEORY								
1	CS 521	Network Security and Cryptography(Core)	3	1	-	75	25	3
2	CS 522	Data Mining(Core)	3	1	-	75	25	3
3	CS XXX	ELECTIVE - III	3	1	-	75	25	3
4	CS XXX	ELECTIVE - IV	3	1	-	75	25	3
5	CS XXX	ELECTIVE - V	3	1	-	75	25	3
6	CS XXX	ELECTIVE - VI	3	1	-	75	25	3
PRACTICALS								
1	CS 541	Network Security and Cryptography Lab	-	-	3		50	2
2	CS 542	Seminars	-	-	3		50	2
		TOTAL	**18**	**06**	**06**	**450**	**250**	**22**

Elective – I, II, III, IV, V, VI			
CS 551	Mobile Computing	CS 565	Pattern Recognition & Computer Vision
CS 552	Business Intelligence	CS 566	Adhoc Sensor Networks
CS 553	Distributed Computing	CS 567	Intelligent Agents
CS 554	Real Time Systems	CS 568	Information Retrieval
CS 555	Artificial Intelligence	CS 569	Neural Networks
CS 556	Image Processing	CS 570	Software Architecture & Design Patterns
CS 557	Embedded Systems	CS 571	Middleware Systems
CS 558	Internetworking Technologies	CS 572	Parallel Algorithms
CS 559	Soft Computing	CS 573	Reliability & Fault Tolerance
CS 560	Machine Learning	CS 574	Human computer Interaction
CS 561	Software Quality Assurance & Testing	CS 575	Pervasive Computing
CS 562	Cloud Computing	CS 576	Semantic Web
CS 563	Wireless and Mobile Networks	CS 577	Information Security Audit & Assurance
CS 564	Distributed Algorithms	CS 578	Research Methodologies in Computer Science

With effect from 2013-14

SCHEME OF INSTURCTION & EXAMINATION
M.TECH II YEAR (COMPUTER SCIENCE & ENGINEERING)
WITH EFFECT FROM ACADEMIC YEAR 2013-14

SEMESTER – III

S.No	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination		
			Period per week		Duration in Hrs	Maximum Marks	
			L/T	D/P		Univ. Exams	Sessionals
1	CS	Dissertation + Project Seminar	--	6	--	--	100*

*** 50 Marks to be given by the guide**
*** 50 Marks to be given by Viva Committee which includes Head, Guide and an Examiner**

SCHEME OF INSTURCTION & EXAMINATION
M.TECH II YEAR (COMPUTER SCIENCE & ENGINEERING)
WITH EFFECT FROM ACADEMIC YEAR 2013-14

SEMESTER – IV

S.No	Syllabus Ref. No.	Subject	Scheme of Instruction		Scheme of Examination		
			Period per week		Duration in Hrs	Maximum Marks	
			L/T	D/P		Univ. Exams	Sessionals
1	CS	Dissertation	--	6	--	*Grade	--

*** Grade : Excellent / Very Good / Good / Satisfactory / Unsatisfactory**

Department Vision statement:

To become a center of excellence in the field of Computer Science and Engineering that produces innovative, skillful and, socially responsible professionals who can contribute significantly to industry and research.

Department Mission statement:

To become a center of excellence in the field of Computer Science and Engineering that produces innovative, skillful and, socially responsible professionals who can contribute significantly to industry and research.

M.Tech(CSE) Programme Educational Objectives (PEOs):

After few years the M.Tech (CSE) students will be able to:

1. Practice their profession with confidence and global competitiveness by making intellectual contributions.
2. Pursue a life-long career of personal and professional growth with superior work ethics and character.
3. Engage in research leading to innovations/products or become a successful entrepreneur.

M.Tech(CSE) Program Outcomes (POs):

After completion of the two years of M.Tech(CSE) students:

1. Will be able to apply the computer science principles in modelling, design and development of computer based systems.
2. Will demonstrate an ability to use the modern tools and techniques in the field of computer science.
3. Will be able to investigate, analyze and formulate solutions to the complex real world problems.
4. Will be able to develop sustainable inclusive technologies in the context of society and environment.
5. Will be able to communicate effectively and develop confidence in self and life-long learning.
6. Will be able to possess leadership, project management and financial skills with professional ethics.

With effect from 2013-14

ADVANCED ALGORITHMS

Course Code: CS 511

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

At the end of the course student should

1. Develop mathematical skills for algorithm design, analysis, evaluation and computational cost
2. Develop the skills to design and implement efficient programming solutions to various problems
3. Develop data structure techniques for various aspects of programming

Course Outcomes:

After completion of this course, the student will be able to

1. Design, analyze and evaluate algorithms
2. Develop the skills to design and implement efficient programming solutions to various problems
3. Use data structure techniques for various aspects of programming
4. Gains knowledge in text processing, security algorithms and computational geometry and able to use these methods to design practical algorithms for large or difficult problems.

UNIT- I:

Algorithm Analysis: Asymptotic Notation, Amortization, Basic Data Structure: Stacks and Queues, Vectors, Lists and Sequences, Trees, Priority Queues, Heaps, Dictionaries and Hash Tables ,Search Trees and Skip Lists: Ordered Dictionaries and binary Search Trees, AVL trees, Bounded-Depth Search Trees.

UNIT-II:

Fundamental Techniques: The Greedy Method, Divide and Conquer, Dynamic Programming, Graphs: The Graph abstract data Type, Data Structures for Graphs, Graph Traversal, Directed Graphs.

UNIT-III:

Weighted Graphs: Single Source Shortest Paths, All pairs Shortest Paths, Minimum Spanning Trees. Network Flow and Matching: Flows and Cuts, Maximum Flow, Maximum Bipartite Matching, Minimum Cost Flow

UNIT-IV:

Text processing: Strings and Pattern Matching algorithms, Tries, Text Compression, Text Similarity testing. Number Theory and Cryptography: Fundamental Algorithms involving numbers, Cryptographic Computations, Information Security Algorithms and Protocols.

UNIT-V:

Computational Geometry: Range Trees, Priority Search Trees, Quad trees and k-d Trees, Convex Hulls, N-P Complete.

Suggested Reading:

1. M.T.Goodrich, R.Tomassia, "Algorithm design – Foundations, Analysis, and Internet Algorithms", John Wiley, 2002
2. E Horrowitz, S salmi, S Rajasekaran, "Fundamentals of Computer Algorithms", Second Edition, University Press, 2007

Reference Books:

1. Aho, A V Hopcraft Ullman JD, "The Design and analysis of computer Algorithms", Pearson Education, 2007
2. Hari Mohan Pandy, " Design analysis amd Algorithms", University Science press, 2009
3. Cormen, Lieserson, Rivest, "Introduction to Algorithms", 2nd Edition, PHI, 2003

With effect from 2013-14

Course Code: CS 512

ADVANCED OPERATING SYSTEMS

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of this course, student should get familiarized with

1. global view of distributed operating systems and provides theoretical foundation for distributed systems.
2. various types of algorithms to build distributed operating systems
3. Deal with distributed mutual exclusion& distributed deadlock detection in distributed systems.
4. The management of different resources in distributed systems.
5. Various schemes for recovering from failures and covers techniques for fault tolerance in distributed systems.
6. Security & protection in computer systems and mechanisms used in building multiprocessor operating systems.
7. Concept of transaction and gives a theoretical background for concurrency controls.

Course Outcomes

After completion of this course, the student will be able to

1. Gain knowledge about global view of distributed operating systems and provides theoretical foundation for distributed systems.
2. Identify and explain detailed aspects of internal structures of operating systems. Compare and contrast design issues for various specialized operating systems,
3. Gain experience with defining a project and refining the design, some practical experience with systems programming and tools, Understand technical details of systems concepts like virtualization
4. They can able to implement project Case Studies in distributed OS and Security in Distributed OS, Distributed databases etc. and analyze the requirements, make critiques and create design of secured operating systems.

UNIT- I

Architecture of Distributed Systems: Types, Distributed OS, Issues in Distributed Operating Systems, Theoretical Foundations: Global clock, Lamport's Logical \clock, Vector Clocks, Global State, Termination Detection

UNIT-II

Distributed Mutual Exclusion: classification, requirement, performance, non-token based algorithms, Lamport's algorithms, the Richart Agarwala algorithm, token based algorithm- Suzukukasamil's broadcast algorithm, Singhal's heuristic algorithms

Deadlock Detection: Resource Vs communication deadlock, A graph – theoretic model, prevention, avoidance, detection, control organization, centralized deadlock-detection algorithm, the completely centralized algorithm, the HO- Ramamoorthy algorithms. Distributed deadlock detection algorithm- path-pushing

algorithms, the edge chasing, hierarchical deadlock algorithm, menace-muntz and Horamamoorthy algorithm. Agreement protocols: The system model, the Bizantine agreement, the consensus problem.

UNIT-III

Distributed File System: Mechanisms, Design Issues, Case Studies: Sun NFS, Sprite File System, DOMAIN, Coda File system, Distributed shared memory: Algorithms for implementing DSM, Memory Coherence, coherence Protocols, Design Issues.Case Studies: IVY, Mirage, Clouds Distributed Scheduling: Issues in Load Distribution, components of Algorithm, Stability Load Distributing Algorithm, Performance.

UNIT-IV

Failure Recovery: Backward, Forward Error Recovery in Concurrent Systems, consistent Set of Check Points, Synchronous and Asynchronous check Pointing and Recovery.Fault Tolerance: Commit protocols, Non-blocking, Commit Protocols, Voting Protocols. Protection and Security: Access Matrix, Private Key, Public Key, Kerberos System.

UNIT-V

Multiprocessor Operating Systems: Motivation, Basic Multiprocessor System Architecture, Interconnection Networks for Multiprocessor System, caching, Hypercube Architecture. Threads, Process Synchronization, Processor Scheduling, memory management. Database Operating System: Concurrence Control, Distributed databases, Concurrency control Algorithms.

Suggested Reading:

1. Singhal M. Shivaratri N.G., "Advanced concepts in Operating systems", McGraw Hill Intl., 1994 2. Pradeep K Sinha, : "Distributed Operating Systems Concepts and Design", PHI, 2002
2. Andrew S.Tanenbaum, "Distributed Operating System", Pearson Education India, 2001

Course Code : CS 513

ADVANCED DATABASES

Instruction	3l +1t periods per week
Duration of University Examination	3 hrs
University Examination	75 marks
Sessionals	25 marks
Credits	3

Course Objectives

At the end of the course student should

1. design high-quality relational databases and database applications.
2. translate complex conceptual data models into logical and physical database designs.
3. Gain an understanding of Oracle11g and XML
4. Have a outline knowledge about Parallel and Distributed Databases
5. Gain experience in Performance Tuning

Course Outcomes

After completion of this course, the student will be able to

1. Analyze and evaluate modeling and development methods/techniques in Object-based Databases
2. Understand and analyze query processing and optimization.
3. Understand how distributed and parallel databases are implemented, and how applications can be designed for those databases.
4. Able to gain insight into some advanced topics in database such as Performance Tuning, spatial databases, temporal databases.

UNIT- I

Object Based Databases: Overview, complex Data Types, Structured Types and Inheritance in SL, table Inheritance, Array and Multiset Types in SQL, Object –Identity and Reference Types in SQL, Implementing O-R features, Persistent Programming Languages, Object- Relational Mapping, Object – Oriented versus Object-Relational.

UNIT-II

XML**:** Motivation, Structure of XML data, XML Document schema, Querying and Transformation, Application Program Interface to XML, Storage of XML data, XML applications.

UNIT-III

Query processing:

Overview, Measures of Query Cost, Selection operating, sorting, Join Operation, Other Operations, Evaluation of Expressions.

Query Optimization: Overview, Transformation of Relational Expressions, Estimating Statistics of Expressing Results, Choice of Evaluation plans, Materialized Views.

UNIT-IV

Parallel Databases: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Interoperation Parallelism Query Optimization, Design of Parallel Systems.

Distributed Databases: Homogenous and Heterogeneous Databases, distributed data storage,

Distributed Transactions, Commit Protocols, concurrency Control in Distributed Databases, Availability, Distributed Query Processing, Heterogeneous Distributed Databases, cloud Based Databases, Directory systems.

UNIT-V

Advanced Application development: Performance Tuning, Performance Benchmarks Other Issues in Application Development, Standardization

Spatial and Temporal Data and Mobility: Motivation, Time in Databases, spatial and Geographical |Data, Multimedia Databases, Mobility and Personal databases

Suggested Reading:

1. Abraham Silbershatz, Henry F Korth, S Sudharshan, "Database System Concepts", McGraw Hill International Edition, Sixth Edition, 2010
2. Elmasri Navathe, Somayajulu, Gupta, " Fundamentals of Database Systems", Pearson Education, Fourth Edition, 2006.

Reference Books:

3. CJ Date, A Kannan, S Swamynathan, "An Introduction to database Systems", Pearson Education, Eight Edition, 2006
4. Ramakrishna, Gehrke, "Database Management, "International Edition, Third Edition, 2003

With effect from 2013-14

Course Code: CS 514

OBJECT-ORIENTED SOFTWARE ENGINEERING (OOSE)

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course should get

1. trained on basic concepts of evolving models for various software system

Course Outcomes

Upon the successful completion of the course, students

1. are expected to gain required knowledge in evolving and documenting various computer software requirements and models.
2. Understand the fundamental principles underlying Object-Oriented software design and use commonly available object-oriented design frameworks for application development.
3. Demonstrate conceptual and technical skills in the analysis, design and implementation of a software system using Object Oriented Concepts.

UNIT- I

Information System**:** Problems in Information Systems, development, Project Life Cycles, Managing Information Systems Development, User Involvement and Methodological approaches, Basic Concepts and Origins of Object Orientation Modeling concepts.

UNIT-II

Requirement Capture, Requirement Analysis, Refining the Requirement Models, Objects Interaction

UNIT-III

Operations, Control, Design, System Design**.**

UNIT-IV

Object Design, Design patterns, Human Computer Interaction, Designing Boundary Classes.

UNIT-V

Data Management Design, Implementation, Reusable Components, Managing Object Oriented Projects, System Development Methodologies.

Suggested Reading:

1. Simon Benett, Steve Mc Robb & ray Farmer, “Object Oriented System Analysis ad Design using UML”, McGraw Hill, 2002
2. Grady Booch, James Rumbaugh, Ivor Jacobson, “The Unified Modeling Language- User Guide”, Addison Wesley, 1999.

Reference Books:

1. Ivor Jacobson, Grady Booch, James Rumbaugh, “The Unified Software Development Process”, Addison Wesley, 1999

With effect from 2013-14

Course Code: CS 521

NETWORK SECURITY AND CRYPTOGRAPHY

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student should

1. Deal with the underlying principles of cryptography and network security. It develops the mathematical tools required to understand the topic of cryptography.
2. Start from the classical ciphers to modern day ciphers, the course provides an extensive coverage of the techniques and methods needed for the proper functioning of the ciphers.
3. Deal with the construction and cryptanalysis of block ciphers, stream ciphers and hash functions.
4. Define one way functions and trap-door functions and presents the construction and cryptanalysis of public key ciphers, namely RSA.
5. Discuss key exchange problem and solutions using the Diffie-Hellman algorithm are discussed. Message Authentication Codes (MAC) and signature schemes are also detailed.
6. Deal with modern trends in asymmetric key cryptography, namely using Elliptic Curves. The course concludes with the design rationale of network protocols for key exchange and attacks on such protocols

Course Outcomes

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

1. Understand the most common type of cryptographic algorithm
2. Understand the Public-Key Infrastructure
3. Understand security protocols for protecting data on networks
4. understand the network security issues and apply the related concepts for network protection and communication privacy
5. Be able to digitally sign emails and files
6. Be able to perform simple vulnerablility assessments and password audits
7. Be able to configure simple firewall architectures
8. Be able to deploy wireless security

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)

UNIT-III

Integrity, Authentication and Non-Repudiation**:** Hash Function (MD5, SHA3), Message Authentication Code (MAC), Digital Signature (RSA, DSA Signatures), Biometric Authentication.

UNIT-IV

PKI Interface: Digital Certificates, Certifying Authorities, POP Key Interface.

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

UNIT-V

Applications**:** Kerberos, Web Security Protocols (SSL), IPSec, Electronic Payments, E-cash, Secure Electronic Transaction (SET), Micro Payments.

Suggested Reading:

1. William Stallings, "Cryptography and Network Security", 5th Edition, Pearson, 2013.
2. Behrouz A Forouzan, "Cryptography and Network Security", TMH, 2009.

Reference Books:

1. Joseph MiggaKizza, "A Guide to Computer Network Security ", Springer, 2010.
2. Dario Cataiano, Contemporary Cryptology ", Springer, 2010.
3. William Stallings, "Network Security Essentials: Application and standards", 4th Edition, Pearson, 2012.

With effect from 2013-14

Course Code: CS 522

DATA MINING

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student should

1. To Understand Data mining principles and techniques and Introduce DM as a cutting edge technology.
2. To learn to use association rule mining for handling large data
3. To understand the concept of classification for the retrieval purposes
4. To know the clustering techniques in details for better organization and retrieval of data

Course Outcomes

1. Preprocess the data for mining applications.
2. Apply the association rules for mining the data.
3. Design and deploy appropriate classification techniques
4. Cluster the high dimensional data for better organization of the data

UNIT - I

Introduction: Challenges, Origins of Data Mining and Data Mining Tasks. Data**:** Types of Data Quality, Data Preprocessing, Measures of Similarity and Dissimilarity, OLAP and Multidimensional Data Analysis.

UNIT - II

Classification: Preliminaries, General Approach to Solving a Classification Problem, Decision Tree Induction-Model Over fitting, evaluating the Performance of a Classifier, Rule-Based Classifier.

UNIT - III

Classification: Nearest-Neighbor classifiers, Bayesian Classifiers, Artificial Neutral Networks, Support Vector Machine, Ensemble Methods, Class Imbalance Problem, Multiclass Problem.

UNIT - IV

Association Analysis: Problem Definition, Frequent Item Set Generation, Rule Generation, Compact Representation of Frequent Item Sets, Alternative Methods for Generating Frequent Item Sets, FP-Growth Algorithm, Evaluation of Association Patterns, Effect of Skewed Support Distribution.

UNIT - V

Cluster Analysis: Overview, K-means, Agglomerative Hierarchical Clustering, DBSCAN, Cluster Evaluation on Characteristics of Data, Clusters and Clustering Algorithms.

Suggested Reading:

1. Pang-Ning Tan. Michael Steinbach, Vipin Kumar, "Introduction to Data Mining", Pearson Education, 2008.
2. K.p.Soman, ShyamDiwakar, V.ajay, “Insight into data Mining theory and Practice, PHI, 2010

Reference Books:

1. Arun K Pujari, "Data Mining Techniques ", University Press. 2nd Edn, 2009.
2. VikrarnPudi, P. Radha Krishna, "Data Mining", Oxford University Press, 1st edition, 2009.
3. Sumathi, S N Sivanandam, "Introduction to Data Mining and its Applications ", Springer.

With effect from 2013-14

Course Code: CS 551

MOBILE COMPUTING

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student

- understands the basic concepts and principles in mobile computing.
- gets involved, in networks & systems issues for the design and implementation of mobile computing systems and applications.
- understands the key components and technologies involved and to gain hands on experiences in building mobile applications.

Course Outcomes

After completion of this course, the student will be able to

- Learn state-of-the-art wireless technologies;
- Obtain background for original research in wireless networking and mobile computing field
- Explain the structure and components for Mobile IP and Mobility Management
- Describe the important issues and concerns on security and privacy
- Professional Skill Design and implement mobile applications to realize

UNIT-I

Introduction: Wireless transmission, Frequencies for Radio Transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulations, Spread Spectrum, MAC SDMA, FDMA, TDMA, CDMA, Cellular Wireless Networks.

UNIT-II

Telecommunication Systems: GSM, GPRS, RA, Satellite Networks, Basics, Parameters and Configurations, Capacity Allocation, FAMA and DAMA, Broadcast Systems, DAB, DVB, CDMA and 3G.

UNIT-III

Wireless LAN: IEEE 802.11, Architecture, Services, MAC-Physical Layer, IEEE 802.11a-802.11b Standards, Bluetooth.

UNIT-IV

Routing Adhoc Network Routing Protocols: Adhoc Network Routing Protocols, Destination Sequenced Distance Vector Algorithm, Cluster Based Gateway Switch Routing, fish-eye state routing, Dynamic Source Routing, Adhoc on-demand Routing, Location Aided Routing, Zonal Routing Algorithm.

Mobile IP- Dynamic Host Configuration Protocol.

Traditional TCP-Classical TCP Improvements-WAP, WAP 2.0

UNIT-V

Publishing & Accessing Data in Air: Pull and Push Based Data Delivery models, Data Dissemination by Broadcast, Broadcast Disks, Directory Service in Air, Energy Efficient Indexing Scheme for Push Based Data Delivery.

File System Support for Mobility: Distributed File sharing for Mobility Support, Coda and other Storage Manager for Mobility Support.

Mobile Transaction and Commerce: Models for Mobile transaction, Kangaroo and Joey Transactions, Team Transaction. Recovery Model for Mobile Transactions. Electronic Payment and Protocols for Mobile Commerce.

Suggested Reading:

1. Jochen, M Schiller, "*Mobile Communications, 2nd* Edition Pearson Education, India, 2009.
2. Kurnkum Garg "Mobile Computing", Pearson 2010

Reference Books:

1. Asoke K Talukder,Roopa R Yavagal, "Mobile Computing", TMH 2008
2. Raj Kamal," Mobile Computing", Oxford, 2009.

With effect from 2013-14

Course Code: CS 552

BUSINESS INTELLIGENCE

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student should

1. gets familiarized with BI methodologies
2. learns data warehousing concepts
3. get familiarized with business management
4. learns data mining concepts and implementation of business implementation

Course Outcomes

Upon successful completion of the course, students will learn

1. Concepts of Data warehousing and data mining
2. different ever changing scenarios in business intelligence
3. ethical and legal issues involved in BI

UNIT- I

Introduction to Business Intelligence: Changing Business environments and computerized decision support, A framework for Business Intelligence, Intelligence creation and use in governance, transactional processing versus Analytical processing, successful Business Intelligence implementation, tools and techniques

UNIT -II

Data Warehousing: definition and concepts, DW process overview, Architectures, Data integration and extraction, transformation and load(ETL) processes, Implementation issues, Real time data warehousing.

UNIT -III

Business Reporting, Visual Analytics and Business Performance Management: Overview, strategies, performance measures, Methodologies, applications.

UNIT -IV

Data Mining for BI: Definitions, Methods, process, Text Mining : NLP, Text mining applications, process, tools, Web Mining: web mining process, methods.

UNIT -V

BI implementation: Integration and emerging trends, issues of legality, ethics.

Suggested Reading:

1. Efraim Turban, Ramesh Sharda, Dursun Delen, David King, Janine E. Aronson. Business Intelligence(2nd Edition)*Paperback*, *312 Pages*, *Published 2010 by Prentice Hall*
2. David Loshin, Business Intelligence - The Savy Manager's Guide Getting Onboard with Emerging IT, Morgan Kaufmann Publishers, 2009.

With effect from 2013-14

CS 553

DISTRIBUTED COMPUTING

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student should get

1. Hardware and software concepts.
2. Client and server model.
3. Remote procedure call and Remote method invocation.
4. Message oriented communication and stream oriented communication.
5. Software agent in distributed system
6. Naming and locating mobile entities.
7. Common Object Request Broker Architecture and Distributed Component Object Model.
8. Quality of service management

Course Outcomes

After completion of this course, the student will be able to

1. Develop, test and debug RPC and RMI based client-server programs.
2. Design and build application programs on distributed systems.
3. Improve the performance and reliability of distributed programs.
4. Design and build newer distributed file systems for any OS.

UNIT -I

Introduction: Definition of Distributed Systems, Goals: Connecting Users and Resources, Transparency, Openness, Scalability, Hardware Concepts: Multiprocessors, Homogeneous Multicomputer systems, Heterogeneous Multicomputer systems, Software Concepts: Distributed Operating Systems, Network Operating Systems, Middleware, The client-server model: Clients and Servers, Application Layering, Client-Server Architectures.

UNIT-II

Communication: Layered Protocols, Lower-Level Protocols, Transport Protocols, Higher-Level Protocols.

Remote Procedure Call: Basic RPC Operation, Parameter Passing, Extended RPC Models.

Remote Object Invocation: Distributed Objects, Binding a Client to an Object, Static verses Dynamic Remote Method Invocations, Parameter Passing.

Message Oriented Communication: Persistence and synchronicity in Communication, Message-Oriented Transient Communication, Message-Oriented Persistent Communication. Stream Oriented Communication: Support for Continuous Media, Streams and Quality of Service, Stream Synchronization.

UNIT-III

Process, Threads: Introduction to Threads, Threads in Distributed Systems.

Clients: user Interfaces, Client-Side Software for Distribution Transparency.

Servers: General Design Issues, Object Servers.

Software Agents: Software Agents in Distributed Systems, Agent Technology.

Naming: Naming, Entities: Names, Identifiers, and Address, Name Resolution, The Implementation of a Name System.

Locating Mobile Entities: Naming verses Locating Entities, Simple Solutions, Home-Based and Hierarchical Approaches.

UNIT-IV

Distributed Object based Systems

CORBA: Overview of CORBA, Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance, Security.

Distributed COM: Overview of DCOM, Communication, Processes, Naming, Synchronization, Replication, Fault Tolerance and Security.

GLOBE: Overview of GLOBE, Communication, Process, Naming, Synchronization, Caching Replication, Fault Tolerance, Security, Comparison of CORBA, DCOM, and COM.

UNIT-V

Distributed Multimedia Systems: Introduction, Characteristics of Multimedia Data.

Quality of Service Management: Quality of Service Negotiation, Admission Control.

Resource Management**:** Resource Scheduling.

Suggested Reading:

1) Andrew S. Tanenbaum and Van Steen "Distributed Systems", Pearson Education Inc., 2002.
2) Colouris G., Dollimore Jean and Kindberg Tim, "Distributed Systems Concepts and Design", 3rd Edition, Pearson education, 2002.

Course Code: CS 554

REAL TIME SYSTEMS

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student should get

1. basic concepts of RTS.
2. high-level analysis, design, test plan document based on requirements specifications
3. scheduling and resource allocation techniques of RTS.
4. introduction of the features specific for Real Time Systems.
5. To discuss the various issues involved in Real Time System design and development.

Course Outcomes

Upon the successful completion of the course, students

1. Understands real time systems and real time operating systems.
2. Illustrate the various real time design principles.
3. Analyze the various risks associated with real time system.

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 Tune Systems: Processors and Resources, Periodic Task Model, Precedence and Data Dependency, Temporal, Functional and Resource Parameters, Scheduling Hierarchy.

UNIT-II

Real Time Scheduling: Different Approaches-Clock Driven, Priority Driven, Scheduling of Periodic, a periodic and Sporadic Jobs in Priority-Driven Systems.

UNIT-Ill

Resource Management Resources and Resource Access Control, Critical Section, priority-Ceiling Protocols, Concurrent Access to Data Objects.

UNIT-IV

Implementation Aspects: Tuning 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 Reading:

1. Textbooks: 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.

Reference Books:

1. Raymond JA. Buhr, Donald L. Bailey, ':4n Introduction to Real Time Systems", Prentice Hall International, 1999.
2. K.Y.K.K. Prasad, "Embedded Real Time Systems, concepts, Design and Programming", Dream Teach, 2003.

With effect from 2013-14

Course Code: CS 555

ARTIFICIAL INTELLIGENCE

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

At the end of the course, student

1. will get introduced to the basic principles in artificial intelligence research.
2. gets knowledge about simple representation schemes, problem solving paradigms, constraint propagation, and search strategies.
3. get familiarized with application such as knowledge representation, natural language processing, expert systems, vision and robotics will be explored.
4. Explores m/c learning paradigms.

Course Outcomes:

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

1. learn the basics of the theory and practice of Artificial Intelligence as a discipline about intelligent agents capable of deciding what to do.
2. Use various symbolic knowledge representations to specify domains and reasoning tasks of a situated software agent.
3. Use different logical systems for inference over formal domain representations, and trace how a particular inference algorithm works on a given problem specification.
4. Master the skills and techniques in machine learning, such as decision tree induction, artificial neural networks, and speech recognition.

UNIT-I

Introduction, History, Intelligent Systems, Foundations of AI, Sub areas of AI, Applications
Problem Solving - State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques, Iterative-Deepening A*, Constraint Satisfaction

Game Playing, Bounded Look-ahead Strategy and use of Evaluation Functions, Alpha-Beta Pruning

UNIT -II

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames

UNIT -III

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems versus Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, Use of Shells and Tools

Uncertainty Measure - Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory

UNIT –IV

Machine-Learning Paradigms: Introduction. Machine Learning Systems. Supervised and Unsupervised Learning. Inductive Learning. Learning Decision Trees (Suggested Reading 2), Deductive Learning.
Clustering, Support Vector Machines.

Artificial Neural Networks: Introduction, Artificial Neural Networks, Single-Layer Feed-Forward Networks, Multi-Layer Feed-Forward Networks, Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks .

UNIT -V

Advanced Knowledge Representation Techniques: Case Grammars, Semantic Web

Natural Language Processing: Introduction, Sentence Analysis Phases, Grammars and Parsers, Types of Parsers, Semantic Analysis, Universal Networking Knowledge

Suggested Reading:

1. Saroj Kaushik. Artificial Intelligence. Cengage Learning. 2011 0 2.
2. Russell, Norvig: Artificial intelligence, A Modern'" Approach, Pearson Education, Second Edition 2004 3.

Reference Books:

1. Rich, Knight, Nair: Artificial intelligence, Tata McGraw Hill, Third Edition 2009.

With effect from 2013-14

Course Code: CS 556

IMAGE PROCESSING

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student

1. should learn the fundamental concepts of Image processing techniques.

Course Outcomes

Upon successful completion of the course, student

1.Can develop simple algorithms for image processing.

2. Can use the various techniques involved in various applications.

UNIT-I

Image Formation and 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, DCI. Walsh, Hadamard Transforms.

UNIT-III

Image Enhancements and Segmentation : Histogram Modification. Image Smoothing - Image Smoothing - Image Sharpening, Thresholding. Edge Detection. Segmentation. Point and Region Dependent Techniques.

UNIT-IV

Image Encoding: Fidelity Criteria. Transform Compression. K- 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.D.. Woods R.E. "Digita1 Image Processing", Addison Wesley, 1992.

2. Rosenfeld A, Kak AC. "Digita1 Picture Processing", Vol. I & II Acad. Press. 2nd ed. 1982.

Reference Books:

3. Milan Sonka. Vaclav Hlavac, Roger Boyle, 'Image Processing and Analysis and Nfachine Wsion", 2nd Edition, Thomson Learning, 1999.

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Course Code: CS 557

EMBEDDED SYSTEMS

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student should be able to get to know about

1. emphasis to hardware and software, enabling engineers to face challenges in the design and development, of state of the art embedded systems.
2. increasing availability of inexpensive processors connected by a communication network has motivated the development of numerous concepts and paradigms for distributed real-time embedded systems.
3. The primary objectives of this course are to study the principles and concepts of embedded system architecture and hardware design and development.
4. the concepts and theory necessary to understand and program distributed embedded real-time systems.

Course Outcomes

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

1. Understand the basics of an embedded system
2. Study embedded systems architecture
3. design hardware and development
4. Study the operating system for embedded systems and embedded system development environment
5. Program an embedded system

UNIT-I

Introduction to Embedded Systems. Characteristics and quality attributes of Embedded Systems, Challenges in Embedded System Design. Application and Domain specific Embedded Systems.

UNIT –II

Embedded System Architecture: Instruction Set Architecture. CISC and RISC instruction set architecture. Basic Embedded Processor/Microcontroller Architecture, CISE Examples Motorola (68HCl 1), RISC Example-ARM. DSP Processors. Harvard Architecture Microcontroller Example - PIC.

UNIT –III

Embedded Hardware Design and Development: VLSI and Integrated Circuit Design. EDA tools. usage of ED A tools and PCB layout.

Embedded firmware and Design and Development: Embedded Hardware Design Approaches and Development languages and Programming in Embedded in C.

UNIT -IV .

Operating System for Embedded System: Real Time Operating Systems Based Embedded System Design. Introduction to Embedded. Systems Design with Micro C/OS- II and Vx Works.

Performance Issues of an Embedded System: CPU Performance. Analysis and Optimization of CPU Power Consumption. Program. Execution Time. Energy and Power. Program Size. .

UNIT-V

Embedded Systems Development Environment: IDE. Cross Compilation, Disassembler.
Simulators, Emulators and Debugging. Target Hardware Debugging. Boundary Scan. Product Enclosure Design and Deveiopment Tools, Embedded Product Development Life Cycle- Different phases and Approaches of EDLC. Trends in Embedded Industry.

Suggested Reading:

1. Shibu K V "Introduction to Embedded Systems n . Tata McGraw Hill,201O.
2. Raj Kamal, "Embedded Systems Architecture; Programming & Design ", Tata McGraw Hill.
2010.

Reference Books:

1. Dr K. V.K.K. Prasad, "Embedded Real time Systems: Concepts, Design and Programming n, Dreamtech Press, 2004.

Course Code:CS 558

INTERNETWORKING TECHNOLOGIES

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student

1. Understands the major protocols for internetworking in today's Internet
2. Understands client-server architecture
3. Performs basic website design
4. Performs basic client side programming
5. Performs basic server side programming
6. Gains the ability to learn new Internet technologies by yourself

Course Outcomes

Upon the completion of the course student is able to

1. Know the evolution of Internet and standards
2. Understand architecture of Internet and its protocols
3. Gain knowledge on Internet programming languages
4. Design, develop, host and maintain basic websites

UNIT-I

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

UNIT-II

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

UNIT-III

Components of web page: HTML, DHTML, CSS, JavaScript, XML; Website Design, Overview of Web Servers

UNIT-IV

Core Components: Hardware platforms, Internet Server components, Web server, E-mail servers, FTP servers, Proxy servers, News servers, Directory servers, Mirrored servers.

UNIT-V

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

Suggested Reading:

1. Computer Networks and Internets With Internet Applications By Douglas EComer ,Pearson
2. Computer Network with Internet Protocols By William Stallings ,Pearson

Reference Books:

1. Data Communication and Networking By B.Forouzan TMH Publication
2. Internet & World wide Web :How to Program By Deitel And Deitel ,Person
3. Dynamic HTML: The Definitive Reference (2nd Edition) – Danny Goodman;O'reilly (paperback)
4. HTML 4 Bible - Bryan Pfaffenberger, Bill Karrow; Paperback

Course Code: CS 559

SOFT COMPUTING

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student

1. Understanding the concepts of M/C Intelligence
2. Develop a Neural network for the proposed model
3. Design a genetic algorithm and implement various genetic operators
4. Ability to incorporate Fuzzy Logic and developing Neuro-fuzzy systems.

Course Outcomes

Upon successful completion of the course, student can

1. Design, analyze the Neural network architectures
2. Develop the skills to design and implement Genetic programming solutions to various problems
3. Applying Fuzzy Logic and the techniques of Neuro-fuzzy models.

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: Adaptive Neuro, Fuzzy Inference Systems, Coactive Neuro, Fuzzy Modeling, Classification and Regression Trees, Data Clustering Algorithms, Rule base Structure Identification, Neuro, Fuzzy Control, Case studies.

Suggested Reading:

1. Iyh, Shlng Roger Jang, Chuen,Tsai Sun, EijiMizutani, "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.

Reference Books:

1. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.
2. Mitchell Melanie, "An Introduction to Genetic Algorithm ", Prentice Hall, 1998.
3. David E. Goldberg, "Genetic Algorithms in Search. Optimization and Machine Learning ", Addison Wesley, 1997.

With effect from 2013-14

Course Code: CS 560

MACHINE LEARNING

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student can

1. Discuss basic concepts of Machine Learning , problems and the other concepts such as algorithms, heuristics, solution spaces and relate them to brute force searching.
2. Understand the mathematical concepts related to Multilayer perception.
3. Demonstrate familiarity with various techniques in Machine Learning and their applications as well as general questions related to analyzing and handling large data sets

Course Outcomes

Upon successful completion of the course, student

1. Acquire the basic knowledge of Machine Learning, identify algorithms, machine learning problems
2. gets ability to apply the knowledge of computing and mathematics appropriate to the discipline
3. Identifies various machine learning techniques such as decision tree, artificial neural networks, Bayesian learning, genetic algorithms, clustering and classification algorithms etc. and their applications
4. gets working knowledge of applying the ML algorithms to the available large data sets with the available simulation packages such as WEKA , Clementine etc.

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, Naive 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 Reading*:*

1. Tom M. Mitchell, "Machine Learning ",MacGraw Hill, 1997.
2. Stephen Marsland, "Machine Learning - An Algorithmic Perspective ", CRC Press, 2009.

Reference Books:

1. Margaret H Dunham, "Data Mining", Pearson Edition, 2003.
2. GalitShmueli, Nitin R Patel, Peter C Bruce, "Data Mining for Business Intelligence", Wiley India Edition, 2007.
3. RajjallShinghal, "Pattern Recognition ", Oxford University Press, 2006.

With effect from 2013-14

Course Code: CS 561

SOFTWARE QUALITY ASSURANCE AND TESTING

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives

At the end of the course, student

1. learns the importance of software quality assurance.
2. gets knowledge about Quality tools in the Software development process.
3. gains an insight to Software Testing.

Course outcomes

Upon successful completion of the course

1. Gained Knowledge about Software Quality assurance.
2. Students got acquainted with various Quality tools.
3. Gained knowledge about Software Testing.

UNIT-I

Software Quality, Quality Management, Software Quality Metrics, Product Quality Metrics, In Process Quality Maintenance, Examples.

UNIT-II

Quality Too1s in Software Development, Seven Basic Tools, Check List, Pareto Diagram, Histogram, Run Charts, Scatter Diagram, Control Chart, Cause and Effect Diagram, Defect Removal, Effect Removal Effectiveness, Quality Planning, Cost Effectiveness of Phase Effect 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.

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 Reading*:*

1) Stepen. H. Khan, "Metrics and Models in Software Quality Engineering", Pearson Education. India, 1995.
2) Ron Patton, "Software Testing", Sams Publishing, 2001.

Reference Books:

3) Boris Beizzer, "Software Testing Techniques" Sams Publishing, 2001.
4) Allan Gilles, "Software Quality Theory & Management", Thomson International Press, 1997.

With effect from 2013-14

Course Code: CS 562

CLOUD COMPUTING

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student should be able to get knowledge bout

1. Cloud Architecture and Engineering
2. Public versus Private clouds
3. Privacy in Cloud Computing
4. IT and Business Standards in Cloud Computing
5. IT Compliance in Cloud Computing
6. Legal Issues in Cloud Computing
7. IT Security in Cloud Computing
8. Sustainability of Cloud Computing Facilities
9. Cloud Architecture and Engineering II
10. CC Research and Innovation

Course Outcomes

Upon successful completion of the course, student

1. Acquires the capacity for understanding and appreciation of the key concepts in the architecture of public and private computing clouds
2. Acquires the capacity for understanding and appreciation of the privacy, compliance and legal challenges organizations face in deploying cloud computing solutions to support their mission and processes
3. Assesses the important security and sustainability challenges involved in adopting various cloud architectures and making informed decisions for their organizations
4. Assesses and quantify the technological and economic comparative advantages of various cloud computing architectures and effectively participate in the process of selecting the cloud computing solution most appropriate for parent organization

UNIT-I

Introduction to Cloud Computing: Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

UNIT-II

Virtual Machines and Virtualization of Clusters and Data Centers, Levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation.

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

UNIT-III

Cloud computing architectures over Virtualized Data Centers: Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management

UNIT-IV

Cloud Security and Trust Management, Data Security in the Cloud **:** An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, CryptDb: Onion Encryption layers- DET,RND,OPE,JOIN,SEARCH, HOM, and Homomorphic Encryption, FPE.
Trust, Reputation and Security Management.

Unit-V

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, parallel and distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.
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.

Suggested Reading:

1. John W. Rittinghouse, "Cloud Computing: Implementation, Management, and Security ". James F. Ransome, CRC Press 2009.
2. Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, “Distributed and Cloud Computing From Parallel Processing to the Internet of Things”, Elsevier, 2012.

Reference Books:

1. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski,” Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing), Wiley *Publishing* ©2011
2. Raluca Ada Popa, Catherine M.S. Redfield, Nickolai Zeldovich, and Hari Balakrishnan, “CryptDB: Protecting Confidentiality with encrypted Query Processing”23rd ACM Symposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.
3. A Fully Homomorhic Encryption Scheme, Craig Gentry, September 2009.
4. David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", Auerbach Publications, 2006.
5. Web resources:
6. http://aws.amazon.com
7. http://code.google.com/appsengine
8. http://www.buyya.com/

With effect from 2013-14

Course Code: CS 563

WIRELESS AND MOBILE NETWORKING

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student

1. realizes the benefits "wireless communication" in mobile applications
2. realizes the limitations of allocation of frequencies
3. know the optimal utilization of bandwidth

Course outcomes

Upon successful completion of the course, students get

1. General knowledge of Wireless transmission in mobile Communication technology.
2. Brief history of types communication system and its working
3. Brief knowledge IEEE wireless standards.
4. Working of mobile IP
5. Working of Mobile Transport Layer

UNIT- I

Introduction: Wireless transmission, Frequencies for Radio Transmission , Signals, Antennas, Signal Propagation, Multiplexing, Modulations, Spread Spectrum, MACSDMA, FDMA, TDMA, CDMA, Cellular Wireless Networks.

UNIT-II

Telecommunication Systems: GSM, GPRS, RA, Satellite Networks, Basics,
Parameters and Configurations, Capacity Allocation, FAMA and DAMA, Broadcast Systems, DAB, DVB, CDMA and 3G.

UNIT-III

Wireless LAN: IEEE 802.11, Architecture, Services, MAC-Physical Layer, IEEE 802.11a-802.11b Standards, Bluetooth

UNIT IV

Mobile IP Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunnelling and Encapsulation, Route Optimization, Dynamic Host Configuration Protocol, VoIP, IPSec.

UNIT V

Mobile Transport Layer: Conventional TCP/IP Transport Layer Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Methods of Mobile TCP Layer Transmission, TCP over 2.5G/3G Mobile Networks

Suggested Reading:

1. William Stallings, “Wireless Communications and Networks”, Second Edition, Prentice Hall of India, Pearson Education, 2004.
2. Jochen, M Schiller,“ Mobile Communications, 2ndEdition Pearson Education, India, 2009.

Reference Books:

1. Asoke K Talukder,Roopa R Yavagal, “Mobile Computing”, TMH 2008
2. Raj Kamal,”Mobile Computing”, Oxford, 2009.

With effect from 2013-14

Course Code: CS 567

DISTRIBUTED ALGORITHMS

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student can

1. design and analyze distributed algorithms,
2. proves correctness of distributed algorithms, show their limitations and interpret their analysis.
3. proves impossibility results and develop new distributed algorithms.

Course Outcomes

Upon the successful completion of the course, students can

1.understand the concept of distributed algorithms.

2. describe distributed problems and solutions.

4. analyze to distributed algorithms.

5. realize probable problems in distributed environment.

6. think problems in a distributed way.

7. use modern techniques for developing distributed software.

UNIT-I

Modeling: Synchronous Network Systems, failures, Inputs and Outputs, Execution, Proof Methods, complexity Measured, Randomization.

Leader election in a Synchronous Ring: The Problem, Impossibility Resuot for Identical Processes, A Basic algorithm, An algorithm with O(n log n) communication Complexity, Non-Comparison-based Algorithms, Lower Bound for Comparison-Based algorithms, Lower-Bound for Non-Comparison-Base algorithms.

Algorithms in General synchronous Networks: Leader Election in a General Network, Breadth First Search, Shortest Paths, Minimum Spanning Tree, Maximal Independent Set.

Distributed Consensus with Link Failures: The coordinated Attack Problem – deterministic Version, The coordinated Attack Problem – randomized Version.

UNIT-II

Distributed Consensus with Process Failures: The Problem, algorithms for stopping failures, Algorithms for Byzantine Failures, Number of processes for Byzantine Agreement, Byzantine Agreement in General Graphs, Weak Byzantine Agreement, Number of rounds with stopping failures.

More Consensus Problems: k-Agreement, Approximate Agreement, The commit Problem

UNIT-III

Modelling II: Asynchronous System Model. I/O Automata, Operations on Automata, fairness, Inputs and Outputs for problems, Properties and Proof Methods, complexity Measures, Indistinguishable Executions, Randomization.

Modelling III: Asynchronous System, Model Shared Memory Systems, Environment Model, Indistinguishable States, Shared Variable Type, complexity measures, failures, randomization.

UNIT-IV

Mutual Exclusion: Asynchronous Shared Memory Model , The Problem, Dijkstra's Mutual Exclusion algorithm, Stronger conditions for mutual exclusion algorithms. Lockout-free mutual exclusion algorithms. An algorithm using single – writer shared registers. the Bakery algorithm lower Bound on the number of registers, mutual exclusion using read- modify – write shared variables. Resource Allocation.

UNIT-V

Consensus: The Problem, Agreement using read/write shared memory, Agreement using read- modify – write share memory, other types of shared memory, and commutability in Asynchronous shared memory systems.

Atomic objects: Definitions and basic results, implementing read-modify –write atomic Objects in terms, atomic snapshots of shared memory, read/write atomic objects.

Suggested Reading:

1. Nancy A Lynch. "Distributed Algorithms", Morgan Kaufmann, 2000
2. Nicola Santroo. "Design and Analysis of Distributed Algorithms", John Wiley 2007

With effect from 2013-14

Course Code: CS 565

PATTERN RECOGNITION AND COMPUTER VISION

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

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

1. basics of pattern recognition concepts with applications to computer vision
2. Introduction, practice and theory of computer vision
3. necessary theory and skills for automatic analysis of digital images, and thereby to construct representations of physical objects and scenes, and to make useful decisions based on them

Course Outcomes

Upon successful completion of the course, students will

1. be able to demonstrate successful applications to process and analyze images, and to make automatic decisions based on extracted feature information
2. understand the vision technology in conjunction with real world applications
   learn the principles and commonly used paradigms and techniques of computer vision
3. be able to identify the limitations of vision systems

UNIT-I

Basics of Pattern recognition-Bayesian Decision Theory-Minimum error rate classification, Classifiers, discriminant functions, decision surfaces -The normal density and discriminant-functions for the Normal density-Continuous and discrete valued features-Bayesian Belief Networks, Methods for parameter estimation-Maximum-Likelihood (ML) estimation-Maximum a posteropri (MAP) estimation-Bayesian estimation-Gaussian mixture model (Both unimodal-and multimodal distribution)-Expectation-maximization method

UNIT-II

Sequential pattern classification-Discrete hidden Markov model-Continuous density hidden Markov models-Non-parametric techniques for density estimation-Parzen-window method, K-Nearest Neighbour method, Dimension reduction methods-Principal component analysis-Fisher discriminant analysis, Linear discriminant function based classifiers-Perceptron-Minimum Mean Squared Error (MME) method –The Ho-Kashyap method-Non-metric methods for pattern classification Decision trees-Classification and Regression Tree (CART), Regression-Linear models for regression-Polynomial regression-Bayesian regression-Unsupervised learning and clustering-Criterion functions for clustering-Algorithms for clustering:-K-means, -Hierarchical clustering –Cluster validation

UNIT-III

Image formation and Image model-Components of a vision system-Cameras-Radiometry-Light in space-Light in surface- sources, shadows and shading, Color-Human color perception-Representation of color- A model for image color-Surface color from image color, Early vision-Linear Filters and Convolution-Shift variant Linear system- Spatial Frequency and Fourier Transforms-Samoling and Aliasing-Filters as Templates-Normalized correlation and finding patterns-Edge detection-Texture Representation ,Analysis and Application

UNIT-IV

Multiple images-The Geometry of multiple views-Stereopsis-Affine structure from motion-Elements of Affine Geometry-Affine structure and motion from two images-Affine structure and motion from multiple images-From Affine to Euclidean images. Middle level vision-Segmentation by clustering-Shot Boundary Detection and Background Subtraction-Image segmentation by clustering pixels-Segmentation by Graph-Theoretic clustering- Segmentation by fitting a model-The Hough Transform-Fitting lines-Fitting curves-Fitting as a probabilistic inference problem-Robustness-Segmentation and fitting using probabilistic methods.

UNIT-V

High level vision-:Geometric methods-Model based vision-Obtaining hypothesis by pose consistency, pose clustering and using Invariants- Verification-smooth surface and their outlines-Aspect graphs- Range data-Range Data segmentation- Range image Registration and model acquisition-Object Recognition.

Suggested Reading:

1, R.O.Duda, P.E.Hart and D.G.Stork. Pattern Classification, John Wiley, 2001
2, S.Theodoridis and K.Koutroumbas. Pattern Recognition,4th Ed., Academic Press, 2009

Reference Books:

1. David A forsyth& Jean ponce. Computer vision – A modern Approach Prentice Hall ,2002.
2. Bernd Jahne and Horst HauBecker. Computer vision and Applications, Academic press ,2000.

With effect from 2013-14

Course Code: CS 566

ADHOC AND SENSOR NETWORKS

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student

1. learns about the concepts and principles of adhoc and sensor networks.
2. explores both theoretical and practical issues of adhoc and sensor networks.
3. develops skills of finding solutions for adhoc and sensor networks applications.
4. performs research in upcoming technologies of adhoc and sensor networks.

Course Outcomes

Upon successful completion of the course, students will be

1. able to describe the unique issues in adhoc and sensor networks.
2. able to describe current technology trends for the implementation and deployment of wireless adhoc and sensor networks.
3. able to discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc/sensor networks.
4. able to build and configure a testbed for a sensor network.
5. able to describe and implement protocols on a sensor testbed network.

UNIT- I

Introduction : Routing in Ad Hoc Networks, Broadcasting, Multicasting and Geocasting.

UNIT- II

Wireless LANs, Wireless PANs, Wireless Mesh Networks.

UNIT -III

Cognitive Radio and Networks, TCP over Adhoc Networks, Applications of Sensor Networks.

UNIT- IV

Sensor Networks Design Considerations, Sensor Networks in Controlled Environment and Actuators.

UNIT- V

Security in Ad Hoc and Sensor Networks, Integrating MANETs, WLANs and Cellular Networks.

Suggested Reading:

1. Carlos de Morais Cordeiro and Dharma Prakash Agrawal, “Ad Hoc and Sensor Networks : Theory and Applications”, Second Edition, World Scientific Publishers, 2011
2. Prasant Mohapatra and Sriramamurtyhy, “Ad Hoc Networks: Technologies and Protocols”, Springer International Edition, 2009

Reference Books:

1. Kazem Sohraby, Daniel Minoli, Taieb Znati, “Wireless Sensor Networks’, A John Wiley & Sons Inc. Publication, 2007

With effect from 2013-14

Course Code: CS 567

INTELLIGENT AGENTS

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

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

1. Introduced to students to advanced techniques within artificial intelligence (AI), with particular focus on automated planning and multi-agent systems.
2. To explain, analyze and implement advanced AI techniques.

Course outcomes

Upon successful completion of the course, student can

1. compare and assess the appropriateness of various AI techniques for solving a given concrete problem
2. combine different AI techniques in a theoretically sound and practically useful way
3. apply a given AI technique to a given concrete problem
4. create logical agents to do inference using first order logic.
5. apply Bayesian Networks for probabilistic reasoning and perform Statistical learning using EM algorithm.

UNIT-I

INTRODUCTION – Definition of an Agent, Agents and Objects ,Evaluation of Agents – Agent Design Philosophies- Multi-agent System – Mobile Agents – Agent Communication – Knowledge query Language – Definitions- The Foundations of Artificial Intelligence.

UNIT-II

INTELLIGENT AGENTS – Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments**,** Agent Architectures: The Structure of Agents, Types of Agents, Problem-Solving Agents-Formulating problems, Searching for Solutions, Uninformed Search Strategies, Breadth-first search, Depth-first search, Searching with Partial Information, Informed (Heuristic) Search Strategies, Greedy best-first search, A* Search: Minimizing the total estimated solution cost, Heuristic Functions, Local Search Algorithms and Optimization Problems.

UNIT-III

LOGICAL AGENTS – Knowledge Based agents, The Wumpus World, Logic, Propositional Logic: A Very Simple Logic, Reasoning Patterns in Propositional Logic, Resolution, Forward and Backward chaining FIRST ORDER LOGIC – Syntax and Semantics of First-Order Logic, Using First-Order Logic , , Knowledge Engineering in First-Order Logic; - INFERENCE IN FIRST ORDER LOGIC – Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution

UNIT-IV

Introduction to Multi Agent Systems Communication Efficiency in Multi-Agent Syste.ms UNCERTAINTY – Acting under Uncertainty, Basic Probability Notation, The Axioms of Probability, Inference Using Full Joint Distributions, Independence, Bayes' Rule and its Use, The Wumpus World Revisited;

UNIT-V

PROBABILISTIC REASONING **–**Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distribution, Exact Inference in Bayesian Networks, Approximate Inference in Bayesian Networks; - STATISTICAL LEARNING METHODS –Statistical Learning, Learning with Complete Data, Learning with Hidden Variables: EM Algorithm.

Suggested Reading:

1. Stuart Russell and Peter Norvig, ``Artificial Intelligence: A Modern Approach.'' 3rd Edition, Prentice Hall, 2010.
2. Nils J Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kaufmann, Publications, 2000.

Reference Book:

1. An Introduction to Multi Agent Systems John Wiley & Sons Ltd Bat'fins Lane, Chichcstcr,2007

Course Code: CS 568

INFORMATION RETRIEVAL

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives

At the end of the course, student get

1. familiarized the different IR models.
2. to develop an overall understanding of the different text retrieval models, query languages and query evaluation
3. to develop a thorough understanding of the technical details of the important processes such as indexing, compression and searching.

Course outcomes

Upon successful completion of the course

1. Have obtained sufficient theoretical background to develop efficient Information retrieval systems.
2. Have gained sufficient insight which would help in conducting research in the area.

UNIT-I

Introduction: Basic concepts, Past present and Future of IRS, Retrieval Process. Modeling: Introduction, A Taxonomy of IR Models, Retrieval: Adhoc and Filtering, A formal characterization of IR Models, Classic IR, Set Theoretic Models, Algebraic Models, Probabilistic Models

UNIT-II

Structured Text Retrieval Models, Models for Browsing, Retrieval Evaluation: Introduction, Reference Collections. Query languages: Introduction, Keyword-based querying, pattern Matching, Structural Queries, Query Protocols.

UNIT-III

Query operations: Introduction, User Relevance Feedback, Automatic Local Analysis, Automatic Global Analysis. Text and Multimedia Languages and Properties: Introduction, Meta Data, Text, Markup Languages, Multimedia.

UNIT-IV

Text operations: Introduction, Document Preprocessing, Document Clustering, Text Compression, Comparing Text Compression Techniques. Indexing: Introduction, Inverted Files, Other Indices for Text Searching, Boolean Queries,

UNIT-V

Searching: Sequential Searching, Pattern Matching, Structural Queries, Compression. Parallel and Distributed IR: Introduction, Parallel IR, Distributed IR.

Suggested Reading:

1) Ricardo, Baeza-yates, BerthierRibeiro-Neto, “Modern Information Retrieval” Pearson Education, 2008
2) David A. Grossman, OphirFrieder, "Information Retrieval - Algorithms and Heuristics", Springer, 2nd Edition (Distributed by Universities Press), 2004.

Reference Books:

3) Gerald Kowalski, “Information Retrieval Systems: Theory and Implementation”, Springer.
4) William B. Frakes, Ricardo Baeza- Yates, “Information Retrieval – Data Structures & Algorithms”, Pearson Education, 2008.

With effect from 2013-14

Course Code: CS 569

NEURAL NETWORKS

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives

At the end of the course, student

1. Study the role of neural networks in engineering, artificial intelligence, and cognitive learning
2. Study about the basic neural network models, architectures
3. Study about various learning approaches
4. Hands-on experience in selected applications (Pattern recognition, function approximation, information visualization etc.)

Course outcomes

Upon successful completion of the course students

1. Understand the aspects of social, intellectual and neurobiological context of neural networks research.
2. Have an understanding of neural networks and variety of neural network techniques including
3. Understand various learning methods like Delta learning, Back propagation, Competitive etc.
4. Have a working knowledge of a typical neural network simulation package , learn, and be able to use it to perform a range of computational tasks

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. Hebbain 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. Leam 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

Neuro dynamics' Introduction. Dynamical Systems. Stability of equilibrium States. Attractors Neuro dynamical Models. Manipulation of Attractors as a Recurrent Network Paradigm. Hopf ield Models. Cohen-Grossberg Theorem.

Suggested Reading:

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.

With effect from 2013-14

Course Code: CS 570

SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

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

1. software engineering, software architecture, concepts very clearly understandable to the students.
2. Introduction to software reuse techniques and design patterns in software industry.
3. various techniques in software engineering are made available.
4. design patterns, making the students capable of writing design patterns.

Course Outcomes

Upon successful completion of the course, students can

1. understand design pattern in depth
2. write design patterns for various software models.
3. Be made capable of creating new design patterns.

UNIT-I

Introduction To Software Architecture

An Engineering Discipline for Software, Status of S/W Arch. Architecture Business Cycle, Where do Architectures Come from. Software Processes and the Architecture Business Cycle, Features of Good Architecture. Architecture Styles, Pipes and Filters, Data Abstraction and Object Oriented organization, Even-based Implicit Invocation, Layered Systems, Registers, Interpreters, Process Control, Other Familiar Architectures, Heterogeneous Architectures.

UNIT-II

Shared Information Systems, Database Integration, Interpretation in Software Development Environments, Architectural Structures for Shared Information Systems, Architectural Design Guidance for User Interface Architectures, Case Study in Inter Operability: World Wide Web. Pattern Types, Architectural Patterns, Structural Patterns, Patterns for Distribution, Patterns for Interactive Systems.

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UNIT-III

Formal Models And Specifications, Finalizing the Architectural of a Specific System. Architectural Style. Architectural Design Space. Case Study of an Industry Standard Computing. Infrastructure: CORBA, Architectural Description Languages, ADL's today, capturing Architectural Information in an ADL, Application of ADL's in system Development, Choosing an ADL, Example of ADL. Reusing Architectural Assets Within An Organization, Creating Products and Evaluating a Product Line, Organizational Implications of a Product Line, Component, Based Systems. Software Architectures in Figure: Legacy Systems. Achieving an Architecture, for Architecture to System.

UNIT-IV

Introduction To Design Patterns, Design Pattern Definition, Design Patterns in Small Talk MVC, Describing Design Patterns, Catalog of Design Patterns, Organizing the Catalog, Solving of Design Problems using Design Patterns, Selection of a Design Pattern, use of Design Patterns, Designing A Document Editor: A Case Study Design problems, Document structure, Formatting, Embellishing the User Interface, Supporting Multiple Look and Feel standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.

UNIT-V

Design Patterns Catalog, Creational Patterns, Abstract Factory, Builder, Factory Method, Prototype, Singleton. Discussion of Creational Patterns. Structural Patterns-1, Adapter, Bridge, Composite, Decorator. Structural Patterns-2 & Behavioral Patterns-1, Structural patterns: Façade. Flyweight. Proxy. Discuss of Structural Patterns. Behavioral Patterns: Chain of Responsibility Command, Interpreter.

Behavioral Patterns-2, Iterator. Mediator. Observer. State. Strategy. Template Method. Visitor. Discussion of Behavioral Patterns, Behavioral Patterns-3 ,State. Strategy. Template Method. Visitor. Discussion of Behavioral Patterns

Suggested Reading:

1. Mary Show, David Garlan, "S/W Arch. Perspective: on an Emerging Discipline", 1996, PHI.
2. Len Bass, Paul Elements, Rick Kazman, "Software Architecture in Practice", 1998, Pearson Education Academy.
3. Gamma, Belm, Johnson, "Design Patterns: Elements of Reusable Object Oriented Software",1995, Pearson Education Academy.

Reference Books:

1. Garmus, Herros, "Measuring the Software Process: A Practical Guide to Functional Measure", 1996,PHI.
2. Florac, Carleton, "Meas. Software Process: Stat. Proce. Cont. for Software process Improvements",1999, Pearson Educational Academy.
3. Cooper, "Java Design Patterns", Educational Academy.
4. Horstmann, "Object Oriented Design and Patterns", Wiley.

With effect from 2013-14

Course Code: CS 571

MIDDLEWARE SYSTEMS

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student are made

1. To develop a technical overview of the web & emerging platforms
2. To appreciate the mechanisms by which web content can be enriched to take account of contextual factors
3. To identify, evaluate and apply appropriate technologies for web development
4. To learn the components of JAVA and CORBA
5. To introduce the basic concepts of XML technology
6. To understand the concepts of web services key technologies

Course Outcomes

Upon successful completion of the course, students can

1. Evaluate and assess the security & privacy implications of web applications
2. Use XML to enhance cross-application compatibility
3. Understand Web Services and its Infrastructure
4. Build a Web Service
5. Deploy and Publishing Web Services

UNIT- I

Technologies for Web Applications :Client/ Server communications on the web- Client-side technologies- Document-specific technologies- HTMLDHTML- Synchronized Multimedia Integration Language- Extensible Markup Language – Extensible style sheet language- Java script- Server-side technologies- Servlet- URI handlers- Web service- Middleware technologies.

UNIT-II

Introduction: Introduction to Internet and WWW – Role of XML – XML language basics - Document Type Definition (DTD) - Schemas. XML Technology: XML path language-Extensible style sheet language transformations - Extensible style sheet language formatting objects- Xlink- XPointer - XInclude - XBase.

UNIT- III

Java based Component Technologies: Threads – Java Beans – Events and connections –Properties – Introspection – JAR files –Reflection – Object serialization – Enterprise Java Beans – Distributed object models – RMI and RMI-IIOP. CORBA Component Technologies : CORBA to OMA –Common object service specifications – CORBA component model – CORBA compliant implementations- CORBA facilities – Application object

UNIT- IV

Web Services: Evolution of distributed computing- Client/Server - CORBA - Java RMI – Microsoft DCOM – Introduction to web services - Building web services architecture , Understanding SOA, Introduction of SOA- SOA architecture fundamentals-Overview of SOA implementation methodology – SOA reference architecture – Service identification –Service specification- Service realization –Service life cycle

UNIT-V

SOAP: Developing web services using SOAP –Anatomy of a SOAP message-SOAP encoding-SOAP message-Exchange model –SOAP communication-SOAP security. Description and Discovery of Web Services and Security in Web Services Web services description language - Universal Description, Discovery, and Integration (UDDI) - Programming with UDDI - Inquiry APIs- Publishing APIs- Implementations of UDDI- Web services security-XML encryption-XML signature

Suggested Reading:

1. A.A.Puntambekar " Web technologies " , 2009
2. Michael Rosen, Boris Lublinsky, Kevin T.Smith and Marc J.Balcer, Service-Oriented Architecture and Design Strategies, Wiley India Edition, 2008.

Reference Books:

1. Clemens Szyperski, Component Software: Beyond Object-Oriented Programming, Pearson Education publishers, 2011

Course Code: CS 572

PARALLEL ALGORITHMS

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student is

1. Equipped the students with mathematical preliminaries required to analyze and design parallel algorithms
2. Introduced with design approaches of parallel algorithms and performance measured of parallel algorithms
3. Familiarized with specific parallel algorithms for various applications in sorting, searching and graphs.

Course outcomes

Upon successful completion of the course, students shall

1. Be able to define efficiently and speed up .
2. Get acquainted with different parallel architectural constraints and design of parallel algorithms
3. Develop an efficient parallel algorithm to solve it.

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 networking, Bubble sort and its variants, quick sort, Bucket and Sample Sort.

UNIT-IV

Parallel Graph Algorithms- Definitions and Representation, 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", Cengaga Learning, 2002.

2. Ananthgrama and Anshul Gupta "Introduction to Parallel Computing", Pearson Education Second Edition, 2004.

With effect from 2013-14

Course Code: CS 573

RELIABILITY AND FAULT TOLERANCE

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives

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

1. understands the risk of computer failures and their peculiarities compared with other equipment failures;
2. knows the different advantages and limits of fault avoidance and fault tolerance techniques;
3. be aware of the threat from software defects and human operator error as well as from hardware failures;
4. understands the basics of redundant design;
5. knows the different forms of redundancy and their applicability to different classes of dependability requirements;
6. will be able to choose among commercial platforms (fault-tolerant or non fault-tolerant) on the basis of dependability requirements;
7. will be able to specify the use of fault tolerance in the design of application software;

Course outcomes

Upon successful completion of the course students get knowledge of

1. Fundamentals of design for dependability and fault tolerance.
2. Methods for error detection, confinement and recovery
3. Recovery, modular redundancy and fault tolerance in distributed systems
4. Fault tolerance against software and design faults, and against operator error
5. Commercial fault tolerant systems; decisions in design, procurement and deployment of fault-tolerant systems

UNIT-I

Introduction to Reliability Engineering : Reliability - Repairable and Non Repairable Systems - Maintainability and Availability - Designing - Reliability - MTBF, MTTF MDT. k out of in systems.

UNIT- II

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.

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 Fault Trees - Validation of Fault Tolerant Systems. .

UNIT- V

Fault Types **-** Fault Detection and Containment - Redundancy - Data Diversity - Reversal- Reversal Checks - Obtaining Parameter Values - Reliability Models for Hardware Redundancy - Software Error Models - Checks - Fault Tolerant Synchronization - Synchronization in Software.

Suggested Reading:

1. John D. Musa, "Software Reliability", McGraw Hill, 1095.
2. Patrie D. T.O. Concor, "Practical Reliability Engineering", 4th edition, John Wesley & Sons, 2003. .

Reference Books:

1. C.M. Krishna, Kang G. Shin. "Real Time Systems ", McGraw Hill, 1997

With effect from 2013-14

Course Code: CS 574

HUMAN COMPUTER INTERACTION

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives

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

1. design, evaluate and deploy usable, effective technologies
2. produce a low-fidelity prototype for an interactive product based upon a simple list of interaction design principles.

Course outcomes

Upon successful completion of the course

1. Think constructively & analytically about how to design and evaluate interactive technologies.
2. determine the most appropriate HCI methods to meet the needs of a practical software development project

UNIT - I

Interaction Paradigms: Computing Environments, Analyzing Interaction Paradigms, Interaction Paradigms.

Interaction Frameworks and Styles**:** Frameworks for Understanding Interaction, Coping with Complexity, Interaction Styles.

UNIT - II

Interaction Design Process: Iterative Design, User-Centered Design, Interaction Design Models, Overview of Interaction Design Models.

Discovery: Discovery Phase Framework, Collection, Interpretation, Documentation.

Design: Conceptual Design, Physical Design, Evaluation, Interface Design standards, Designing the Facets of the Interface.

UNIT - III

Design Principles: Principles of Interaction Design, Comprehensibility, Learnability.

Effectiveness/Usefulness, Efficiency/Usability, Grouping, Stimulus Intensity, Proportion, Screen Complexity, Resolution/Closure, Usability Goals.

Interaction Design Models: Model Human Processor, Keyboard Level Model, GOMS, Modeling Structure, Modeling Dynamics, Physical Models.

Usability Testing: Usability, Usability Test, Design the Test, Prepare for the Test, Perform the Test, Process the Data.

UNIT - IV

Interface Components: The WIMP Interface, Other Components.

Icons: Human Issues Concerning Icons, Using Icons in Interaction Design, Technical Issues Concerning Icons.

Color: The Human Perceptual System, Using Color in Interaction Design, Color Concerns for Interaction Design, Technical Issues Concerning Color.

UNIT - V

Text: Human Issues Concerning Text, Using Text in Interaction Design, Technical Issues Concerning Text.

Speech and Hearing: The Human Perceptual System, Using Sound in Interaction Design, Technical Issues Concerning Sound.

Touch and Movement: The Human Perceptual System, Using Haptics in Interaction Design, Technical Issues Concerning Haptics.

Suggested Reading*:*

1. Steven Heim, "The Resonant Interface: HCI Foundations for Interaction Design", Addison-Wesley, 2007.
2. J. Preece, Y. Rogers, and H. Sharp, "Interaction Design: Beyond Human-Computer Interaction", Wiley & Sons, 2nd Ed., 2007.

Reference Books:

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

With effect from 2013-14

Course Code: CS 575

PERVASIVE COMPUTING

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives

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

1. a sound conceptual foundation in the area of Pervasive Computing aspects
2. a balanced treatment of the mechanisms and environments of pervasive computing

Course outcomes

Upon successful completion of the course, student will

1. have a sound conceptual foundation in the area of Pervasive Computing aspects
2. be able to conceptualize, analyze and design select classes of pervasive computing systems.

UNIT- I

Pervasive Computing: Past, Present and Future Pervasive Computing-Pervasive Computing Market-m-Business-Application examples: Retail, Airline check-in and booking-Sales force automation-Health care-Tracking-Car information system-E-mail access via WAP

UNIT -II

Device Technology: Hardware-Human Machine Interfaces-Biometrics-Operating Systems-Java for Pervasive devices

UNIT -III

Device Connectivity: Protocols-Security-Device Management Web Application Concepts: WWW architecture-Protocols-Transcoding - Client authentication via internet

UNIT -IV

WAP and Beyond: Components of the WAP architecture-WAP infrastructure-WAP security issues-WML-WAP push-Products-i-Mode-Voice Technology: Basics of Speech recognition- Voice Standards-Speech applications-Speech and Pervasive Computing

UNIT -V

PDA: Device Categories-PDA operation Systems-Device Characteristics-Software Components-Standards-Mobile Applications-PDA Browsers Pervasive Web Application architecture: Background-Scalability and availability-Development of Pervasive Computing web applications-Pervasive application architecture

Suggested Reading:

1. Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaec & Klaus Rindtorff: Pervasive Computing: Technology and Architecture of Mobile Internet Applications, Pearson Education, New Delhi, 2012.
2. Stefen Poslad: Ubiquitous Computing: Smart Devices, Environments and Interactions, Wiley, Student Edition, 2010.

Reference Books:

1. Ajith Abraham (Ed.): Pervasive Computing, Springer-Verlag, 2012.
2. Guruduth S. Banavar, Norman H. Cohen, Chandra Narayanaswami: Pervasive Computing: An Application-Based Approach, Wiley Interscience, 2012.
3. Frank Adelstein, S K S Gupta, GG Richard & L Schwiebert: Fundamentals of Mobile and Pervasive Computing, Tata McGraw-Hill, New Delhi, 2005.

With effect from 2013-14

Course Code: CS 576

SEMANTIC WEB

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of this course, students should be able to

1. sketch the overall architecture of the Semantic Web.
2. identify the component technologies of the Semantic Web and explain their roles.
3. illustrate the design principles of the Semantic Web by applying the technologies.
4. understand certain limitations of the Semantic Web technologies, and be aware of the kinds of services it can and cannot deliver.

Course Outcomes

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

1. understand the concept structure of the semantic web technology and how this technology revolutionizes the World Wide Web and its uses.
2. understand the concepts of metadata, semantics of knowledge and resource, ontology, and their descriptions in XML-based syntax and web ontology language (OWL).
3. describe logic semantics and inference with OWL.
4. use ontology engineering approaches in semantic applications

Unit -I

Introduction to the Semantic Web: semantic web vision, semantic web technologies, a layered approach

Unit- II

Structured Web Documents and Resource Description Framework: Data model, syntaxes, RDFS: adding semantics, RDF schema, Axiomatic semantics for RDF schema, direct inference system for RDF schema.

Unit- III

Querying the semantic web: SPARQL infrastructure, Matching patterns, filters, organizing result sets, other forms of SPARQL queries, querying schemas, SPARQL update. Web Ontology Language(OWL): Introduction requirements for ontology languages, OWL language, OWL2 profiles.

Unit -IV

Logic and inference rules: Introduction, examples of monotonic rules : syntax and semantics, OWL2Rl, Rule Interchange format, semantic web rules language, rules in SPARQL, Non monotic rules, Rule markup language.

UNIT -V

Semantic web applications, Ontology engineering: Introduction, construction of ontologies, reusing existing ontologies, semiautomatic ontology acquisition, ontology mapping, exposing relational databases, semantic web application architecture.

Suggested Reading:

1. Grigoris Antoniou and Frank van Harmelen, *A Semantic Web Primer*, 2nd Edition, 2008 The Massachusetts Institute of Technology Press, ISBN: 978-0-262-01242-3.

2. Allemang, D., & Hendler, J. (2011). Semantic Web for the working ontologist. 2nd Edition, Morgan&Kaufmann Publisher. [ISBN:978-0-12-385965-5]

Reference Books:

1. Daconts, M.C., Orbst, L.J., & Smith, K.T.(2003). The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management. New York: Wiley. [ISBN: 0-471-43257-1]

With effect from 2013-14

Course Code: CS 577

INFORMATION SECURITY AUDIT AND ASSURANCE

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of the course, student should be able

1. To prepare student to understand the various issues in information systems
2. To understand their security risks; to appreciate the importance of information security and to provide a guideline for further studying in the field.

Course Outcomes

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

1. Identify the top threats to a computer network: intrusion, Denial of Service attacks, and malware.
2. Assess the likelihood of an attack on your personal computer and network.
3. Compare and contrast perimeter and layered approaches to network security.
4. Have a working knowledge of several specific virus outbreaks, including the Sobig and Sasser types.

UNIT- I

Information, Information Systems and Management Information Systems, Information Security challenges brought about by computers and the Internet, Unauthorized or inappropriate access to information or systems, Malicious hackers, Cyber-terrorism, Viruses and other malicious code, Other threats and vulnerabilities.

UNIT-II

Importance of protecting information assets, Information Security awareness, Training, Education, Profession opportunities, Basic Information Security terminology, Confidentiality, Integrity, Availability, Authentication and Authorization, Storage and Transmission, Auditing, Policies, Configuration and control, Risk Management, System Management, Information Resource Custodian, Mode of Operations.

UNIT-III

Database and database security, Data mart and data mining, Electronic Profiling, protections, Transmission Security Discussion, Burst, Dial back, Masking, wire line protection and authorization, optical systems, Operation Security.

UNIT-IV

Information Security Countermeasures, Policies, Procedures, Industrial Practices, Human Intelligence, Cover, Monitoring, Surveillance, Technology, Data Mining, Intelligent Video Analysis, Operation Security, Control and Responsibilities, Physical security discussions, Physical Access.

UNIT-V

Alarms and Reporting Structures, Fire Control, Network Room Protection, Power, Organizational Roles, Software Security, Configuration, Version Control, Documentation Sandbox, Usage Monitoring, Verification, Validation, Testing, EMSEC, TEMPEST, Security, Attenuation, shielding, Zoning, Filtered Power, Control and Security Policies, Risk Analysis, Various Legislations.

Suggested Reading:

1. Conklin et al, Principles of Computer Security: Security+ and Beyond, 1st Edition McGraw Hill, 2005 0072255099

Reference Book:

1. Merkow, M, Breithaupt, J, Information Security: Principles and Practices Prentice Hall 2006 ISBN: 0-13-154729-1

With effect from 2013-14

Course Code: CS 578

RESEARCH METHODOLOGIES IN COMPUTER SCIENCE

Instruction	3L + 1T periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

At the end of this course, students should be able

1. To understand epistemology, objectives and types of research.
2. To collect data, analyze and report the results.
3. To apply latest computer methodologies to the research problems.

Course Outcomes

Upon the successful completion of the course, student can

1. Understand , design and analyze a research problem
2. Will be able to collect data, analyze data
3. Use Computer Science Methodology to solve a problem.

UNIT- I

Introduction to Research Methods**:**, Evolutionary Epistemology, Scientific Methods, Hypotheses Generation and Evaluation, Code of Research Ethics, Issues related to plagiarism, collaborative models and ethics, acknowledgments. Intellectual Property Rights: Copy rights, copy left, Patents, Industrial designs, Trademarks. Definition and Objectives of Research, Various Steps in Scientific Research, Types of Research, Research Purposes, Research Design, Survey Research, Case Study Research.

UNIT- II

Data: Methods of Data collection, Description and Analysis of Data, Sampling Design, Role of Statistics for Data Analysis, Functions of Statistics, Estimates of Population, Parameters, Parametric V/s Non Parametric methods, Descriptive Statistics, Points of Central tendency, Measures of Variability, Measures of relationship, Inferential Statistics- Estimation, Hypotheses Testing, Use of Statistical software(SPSS).

UNIT-III

Data Analysis: Deterministic and random data, Uncertainty analysis, Tests for significance, Chi-square, t-test, Regression modeling, Direct and Interaction effects, ANOVA, F-test, Time Series analysis, Correlation and Regression.

Computational Intelligence: Computational Intelligence Paradigms, Artificial Neural Networks, Evolutionary Computation, Swarm Intelligence, Artificial Immune Systems, Fuzzy Systems.
Epistemology: applications in AI, Software Engineering

UNIT-V

Research Reports, Ethics and Morals:
Structure and Components of Research Report, Types of Report, Layout of Research Report, Mechanism of writing a research report. Format of the Research Report, Style of writing report, References / Bibliography / Webilography. Technical paper writing / Journal report writing, Writing Research Grant Proposal, Funding agencies

Suggested Reading:

1. C.R.Kothari, Research Methodology, Methods and Techniques, New age International Publishers, 2004
2. Andries P. Engelbrecht, "Computational Intelligence An Introduction", Wiley, 2nd Edition, 2007

Reference Books:

3. Chris Eaton, Dirk Deroos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data Analytics for Enterprise class Hadoop and Streaming Data" I Edition, TMH 2012.
4. R.Ganesan, Research Methodology for Engineers, MJP Publishers, 2011
5. Y.P.Agarwal, Statistical Methods: Concepts, Application and Computation, Sterling Publications Pvt.Ltd., New Delhi, 2004.
6. Vijay Upagade and Araving Shende, Research Methodology, S.Chand & Company Ltd. New Delhi, 2009.
7. Statistical Methods by S.P.Gupta.

With effect from 2013-14

Course Code: CS 531

ADBS LAB / OOSE LAB

Instruction	3 Periods per week 3 Hours
Duration of University Examination	--
University Sessionals	50 M
Credits	2

ADBS LAB

1. Develop a database application to demonstrate the representation of multi-valued attributes and the use of nested tables to represent complex objects. Write suitable queries to demonstrate their use.

2. Write an XML to display the book information, which includes the following: Title of Book
   Author
   Name ISBN
   Number
   Publisher
   Edition
   Price

3. a) Write a DTD to validate XML
   File b) Display XML as follows
   i) The contents should be displayed in a table. The header of table should be in Grey color
   ii) The author Names column should be displayed in one color & capitalized & should be in bold iii) Use your own colors for remaining columns. Use XSL & CSS for above purpose.

4. Write a program that uses the SAX parser to extract all elements with a particular tag. The use should be able to provide a tag name, and your program should show all instances of that tag.

5. Write a program that uses the DOM parser to provide a searchable interface to the document. The user should be able to provide an element type and value, and your program should display the corresponding data.

OOSE LAB

A Case Study using case tool supporting UML

Note: The students have to submit a report at the end of the semester

With effect from 2013-14

Course Code: CS 532

SOFT SKILLS LAB

(Activity-**based)**

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	--
Sessionals	50 M
Credits	2

Introduction - Definition and Introduction to Soft Skills – Hard Skills Vs Soft Skills – Significance of Soft/Life/Self Skills – Self and SWOT Analysis and

1. **Exercises on Productivity Development**
   - Effective/ Assertive Communication Skills (Activity based)
   - Time Management (Case Study)
   - Creativity & Critical Thinking (Case Study)
   - Decision Making and Problem Solving (Case Study)
   - Stress Management (Case Study)

2. **Exercises on Personality Development Skills**
   - Self-esteem (Case Study)
   - Positive Thinking (Case Study)
   - Emotional Intelligence (Case Study)
   - Team building and Leadership Skills (Case Study)
   - Conflict Management (Case Study)

3. **Exercises on Presentation Skills**
   - Importance of Oral Presentation – Defining Purpose- Analyzing the audience- Planning Outline and Preparing the Presentation- Individual & Group Presentation- Graphical Organizers- Tools and Multi-media Visuals
   - One Minute Presentations (Warming up)
   - PPT on Project Work- Understanding the Nuances of Delivery- Body Language – Closing and Handling Questions – Rubrics for Individual Evaluation (Practice Sessions)

4. **Exercises on Professional Etiquette and Communication**
   - Role-Play and Simulation- Introducing oneself and others, Greetings, Apologies, Requests, Agreement & Disagreement….etc.
   - Telephone Etiquette
   - Active Listening
   - Group Discussions (Case study)- Group Discussion as a part of Selection Procedure- Checklist of GDs
   - Analysis of Selected Interviews (Objectives of Interview)
   - Mock-Interviews (Practice Sessions)
   - Job Application and Preparing Resume
   - Process Writing (Technical Vocabulary) – Writing a Project Report- Assignments

5. **Exercises on Ethics and Values**

   Introduction — Types of Values - Personal, Social and Cultural Values - Importance of Values in Various Contexts
   - Significance of Modern and Professional Etiquette – Etiquette (Formal and Informal Situations with Examples)
   - Attitude, Good Manners and Work Culture (Live Examples)

- Social Skills - Dealing with the Challenged (Live Examples)
- Professional Responsibility – Adaptability (Live Examples)
- Corporate Expectations

Suggested Software:

The following software from **'train2success.com'**

- Preparing for being Interviewed
- Positive Thinking
- Interviewing Skills
- Telephone Skills
- Time Management
- Team Building
- Decision making

Suggested Reading:

1. Alex, K. 2012. Soft Skills. S. Chand Publishers
2. Management Shapers. 2011. Collection of 28 Books by different Authors. Universities Press.
3. Sherfield, Robert M. 2005. et al Cornerstone: Developing Soft Skills. Pearson
4. Suresh Kumar, E; Sreehari, P. &Savithri, J. 2011. Communication Skills and Soft Skills- An Integrated Approach. New Delhi: Pearson
5. The ACE of Soft Skills by Gopalaswamy Ramesh &Mahadevan Ramesh. 2013. Pearson Publishers. New Delhi.
6. Patnaik, P. 2011. Group Discussion and Interview Skills. New Delhi: Foundation
7. Sudhir Andrews. 2009. How to Succeed at Interviews. New Delhi: Tata McGraw Hill
8. Sasikumar, V &Dhamija, P.V. 1993. Spoken English - A Self-Learning Guide to Conversation Practice. New Delhi: Tata McGraw-Hill
9. Dixson, Richard J. Everyday Dialogues in English. Prentice Hall India Pvt Ltd
10. Mukhopadhyay. L et al. 2012. Polyskills. New Delhi: CUP India Pvt Ltd
11. Rizvi, M. A. 2005. Effective Technical Communication. New Delhi: Tata McGraw Hill
12. The Hindu Speaks on Education by the Hindu Newspaper
13. Naterop, B. Jean and Revell, Rod. 2004. Telephoning in English. Cambridge: CUP.

With effect from 2013-14

Course Code: CS 541

NETWORK SECURITY AND CRYPTOGRAPHY LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	--
Sessionals	50 M
Credits	2

1. Write a Program to Implement Character Stuffing.

2. Write a Program to Implement Bit Stuffing.

3. Write a Program to Implement Encryption and Decryption Techniques.

4. Write a Program to Implement Data Encryption Standard (DES).

5. Write a Program to Implement Advanced Encryption Standard (AES).

6. Write a Program to Implement RSA Algorithm.

7. Write a program to perform Diffie-Hellman key exchange algorithm.

8. Write a Program to Implement Message Authentication Code

9.Write a Program to implement Digital Certificates.

With effect from 2013-14

Course Code: CS 542

SEMINARS

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	--
Sessionals	50 M
Credits	2

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 PowerPoint presentation slides
Technical Writing

Each Student is required to

1. Submit one page of synopsis of the seminar talk two days before for display on notice board
2. Give 20 minutes of PowerPoint presentation followed by 10 minutes of discussion.
3. 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 two faculty members on the basis of an oral and written presentation in addition to their involvement in the discussion.

SCHOLARLY WRITING

- Learn how to use the scientific method
- Discuss your topic with fellow students
- Find literature sources
- Develop scholarly writing skills
- Develop critical thinking skills
- Investigate professors that are potential guides
- Learn about engineering requirements
- Develop bibliographic organization and citation skills
- Prepare a report