BHARATI VIDYAPEETH UNIVERSITY,
Pune.

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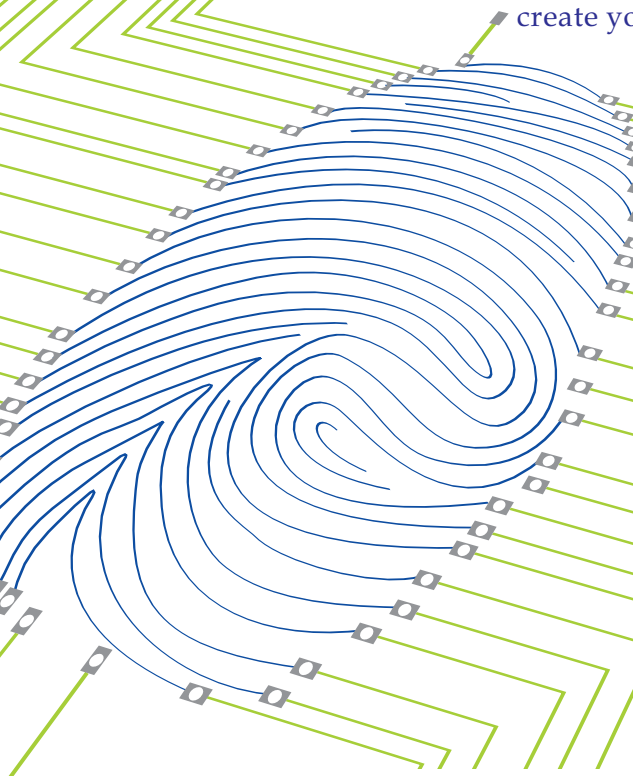

COURSE STRUCTURE & SYLLABUS

M. Tech. (Computer) (Semester - I to IV)

COURSE STRUCTURE & SYLLABUS

BHARATI VIDYAPEETH UNIVERSITY, PUNE

M. Tech. (COMPUTER) (Sem. I to IV)

HIGHLIGHTS

Bharati Vidyapeeth University College of Engineering (BVUCOE) is the largest Engineering College in Maharashtra with an intake of 700 students in each academic year. Imparting quality technical education from Under Graduate to Doctorate Level, BVUCOE is probably the only Engineering College in India with an accreditation from both NAAC as well as NBA. The faculty at BVUCOE boasts of highly qualified academicians, a quality that is further emphasized by the fact that 15 of them are presently pursuing their Ph.D. degree.

BVUCOE has been ranked 29th amongst the Top 50 Technical Schools of India in survey conducted by DATAQUEST-IDC. We have enjoyed a ranking in this list for the last 4 years. Research is of utmost importance in all our programs. A total of 113 research papers were published in the academic year 2007-2008.

Currently we have 12 ongoing research projects. The infrastructure of BVUCOE is state-of-the-art with 62 classrooms, 59 laboratories and a well-stocked library that currently holds 27,130 titles. The college has an international presence with MoUs signed with the North Carolina A&T State University (Greensboro, USA), University of Venice (Italy), Actel Corporation (USA).Corporate interaction is also inculcated in our programs through our association with Oracle India Ltd., Infosys Ltd. and Tata Consultancy Services.

SALIENT FEATURES

The field of engineering reflects the technological dynamism present in today's world. The department an under-graduate programme viz. B.Tech. (Comp) and a post-graduate programme viz. M.Tech. (Comp). The department has incorporated all the latest facilities for the benefit of the students. The department has 8 well-equipped laboratories, with three servers. The latest software and hardware equipments are provided to the students. The department has specialized laboratories in Digital Signal Processing, Multimedia Techniques, Linux and Software Engineering.

The Association of Computer & Information Technology Engineering Students (ACIES) organizes different events, guest lectures for the students. The syllabi of the department are revised regularly so as to match the needs of the industry. Apart from giving thorough technical knowledge using the state-of-art technology, the students are taught communication skills and are given experience in working in groups on live projects.

MAJOR GROUPS/ AREAS

Operating Systems, Multimedia, Image Processing, Computer Networks, Software Engineering, System Programming

EXPERTISE IN RESEARCH AND CONSULTANCY

The department of Computer Engineering has received fund from AICTE for Modernization of Research Laboratory "Object Oriented Modeling and Design".

ON GOING RESEARCH PROJECTS

Extended Log Structural File System For Linux Operating System, Platform Independent File Transfer, Block based Image Processing, Process Based Generic Modeling at Real Time Complex System with specific reference to Visual Modeling, DOUT – Distributed Opportunistic Unit Testing

COMPLETED PROJECTS

Visual Modeling of Real Time System, NeTailor- A Network Patch Management Solution, Voice Message Transform, Artillery Command Post Execution Software, MAFCOG 1.0 Mathematical Formula Analysis and Generator, Object Oriented Learning Environment Using ASP, Real Time Complex System, Implementation of Sniffers.

MAJOR EQUIPMENTS

Pentium -I 120/150 MHz - 25, Pentium - III 550 MHz - 10, Pentium -III 933 MHz - 68, Pentium - IV 2.46 GHz - 94, Pentium - IV 1.7 GHz - 10, Pentium - IV (IBM) 2.8 GHz - 100.

SOFTWARES

Operating Systems	:	MS-DOS, Windows 95, Windows 98, SCO Xenix 2.1, Linux 7.0, Microsoft OS/2 Sdk Ver 1.02, Sun Solaris 7.1
RDBMS	:	Oracle 8, Oracle 8i, Oracle 9i, SQL Ver 7.0 & 8.0
Developing Softwares	:	Visual Studio 6.0, Microsoft Office-2000, Turbo C + + For DOS 4.5, Microsoft C 6.0, Microsoft Fortran, Turbo Pascal, Microsoft COBOL, Turbo C, Visual Studio MS.Net, Developer 2000, MS Project 2003
Web Designing Softwares	:	Adobe Photoshop, PageMaker, Corel Draw
Customized Softwares	:	Payroll, Stores/Purchase, Library/Libsys, Student, Exam Section, Admission

LABORATORIES

Information Technology, Computer Graphics, Artificial Intelligence, Database Management System, Digital Signal Processing, Linux, Software Engineering, Microprocessor

STRUCTURE & EXAMINATION PATTERN

M. Tech. - Computer Engineering

Semester I

Total Duration : 20 Hrs/Week
Total Marks : 500

Subject Code	Subject	Teaching Scheme (Hrs.)		Examination Scheme (Marks)				Total (Marks)
		L	P	Theory	Unit Test	T. W.	Or.	
K30501	Advanced Software Engineering	04	02	70	30	25	25	150
K30502	Advanced Database Management Systems	04	02	70	30	25	25	150
K30503	Wireless Networks and Communication	04	–	70	30	–	–	100
K30504	Computer System Design	04	–	70	30	–	–	100
	Total	**16**	**04**	**280**	**120**	**50**	**50**	**500**

Teaching Scheme		Examination Scheme				Total
Lectures	Practical	Theory	Unit Test	T. W.	Or.	
16	04	280	120	50	50	500

Semester II

Total Duration : 20 Hrs/Week
Total Marks : 500

Subject Code	Subject	Teaching Scheme (Hrs.)		Examination Scheme (Marks)				Total (Marks)
		L	P	Theory	Unit Test	T. W.	Or.	
K30505	Computer Architectural Framework Architecture	04	02	70	30	25	25	150
K30506	Advanced Computer Algorithms	04	02	70	30	25	25	150
K30507	Web Technologies	04	–	70	30	-	–	100
K30508	Distributed Systems	04	–	70	30	-	–	100
	Total	16	04	280	120	50	50	500

Teaching Scheme		Examination Scheme				Total
Lectures	Practical	Theory	Unit Test	T. W.	Or.	
16	04	280	120	50	50	500

STRUCTURE & EXAMINATION PATTERN

M. Tech. - Computer Engineering

Semester III

Subject Code	Subject	Teaching Scheme (Hrs.)		Examination Scheme (Marks)				Total (Marks)
		L	P	Theory	Unit Test	TW & Pr	TW & Or	
K30601	Elective I	04	02	70	30	25	25	150
K30602	Elective I I	04	02	70	30	25	25	150
K30603	Seminar I	-	01	-	-	25	25	50
K30604	Dissertation Stage I	-	02	0	-	25	-	25
	Total	08	07	140	60	100	75	375
	Grand Total	**15**		**200**		**175**		**375**

Semester IV

Subject Code	Subject	Teaching Scheme (Hrs.)		Examination Scheme (Marks)				Total (Marks)
		L	P	Theory	Unit Test	TW & Pr	TW & Or	
K30605	Dissertation Stage II	-	04	-	-	150	75	225
	Total	-	04	-	-	150	75	225
	Grand Total	**04**		**-**		**225**		**225**

Elective – I
a. Machine Learning and Data Mining
b. Net-centric Computing
c. Natural Language Processing and Understanding
d. Information Systems Management
e. Computer Network Security

Elective II
a. VLSI System Design
b. Simulation and Modeling
c. Remote Sensing and GIS
d. Speech Recognition & Processing
e. User Interface Design

Dissertation
Stage I: Identification of Problem, Preparation of Synopsis, Literature survey and formulation of problem.
Stage – II : System Analysis, System Modeling, System Design and Testing, Submission of the Final Report.
Seminar: Seminar topic should not be the same as dissertation.

RULES FOR CONDUCTING TESTS

Mode of the test

- Three unit tests per subject shall be conducted in each semester. The schedule for the same will be declared in the academic calendar of each term.
- Each unit test shall carry 30 marks.
- University examination pattern has given weightage of 30 marks for unit tests and 70 marks for theory examination
- To calculate final marks of the unit test following procedure is followed:

  i) Out of the three unit tests conducted during the semester, the marks of only two unit tests in which the candidate has shown his/her best performance shall be considered, to decide the provisional marks in each subject

  ii) Average marks obtained in two unit tests in which students have performed well shall be considered as provisional marks obtained by the student.

  iii) If the candidate appears only for two unit tests conducted during the semester, he/she will not be given the benefit of the best performance in the tests.

  iv) If the candidate appears only for one unit test conducted during the semester, to calculate the marks obtained in the unit tests it will be considered that the candidate has got 0(zero) marks in other unit tests.

  v) There is separate passing in theory examination. A candidate has to secure minimum 28 marks(i.e.40%) out of 70 marks to declare him/her pass. Provisional marks obtained by the candidate in unit tests should reflect as proportional to the marks obtained in theory examination. In case of disparity of more than 15% it will be scaled down accordingly. These marks will be final marks obtained by the student. No scaling up is permitted.

  vi) Unit test marks will be added in theory examination marks only after passing of candidate in theory examination in respective subject.
- Paper pattern for the unit tests:
- All questions are compulsory with weightage as following:

  Question 1 - 10 marks
  Question 2 - 10 marks
  Question 3 - 10 marks
- For granting the term it is mandatory to appear for all the three unit tests conducted in each semester.
- Roll numbers allotted to the students shall be the examination numbers for the unit tests.

SEMESTER - I

K30501: ADVANCED SOFTWARE ENGINEERING

TEACHING SCHEME

Lectures : 04 Hrs/week
Practical : 02 Hrs/week

EXAMINATION SCHEME

Theory	: 70 Marks
Duration	: 03 Hours
Unit Test	: 30 Marks
Term Work	: 25 Marks
Oral	: 25 Marks

Unit-I (06 Hours)

Software Development Process :

Software Crisis and Myths, Software Process and development, Software life cycle and Models, Analysis and comparison of various models, Planning and Management of software engineering

Unit-II (08 Hours)

Requirement Engineering :

Requirements phase and its importance, Requirement Elicitation and Analysis, Process models (DFD), Data models (ERD), Software Requirement Specification Standard and Preparation, Characteristics of good SRS Documents, traceability matrix and its importance, CASE tool and its basic features.

Unit-III (08 Hours)

System Design Overview :

Design Concepts and activities, Architectural design, Data design, Structured Design Methodology, Transform and Transactional Analysis, Module coupling and cohesion, User Interface Design

UML :

Different methods: Rambaugh / Booch/ Jackmbsons, need for standardization. Diagramming in UML (Use CASE, Class, Interaction, State diagrams, architectural) CASE TOOLS.

Unit-IV (08 Hours)

Testing :

Software V&V and testing Concepts, Goals and importance of Testing, Static testing and its significance, Levels of Dynamic testing, Black- box and

White-box Testing, Test case design and implementation, Automated testing and limitations, debugging methods

Unit-V (08 Hours)

Web Engineering :

WebApp Engineering layers, Web Engineering processes, planning for web engineering projects, Project management issue for web engineering, Metrics, Requirement analysis, Analysis models for web engineering Design for webApps, Testing for webApps.

Unit-VI (08 Hours)

Software Quality and Metrics :

Importance of software quality and measurements, software Engineering techniques for quality assurance, software configuration management, ISO 9000 and CMM/PCMM SW metrics and quality assurance.

Text Books/ References

- Ian Sommerville, "Software Engineering: Update", 8th Edition
- Roger S. Pressman and Roger, "Software Engineering: A Practitioner's Approach"
- Shari Lawrence Pfleeger and Joanne M Atlee, "Software Engineering", 3rd Edition

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI

K30502: ADVANCED DATABASE MANAGEMENT SYSTEMS

TEACHING SCHEME
Lectures : 04 Hrs/week
Practical : 02 Hrs/week

EXAMINATION SCHEME

Theory	: 70 Marks
Duration	: 03 Hours
Unit Test	: 30 Marks
Term Work	: 25 Marks
Oral	: 25 Marks

Unit-I (08 Hours)

Parallel and Distributed Databases :

Architectures for parallel database, Parallel query Evaluation, Parallelizing individual operation, Parallel Query Optimization, Distributed DBMS Architecture, Storing data in distributed DBMS, Distributed Catalog Management, Distributed query processing, Updating distributed data, Distributed concurrence control, Distributed recovery.

Unit-II (06 Hours)

Web databases :

Web search engines, web search architecture, Inverted indexes the IR way, Inverted indexes for web search engines, web crawling, web search statistics.

Unit-III (08 Hours)

Data Warehousing:

Introduction Data Warehousing OLAP, Implementation Techniques for OLAP, Views and decision support.

Data Mining:

Introduction, Counting Co-occurrences, Mining for rules, Tree structured rules, Clustering, Similarity search over sequences, Additional data mining tasks.

Unit-IV (08 Hours)

Object Database Systems:

User defined abstract data types, Structured types, Objects, Objects Identity and Reference types, Inheritance, database design for an ORDBMS,

Comparing RDBMS with OODBMS and ORDBMS.

XML:

Introduction, Structure of XML Data, XML Document Schema, Querying and Transformation, API to XML, Storage of XML Data, XML Applications.

Unit-V (06 Hours)

Spatial Data Management :

Types of Spatial Data and Queries Application involving Spatial data, Introduction to spatial Indexes, Indexing based on space filling Curves, Grid files, R trees, High command Indexing.

Unit-VI

Deductive Databases:

Recursive Queries, Theoretical foundation, Recursive Queries with Negation, Efficient evaluation of Recursive Queries, Additional Transaction Processing, Advance transaction processing Integrated access to Multiply data sources, Mobile database, multiplying database, Geographic Information systems, Temporal and Sequence database, Information Visualization.

Advanced Transaction Processing:

Transaction-Processing Monitors, Transactional Workflows, Main-Memory Databases, Real-Time Transaction Systems, Long-Duration Transactions, Transaction Management in Multi-databases.

Text Book/ References:

- Rob & Colonel, "Database System Design Implementation & Management", Thomson Learning
- Date, "An Introduction to database system", Addison Wesley Pub.
- "Principles of Repagination database", Desai Galgotia Publications
- Mallach, "Decision Support and Data Warehouse Systems", TMH
- Raghu Ram Krishnan, "Database Management Systems", IInd edition
- Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", 5th Edition , McGraw Hill International Edition.
- Jiawei Han, Micheline Kamber, "Data Mining: Concepts and Systems", Morgan Kaufmann publishers

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI

K30503: WIRELESS NETWORKS AND COMMUNICATION

TEACHING SCHEME
Lectures : 04 Hrs/week

EXAMINATION SCHEME
Theory : 70 Marks
Duration : 03 Hours
Unit Test : 30 Marks

Unit -I (08 Hours)

Introduction :

A Short history of wireless communication. A market for mobile communication. Some research topics. A simplified reference model. Wireless Transmission.

Frequencies for Radio Transmission:

Signal antennas, signal propagation. Multiplicity, modulation, spread spectrum, cellular systems.

Unit –II (08 Hours)

Medium Access Control :

Motivation for a specialized MAC. SDMA, FDMA, TDMA, CDMA, Comparison of S/T/F/CDMA.

Telecommunication Systems :

GSM, DECT, TETRA, UMTS.

Unit-III (06 Hours)

Satellite Systems :

Basics, Routing, Localization, Handover.

Broadcast Systems :

Cyclic repetition of data, digital audio broadcasting, digital video broadcasting.

Unit-IV (10 Hours)

Wireless LAN:

Infrared vs. radio transmission, adhoc networks, IEEE802.11, Bluetooth.

Wireless ATM :

Motivation for WATM, WATM services reference model, functions, radio access layer, handover, location management, addressing, mobile quality of service, access point control protocol.

Unit-V (08 Hours)

Mobile Network Layer :

Mobile IP, Dynamic host configuration protocol, Adhoc Networks.

Mobile Transport Layer :

Traditional TCP, Indirect TCP, Mobile TCP.

Unit-VI (08 Hours)

Support Layer for Mobility:

File system, WWW, WAP.

Performance Issues :

QOS issues, Security issues, Non line of sight issues, Power control issue, Mobility, Flexibility, Cost savings, Expandability, Applications:- In education and other application.

Text Books/ References

- Jochen Schiller, "Mobile Communication", Pearson Education Asia
- Mallick, "Mobile and Wireless Design Essentials", Wiley computer pub.
- Andy Dornan, "The Essential Guide of Wireless Communications Applications", Pearson Education Asia
- Weisman, "The Essential guide to RF and wireless", Pearson Education Asia
- Lee, "Mobile Cellular Telecommunications", MGH

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI

K30504: COMPUTER SYSTEM DESIGN

TEACHING SCHEME
Lectures : 04 Hrs/week

EXAMINATION SCHEME
Theory : 70 Marks
Duration : 03 Hours
Unit Test : 30 Marks

Unit -I (08 Hours)

Overview of Parallel Processing and Pipelining Processing :

Necessity of high performance, Constraints of conventional architecture, Parallelism in uniprocessor system, Evolution of parallel processors, future trends, Architectural Classification, Applications of parallel processing, Instruction level Parallelism and Thread Level Parallelism, Explicitly Parallel Instruction Computing (EPIC) Architecture, Case study of Intel Itanium Processor,

Principles of scalable performance:

Performance Metrics and Measures, Speedup Performance Laws.

Unit –II (08 Hours)

Pipeline Architecture :

Principles and implementation of Pipelining, Classification of pipelining processors, General pipelining reservation table, Design aspect of Arithmetic and Instruction pipelining, Pipelining hazards and resolving techniques, Data buffering techniques, Job sequencing and Collision, Advanced pipelining techniques, loop unrolling techniques, out of order execution, software scheduling, trace scheduling, Predicated execution, Speculative loading, Register Stack Engine, Software pipelining, VLIW (Very Long Instruction Word) processor, Case study: Superscalar Architecture- Pentium, Ultra SPARC.

Unit-III (06 Hours)

Vector and Array Processor :

Basic vector architecture, Issues in Vector Processing, Vector performance modeling, vectorizers and optimizers, Case study: Cray Arch. SIMD Computer Organization Masking and Data network mechanism, Inter PE

Communication, Interconnection networks of SIMD, Static Vs Dynamic network, cube hyper cube and Mesh Interconnection network. Parallel Algorithms for Array Processors: Matrix Multiplication. Sorting, FFT.

Unit-IV (08 Hours)

Multiprocessor Architecture :

Loosely and Tightly coupled multiprocessors, Processor characteristics of multiprocessors, Inter Processor communication network, Time shared bus, Crossbar switch, Multiport Memory Model, Memory contention and arbitration techniques, Cache coherency and bus snooping, Massively Parallel Processors (MPP), COW's and NOW's Cluster and Network of Work Stations), Chip Multiprocessing (CMP), Case Study of IBM Power4 Processor, Inter Processor Communication and Synchronization

Unit-V (06 Hours)

Multithreaded Architecture :

Multithreaded processors, Latency hiding techniques, Principles of multithreading, Issues and solutions, Parallel Programming Techniques: Message passing program development, Synchronous and asynchronous message passing, Message passing parallel programming, Shared Memory Programming, Data Parallel Programming.

Unit-VI (10 Hours)

Parallel Software Issues :

Parallel algorithms for multiprocessors, classification of parallel algorithms, performance of parallel algorithms, Operating systems for multiprocessors systems, Message passing libraries for parallel programming interface, PVM (in distributed memory system), Message Passing Interfaces (MPI), PThreds (in shared memory system), Parallel Programming Languages : Fortan 90, Occam, C-Linda, CCC etc., Issues towards cluster computing. Introduction to Neuro Computing and Grid Computing

Text Books/References

- Kai Hwang, Faye A. Briggs, "Computer Architecture and Parallel Processing", McGraw Hill International Edition

- Kai Hwang, "Advanced Computer Architecture", Tata McGraw Hill Edition
- V. Rajaraman, L. Sivaram Murthy, "Parallel Computers", PHI
- William Stallings, "Computer Organization and Architecture, Designing for Performance", Prentice Hall, Sixth edition
- Kai Hwang, "Scalable Parallel Computing"
- Harrold Stone, "High performance computer Architecture"
- Richard Y. Kain, "Advanced Computer Architecture"

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI

SEMESTER - II

K30505: COMPUTER ARCHITECTURAL FRAMEWORK

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 04Hrs/week	Theory	: 70 Marks
Practical	: 02Hrs/week	Duration	: 03 Hours
		Unit Test	: 30 Marks
		Term Work	: 25 Marks
		Oral	: 25 Marks

Unit -I (08 Hours)

Introduction to object oriented systems:

Preview of object orientation, concept of Distributed Object system- reason to distributed or centralize object, mapping object to locations, Object oriented system architecture-Client server system architecture, design of an Object Oriented system Architecture and component technology compound documents.

Introduction to Distributed objects:

Computing standards: OMG, Microsoft, SUN, HP, Overview of CORBA, overview of COM/DCOM and of an open doc, overview of object web, and overview of Java/enterprise java bins.

Unit –II (08 Hours)

Component Object Model (COM) introduction:

COM as better C++, S/W distribution, Dynamic linking, separating interface from implementation, Run time polymorphism, Introduction to DCOM.

Interfaces in COM/DCOM:

Introduction to interfaces, Interface definition language (IDL), interfaces and IDL, Using COM interface pointers, Optimizing query interface, Code sharing and reuse.

Unit-III (08 Hours)

Classes and objects in COM/DCOM:

Introduction, Classes and servers, Optimization, Classes and IDL, Class emulation, Query interface types and properties, object services and dynamic composition, Apartments : Cross apartments access, Life cycle management.

Distributed COM: Fundamental programming architecture of DCOM:

Parallel processing, Advantages of distributed computing. Threading models and apartments: Apartments, Apartments interaction, Implementing multithreaded local components, facilities: Connection points and type information, Connectable objects. Remoting: DLL surrogates and executable components.

Unit-IV (08 Hours)

CORBA:

Introduction and concepts, Distributed objects in CORBA, CORBA components, Architectural features, Method Invocations: static and Dynamic. (IDL (Interface Definition Language) models and Interfaces: Structure of CORBA IDL, CORBAs self describing data, CORBA interface repository.

CORBA services:

Services of object naming, object life cycle, event, Transaction service features, concurrency control services, persistent object service and CORBA security service.

Unit-V (08 Hours)

JAVA:

Introduction , Three stages of JAVA , Distributed JAVA: RMI(Remote Method Invocation) JAVA Beans, Implementing JAVA Beans, Creating Bean Object, Serializing a Bean. Introduction to JDBC, registering the drivers, opening the connection, obtaining data from database.

Unit-VI (08 Hours)

Object Web:

Web Technologies: HTML XMA etc. Integration of Web & Distributed objects.

Text Books/ References

- Guy Eden and Henry Eden, "DCOM", Microsoft Press
- John Siegle, "CORBA - Fundamentals and Programming", John Wiley and Sum's 96
- Jackobson, Rumbaugh, "Essential COM", Addison Wesley

- Mowbray and Zahavi, "Essential CORBA", Addison Wesley
- Orfali, the essential distributed object survival guide

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI

K30506: ADVANCED COMPUTER ALGORITHMS

TEACHING SCHEME

Lectures : 04Hrs/week
Practical : 02Hrs/week

EXAMINATION SCHEME

Theory	: 70 Marks
Duration	: 03 Hours
Unit Test	: 30 Marks
Term Work	: 25 Marks
Oral	: 25 Marks

Unit -I (08 Hours)

Introduction :

Asymptotic notation, Models of Computation, Algorithm & their complexity, Random Analysis machines, Computational complexity of RAM programs, A stored program model, Abstractions of the RAM, A primitive model of computation(Turing Machines),Relational between Turing machine & RAM model ,Pidgin ALGOL –A high level lang.

Unit –II (08 Hours)

Algorithm Analysis :

Analyzing Algorithm, Designing Algorithm, Time & Space Complexity, Average & Worst case analysis, Lower Bounds.

Algorithm Design techniques :

Divide & Conquer, Search Traversals, Dynamic Programming, Backtracking, Branch & Bound, Greedy Algorithm.

Unit-III (08 Hours)

Sorting and Searching Algorithm :

The Sorting problem, Radix Sorting, Sorting by comparison, Heap sort-an O(n log n) comparison sort, Quick Sort-an O(n log n) expected time sort, Expected time for Order statistics, Binary Search, binary search trees, optimal binary search tree, B-Trees Algorithms on graph: Elementary graph Algorithm, Minimum spanning tree, Single Source shortest Path, All pairs shortest path

Unit-IV (06 Hours)

String Processing Algorithm:

The naïve string matching, The Robin-Karp algorithm, String matching

with Finite Automata, the Knuth Morris Pratt Algorithm

Divide and conquer method:

Binary search, Mergesort, Quick sort, Strasen's matrix multiplication.

The Greedy method:

Knapsack problem, job sequencing, optical merge patterns, minimal spanning trees.

Unit-V (08 Hours)

Dynamic Programming:

Multistage graphs, OBST, 0/1 Knapsack, traveling sales man problem.

Back Tracking:

Eight Queens problem, graph coloring, Hamiltonian cycles, Knapsack problem, Maze problem.

Branch & Bound:

0/1 Knapsack, Traveling salesman problem lower bound theory-comparisons trees for sorting/searching, lower bound on parallel computation.

Unit-VI (08 Hours)

NP-hard and Np-complete problems- Algorithms, Complexity-intractability, Non-Deterministic Polynomial time (NP) Decision problems, cooks Theorem, NP-Complete problems- statisfiability problem, vertex cover problem. NP-Hard problems-graph, scheduling, code generation problems, Simplified NP Hard Problems, Approximation Algorithm for NP Hard Problem.

Text Books/ References

- Bressard, "Fundamental of Algorithm"
- Horowitz, Sahani, "Fundamentals of Computer Algorithms", Galgotia
- Thomas H. Cormen and Charles E. L. Leiserson, "Introduction to Algorithm", PHI
- A. V. Aho and J. D. Ullman, "Design and Analysis of Algorithms", Addison Wesley
- E. V. Krishna Murthy, "Introduction to Theory of Computer"

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI

K30507: WEB TECHNOLOGIES

TEACHING SCHEME
Lectures : 04Hrs/week

EXAMINATION SCHEME
Theory : 70 Marks
Duration : 03 Hours
Unit Test : 30 Marks

Unit -I (08 Hours)

Web Environment:

WWW, HTTP, Web Server and its deployment, N-Tier Arch., Services of Web Server – Mail server, News server, Proxy server, Multimedia server, etc.

XML Primer :

Introduction, Benefits, components of XML, XML schemas, DTD, Parsing XML, Parsing methodologies, X Link, X pointer, X Include, XBase, XML Technologies & applications viz. E-Commerce, etc.

Unit –II (08 Hours)

XLS :

Overview, applications and programming with XLS.

JSP :

JSP overview, JSP language basics, JSP translation and compilation directives, Standard java objects from JSP, JSP configuration and deployment, actions and tags of JSP; Java servlets – Arch, servlet interface, applications of servlets.

Unit-III (08 Hours)

ASP :

Objects and Components, Handling databases, applications of ASP, session management, ASP with .NET

Unit-IV (08 Hours)

Web Technologies :

Server side programs. CGI programs. Client side scripts. The applet concept.

Unit-V (08 Hours)

The Web as an example of client server computing :

Characteristics of web servers: handling permissions. File Management Capabilities of common server architectures .Role of client Computer. Nature of Client server relationship. Web protocols Support tools for web site creation and management. Developing Internet Information servers. Publishing information and application.

Unit-VI (08 Hours)

Building Web applications :

Protocols at the application layer . Principles of Web engineering. Database driven websites. RPC. Lightweight distributed objects. The role of the middleware. Support tools. Security issues in Distributed object systems. Enterprise- wide web base.

Text Books/ References

- Phil Hanna, "Instant Java Servlets", TMGH
- Bill Brogden, Chris Minnick, "Java Developer's Guide to E-Commerce with XML and ASP", BPB
- Stephen Walther and others, "Active Server Pages Unleashed ", SAMS Techmedia
- Rick Leinecker, " COM+ & XML: ASP.Net on the Edge", IDG
- Forouzen, "TCP/IP Protocol Suite", TMH
- Hrbert Schildt, "Complete Reference JAVA 2", TMH
- Wynkoop, "Running a perfect website", PHI
- Strebe, Perkins, "Internet Information Server 4 Study guide", BPB pub.
- Godbole, "Web Technologies"

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI

K30508: DISTRIBUTED SYSTEMS

TEACHING SCHEME
Lectures : 04Hrs/week

EXAMINATION SCHEME
Theory : 70 Marks
Duration : 03 Hours
Unit Test : 30 Marks

Unit -I (10 Hours)

Characterization of Distributed Systems:

Introduction, Examples of Distributed Systems, Resource sharing and the web, Challenges. System Models Introduction, Architectural Models, Fundamental Models.

Interprocess Communication:

Introduction. API for the Internet Protocols. External Data Representation and marshaling. Client Server communication. Group Communication.

Unit –II (08 Hours)

Distributed Objects and Remote Invocation :

Introduction, Communication between distributed objects. Remote Procedure Calls. Events and Notification. Java RMI Case studies.

Operating System Support :

Introduction. The operating System Layer. Protection. Process and threads. Communication and Invocation. Operating System Architecture.

Unit-III (06 Hours)

Security:

Introduction Overview of Security techniques. Cryptographic algorithms. Digital Signatures. Cryptography pragmatics. Case studies.

Distributed File System File System Architecture. NFS. AFS.

Unit-IV (06 Hours)

Name Services :

Name services and domain name services. Directory and discovery services. Case studies.

Time and Global States:

Clocks, events, process states, synchronization physical clocks. Logical

Time and Logical Clocks. Global states

Unit-V (10 Hours)

Coordination and Agreements:

Distributed mutual Exclusion. Elections. Multicast communication. Consensus and Related Problems.

Transaction and Concurrency Control:

Transactions, Nested Transactions. Locks. Optimistic concurrency control. Timestamp ordering. Distributed Transaction Flat and Nested Distributed Transaction. Atomic commit protocols. Concurrency control in distributed transaction Distributed Deadlocks. Transaction Recovery

Unit-VI (08 Hours)

Replication:

System Model and group communication. Fault Tolerant services. Highly available services. Transaction and replicated data.

Distributed Shared Memory COBRA Case studies.

Text Books/ References

- Andrew S., Tanenbaum, "Distributed Systems: Principles and Paradigms"
- Jean Dollimore, Tim Kindberg, and George Coulouris, "Distributed Systems: Concepts and Design", 4th Edition
- M. Tamer Ozsu and Patrick Valduriez, "Principles of Distributed Database Systems", 2nd Edition

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI

SEMESTER - III

K30601 ELECTIVE I:
MACHINE LEARNING AND DATA MINING

TEACHING SCHEME

Lectures : 04 Hrs/week
Practical : 02 Hrs/week

EXAMINATION SCHEME

Theory	: 70 Marks
Duration	: 03 Hours
Unit Test	: 30 Marks
Termwork	: 25 Marks
Oral	: 25 Marks

Unit-I (08 Hours)

Overview of machine learning methods, Classification, Regression, Logical relations, Equations, Clustering, reinforcement learning. History of machine learning: Symbolic rule learning, Neural networks, reinforcement learning, Genetic algorithms, statistical methods, Formal learning theory. Applications of machine learning: Diagnosing the production process, Medical diagnosis, Risk evaluation of insurance and loan applicants, Image classification, Game playing, Predicting the structure of chemical compounds.

Unit-II (08 Hours)

Data mining tools and standards, Learning and Intelligence, What is learning, Natural learning, Learning, intelligence, consciousness, Machine Learning Basics, Measures for performance evaluation, Estimating performance: Reliability of quality estimations, Confidence interval, Cross validation.

Unit-III (08 Hours)

Comparing performance of ML algorithms: Two algorithms on a single domain, Two algorithms on several domains, and several algorithms on several domains.

Unit-IV (08 Hours)

Learning as Search: Exhaustive search – BFS, DFS, Interactive deepening, Bounded exhaustive search (branch and bound) – Bounded BFS, Bounded DFS. Best-first search, Greedy Search, Beam Search, Gradient search.

Unit-V (08 Hours)

Attribute Quality Measures, Measures for classification, Measures for

regression, Data Preprocessing, Representation of complex structures, Discretization of continuous attributes, Attribute binarization, Transforming discrete attributes into continuous. Dimensionality reduction.

Unit-VI (08 Hours)

Constructive Induction, Constructive induction without pre-defined operators, induction with pre-defined operators, Symbolic learning: Learning of decision trees, Learning of decision rules, Learning of association rules, statistical learning, Artificial neural network, Cluster analysis, Learning theory.

Text Books/ References

- Igor Kononenko, "Machine Learning and Data Mining: Introduction to Principles and Alogorithms", Horwood Pub.
- Michael Berry, John Wiley, "Mastering Data Mining"
- "Introduction to Data Mining using SAS enterprise", Miner
- "Data Mining Introductory and Advanced Topics", PHI

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI

K30601 ELECTIVE I: NET-CENTRIC COMPUTING

TEACHING SCHEME

Lectures : 04 Hrs/week
Practical : 02 Hrs/week

EXAMINATION SCHEME

Theory	: 70 Marks
Duration	: 03 Hours
Unit Test	: 30 Marks
Termwork	: 25 Marks
Oral	: 25 Marks

Unit-I (08 Hours)

Network Technology:

Introduction Client server architecture, The OSI Model, Protocols and capabilities, Data link protocols. Networking topologies, Types of Networks, NetBIOS, IPX, TCP/IP, CSMA/CD, Token passing, Frame relay, Networking devices, Repeaters, Bridges, Routers, Switches, Gateways, Network design issues, Data in support of network design, Network design tools, Protocols and Architecture.

Unit-II (08 Hours)

Network performance Modeling and Estimation:

Issues related with optimizing network performance. Probability, Stochastic processes, Modeling and Performance evaluation, Queuing theory. Queuing models. Estimating model Parameters, Throughput, utilization. Modeling Network as a Graph External and Internal representation, Complexity issues. Network traffic controls, Network Administrator Function and responsibilities.

Unit-III (08 Hours)

Network Design:

Problem definition. Multipoint line layout heuristics, CMST algorithm, ESAU-William's algorithm, Sharma's algorithm, Unified algorithm. Bin-packing algorithm, Terminal assignments and Concentrator location.

Unit-IV (08 Hours)

High Speed Network:

Need, Characteristics, Challenges, Applications. Frame Relay, ATM, ISDN,

High speed LANs: Ethernet, Fibre Channel, DQDB, SMDS, B_ISDN, STM, DSL, DWDM, Optical Networking; Introduction, Signal propagation, Components and Applications, First generation optical networks: SONET/SDH, ESCON. Architectures, Transport, Switching and Routing in optical domain, Optical network management, Internetworking, VolP System architecture, Protocol hierarchy, Structure of a voice endpoint. Protocols for the transport of voice media over IP networks, Providing IP quality of service for voice, Signaling protocols for VolP, PSIN gateways, VolP applications.

Unit-V (08 Hours)

Network Security:

Basic cryptographic techniques, Security in die OSI architecture, Internet, and networked computing; Kerberos firewalls; Proxy etc. Security applications in e-commerce and banking, Compression: Overview of Information Theory Lossless Compression, Run-Length Encoding, Facsimile compression, String-matching Algorithms; Lossy Compression: DCT, Wavelet compression.

Unit-VI (08 Hours)

Storage Network:

Introduction, Challenges, SCSI Protocols and Architecture: RAID, Backup and mirroring, Fiber channel attached storage. Network attached storage including NFS, DFS and DAFS, Management of network storage architectures, New storage protocols, Architectures and Enabling technologies.

Text Books/References:

- Stallings W., "High-Speed Networks and Internets: Performance and Quality of Service", Prentice-Hall, 2002
- Kirshenbaum A, "Telecommunication Network Design Algorithms", Tata McGraw Hill
- Ramaswami R., Shivrajan, "Optical Networks", Morgan Kaufmann
- Douskalis B., "IP Telephony: The Integration of Robust VolP Services", Pearson Ed. Asia

- Douglas R. Comer, "Computer Network and Internet", Pearson Education Asia
- Stallings W., "High-Speed Networks: TCP/IP and ATM Design Principles", Prentice Hall, 1998
- Andrew Tananbaum, "Computer Network", PHI

Syllabus for Unit Test

Unit Test 1	Unit I & II
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K30601 ELECTIVE I: NATURAL LANGUAGE PROCESSING AND UNDERSTANDING

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 04 Hrs/week	Theory	: 70 Marks
Practical	: 02 Hrs/week	Duration	: 03 Hours
		Unit Test	: 30 Marks
		Termwork	: 25 Marks
		Oral	: 25 Marks

Unit -I (08 Hours)

Introduction and Overview:

Introduction, Overview and Linguistics, Grammars and Languages, Basic Parsing Techniques, Semantic analysis and representation structures, Natural Language Generation, Natural Language systems, What is Natural Language Processing, Ambiguity and uncertainty in language.

Unit –II (08 Hours)

String Edit Distance and Alignment:

Key algorithmic tool: Dynamic programming, first a simple example, then its use in optimal alignment of sequences. String edit operations, edit distance, and examples of use in spelling correction, and machine translation.

Context Free Grammars:

Constituency, CFG definition, use and Limitations. Chomsky Normal Form. Top-down parsing; Bottom-up parsing, and the problems with each.

Non-probabilistic Parsing:

Efficient CFG parsing with CYK, another dynamic programming algorithm. Designing a little grammar and parsing with it on some test data.

Unit-III (08 Hours)

Information Theory:

What is information? Measuring it in bits. The "noisy channel model." The "Shannon game"--motivated by language! Entropy, cross-entropy, information gain. Its application to some Language Phenomena.

Language modeling and Naive Bayes:

Probabilistic language modeling and its applications. Markov models.

N–grams. Estimating the probability of a word, and smoothing. Generative models of language and their application

Unit-IV (08 Hours)

Part of Speech Tagging and Hidden Markov Models:

The concept of parts-of-speech, examples, usage. The Penn Treebank and Brown Corpus. Probabilistic (weighted) Finite State Automata. Hidden Markov models (HMMs), Definition and Use.

Viterbi Algorithm for Finding Most Likely HMM Path:

Dynamic programming with Hidden Markov Models, and its use for part-of-speech tagging, Chinese word segmentation, Prosody, Information Extraction, Weighted context free grammars. Weighted CYK. Pruning and Beam Search.

Unit-V (06 Hours)

Maximum Entropy Classifiers:

The maximum entropy principle, and its relation to maximum likelihood. The need in NLP to integrate many pieces of weak evidence. Maximum Entropy classifiers and their application to document classification, Sentence Segmentation, and other language tasks.

Maximum Entropy Markov Models & Conditional Random Fields:

Part-of-speech Tagging, noun-phrase segmentation and information Extraction models that combine maximum entropy and finite-state Machines. State-of-the-art models for NLP.

Unit-VI (08 Hours)

Machine Translation:

Probabilistic models for translating any Language into English. Alignment, translation, language generation.

Text Books/References

- Jurafsky D. and Martin J. H., "Speech and Language Processing", Prentice Hall
- Allen, J., "Natural Language Understanding", The Benajmins Cummings Publishing Company

- Dan W. Petterson, "Artificial Intelligence and Expert Systems"

Syllabus for Unit Test

Unit Test 1	Unit I & II
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K30601 ELECTIVE I:
INFORMATION SYSTEMS MANAGEMENT

TEACHING SCHEME

Lectures : 04 Hrs/week
Practical : 02 Hrs/week

EXAMINATION SCHEME

Theory	: 70 Marks
Duration	: 03 Hours
Unit Test	: 30 Marks
Termwork	: 25 Marks
Oral	: 25 Marks

Unit -I (08 Hours)

Management Information Systems:

Introduction, Classification, Current theories and practices of information processing and decision making. Focus on information technology and its uses in improving work practices, products, and tools for decision support. Use of artificial intelligence and other developments in technology. Competitive pressures and risks of information technology (IT). Setting IT strategy, information system planning and development of enterprise architecture. Focus on systems development and implementation.

Unit –II (08 Hours)

Business Software Development:

A survey of business-oriented programming languages with emphasis on design, writing, debugging and testing of computer programs for business transaction processing and managerial decision-support. Topics include structured programming and file processing.

Advanced Business Software Development:

A study of business-oriented programming languages with emphasis on state-of-the-art development techniques for business software. Topics include object-oriented and Internet programming issues and methods.

Unit-III (08 Hours)

Data Management for Decision Makers:

The data needs of functions such as marketing, finance, production etc. design, develop and use of database, data warehousing and data mining systems for effective decision support.

Electronic Commerce:

Overview of how modern communication technologies (Internet and World Wide Web) revolutionized the business. Internet technologies and business.

Unit-IV (08 Hours)

Telecommunications Management:

Issues involved in the management of telecommunications functions. Overview of communications technology used in various business applications, local area network, wide area network, broad band network, wireless and voice networks. Internet technologies and protocols. Analyzing the strategic impact of these technologies on organizations. Strategic planning for telecommunications, including network planning and analysis.

Unit-V (08 Hours)

Information Resource Management:

Information Resource Management (IRM). IS outsourcing, total cost of ownership, IS planning and strategic analysis, justification for IT investment, management of IT human resources, traditional project management theory, and project management techniques derived from the Theory of Constraints (TOC).

Unit-VI (10 Hours)

Business Processes and Systems Development:

Data and process modeling, relational data base theory, database management, systems design, and developing technical specifications for a business system. A working prototype for a business application will be developed using popular software development packages.

Text Books/References

- James A. O'Brien, George Marakas, "Management Information Systems", McGraw Hill Publications
- Stephen Haag, Maeve Cummings, "Information Systems Essentials", McGraw Hill Publications

Syllabus for Unit Test

Unit Test 1	Unit I & II
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K30601 ELECTIVE I: COMPUTER NETWORK SECURITY

TEACHING SCHEME
Lectures : 04 Hrs/week
Practical : 02 Hrs/week

EXAMINATION SCHEME

Theory	: 70 Marks
Duration	: 03 Hours
Unit Test	: 30 Marks
Termwork	: 25 Marks
Oral	: 25 Marks

Unit -I (08 Hours)

Introduction:

Management of malicious intent, threat scenarios, critical infrastructures, security targets and policies, security mechanisms, examples of applications and their-different security requirements: multi-lateral security, privacy and data protection, computer misuse legislation.- Operating system and network security. Cyber laws.

Unit –II (08 Hours)

Security Models:

Military and civil Security, vulnerability and threat models, End-to-end security (COMSEC), link encryption (TRANSEC). Compartments, Privacy, Authentication, Denial of service, Non-repudiation, Overview of private-key and public-key cryptographic algorithms: DES, RSA, Encapsulation, Encryption principles, Issues in multi-level secure systems, Internet security models: IPv4/IPv6 encapsulation header.

Unit-III (08 Hours)

Security Policies and Design Guidelines:

Policies, Policy creation, Regularity considerations, Privacy regulators, Security, Infrastructure and components, Design Guidelines, Authentication Authorization and accounting, Physical and logical access control-User authentication, Biometrics devices.

Unit-IV (08 Hours)

Network Layer Security:

Algorithm vulnerabilities, route and sequence number spoofing, instability and resonance effects, Information hiding DMZ networks, route

aggregation and segregation, ICMP redirect hazard, denial of service. ARP hazard: phantom sources. ARP explosions and slow links, defending against Chernobyl packets and meltdown. Fragmentation vulnerabilities and remedies: (ICMP Echo overrun).

Unit-V (08 Hours)

Transport and Application Layer Security:

Techniques for fault detection, isolation and repair. Secure network infrastructure services: DNS, NTP, SNMP. Privacy enhanced mail (PEM). Secure binding of multimedia streams, Secure RTP, Secure RSVP, Mobile systems: Address Export and re-use. Session key management: Blind-key cryptosystems (NTP).

Firewalls :

Network partitioning. Firewall platforms. Partitioning models and methods. Secure SNMP. Secure routing interoperability: virtual networks (DART net /CAIRN).Transparent and opaque network services. Source masking and hidden channels.

Unit-VI (08 Hours)

Key and Certificate Management:

Secure, binding of public and private values: DNS certificates, Making and distributing key media: randomization, lifetime issues. Key agreement protocols: STS protocol and IETF work orders. Key Escrow: the Clipper chip, One-time passwords: schemes based on S/KEY, PKI components and Applications. Exploiting diversity and redundancy: Byzantine generals. Time-stamping and reliable ordering of events: NTP. Consensus and agreement protocols.

Security in Wireless Networks:

How it is different, Methods and procedures, MIN/ESN, Shared secret data authentication, Token based, public key based.

Text Books/ References

- Stallings W., "Cryptography and Network Security: Theory and Practice", John Wiley

- Schneier B., "Applied Cryptography - Protocols, Algorithms, and Source Code in C", John Wilev and Sons
- Stinson D., "Cryptography - Theory and Practice", CRC Press, Boca Raton
- Stein L., "Web Security: A Step-by-Step Reference Guide", Addison Wesley Longman Inc.
- Gollmann D., "Computer Security", Wiley
- Anderson R., "Security Engineering: A Guide to Building Dependable Distributed Systems", Wiley
- Cheswick W., Bellovin S., "Firewall and Internet Security: Repelling the Will Hacker", Addison-Wesley
- Atul Kahate, " Cryptography and Network Security", TMGH

Syllabus for Unit Test

Unit Test 1	Unit I & II
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K30602 ELECTIVE II : VLSI SYSTEM DESIGN

TEACHING SCHEME
Lectures : 04 Hrs/week
Practical : 02 Hrs/week

EXAMINATION SCHEME

Theory	: 70 Marks
Duration	: 03 Hours
Unit Test	: 30 Marks
Termwork	: 25 Marks
Oral	: 25 Marks

Unit -I (08 Hours)

Basics of VLSI, Introduction to CMOS Circuits: MOS Transistors, CMOS combinational logic gates, multiplexers, latches and flip-flops. CMOS fabrication and layout. VLSI design flow. MOS transistor theory: DC transfer characteristics. Switch level RC delay models. CMOS technologies. Layout design rules. CMOS process enhancement. Technology related issues. Circuit characterization and performance estimation: Delay estimation. Logical effort and transistor sizing. Power dissipation. Interconnect design margin. Reliability. Scaling. Circuit simulation : Device models, Device and circuit characterization. Interconnect simulation.

Unit –II (08 Hours)

Analog VLSI, Advanced MOS modeling, BJT modeling , CS, CD and CG amplifiers. Current mirrors – active loads. High input impedance current mirrors. BJT gain stages. CMOS operational amplifiers- compensation. Comparators. Sample and hold circuits MOS, CMOS and Bi CMOS S/H circuits. Switched capacitor filters, operation, analysis and applications. Nyquist rate. D/A converters. A/D converters. Over sampling techniques, filter design.

Unit-III (08 Hours)

Modeling and Synthesis with the Verilog HDL, Hardware modeling with the verilog HDL. Encapsulation, modeling primitives, different types of description. Logic system, data types and operators for modeling in verilog HDL. Verilog Models of propagation delay and net delay path delays and simulation, inertial delay effects and pulse rejection. Behavioral descriptions in verilog HDL. Synthesis of combinational logic. HDL-based synthesis- technology-independent design, styles for synthesis of

combinational and sequential logic, synthesis of finite state machines, synthesis of gated clocks, design partitions and hierarchical structures. Synthesis of language constructs, nets, register variables, expressions and operators, assignments and compiler directives. Switch-level models in verilog. Design examples in verilog. VLSI testing tools

Unit-IV (12 Hours)

Electronic Design Automation Tools, An overview of OS commands. System settings and configuration. Introduction to Unix commands. Writing Shell scripts. VLSI design automation tools. An overview of the features of practical CAD tools. Modelsim, Leonardo spectrum, ISE 8.1i, Quartus II, VLSI backend tools. Synthesis and simulation using HDLs- Logic synthesis using verilog and VHDL. Memory and FSM synthesis. Performance driven synthesis, Simulation- Types of simulation. Static timing analysis. Formal verification. Switch level and transistor level simulation. Circuit simulation using Spice - circuit description. AC, DC and transient analysis. Advanced spice commands and analysis. Models for diodes, transistors and opamp. Digital building blocks. A/D, D/A and sample and hold circuits. Design and analysis of mixed signal circuits. Mixed signal circuit modeling and analysis using VHDL –AMS, System design using SystemC- SystemC models of computation. Classical hardware modeling in system C. Functional modeling. Parametrized modules and channels. Test benches. Tracing and debugging. Designing with ASICs

Unit-V (06 Hours)

Low Power VLSI Circuits, Evolution of CMOS technology, Shallow trench isolation. Lightly-doped drain. Buried channel. BiCMOS and SOI CMOS technologies. Second order effects and capacitance of MOS devices. CMOS inverters, static logic circuits of CMOS, pass transistor, BiCMOS, SOI CMOS and low power CMOS techniques. Basic concepts of dynamic logic circuits. Various problems associated with dynamic logic circuits. Differential, BiCMOS and low voltage dynamic logic circuits. Different types of memory circuits. Adder circuits. Multipliers, advanced structures. PLA. PLL. Processing unit.

Unit-VI (08 Hours)

VLSI Technology, Electron grade silicon. Crystal growth. Wafer preparation. Vapour phase and molecular beam epitaxy. SOI. Epitaxial evaluation. Oxidation techniques, systems and properties. Oxidation defects. Optical, electron, X-ray and ion lithography methods. Plasma properties, size, control, etch mechanism, etch techniques and equipments. Deposition process and methods. Diffusion in solids. Diffusion equation and diffusion mechanisms. Ion implantation and metalisation. Process simulation of ion implementation, diffusion, oxidation, epitaxy, lithography, etching and deposition. NMOS, CMOS, MOS memory and bipolar IC technologies. IC fabrication. Analytical and assembly techniques. Packaging of VLSI devices.

Text Books/ References

- N.H.E.Weste etal, "CMOS VLSI Design (3/e)", Pearson, 2005
- S.M.Sze, "VLSI Technology (2/e)", McGraw Hill, 1988
- W. Wolf, "Modern VLSI Design", (3/e), Pearson, 2002
- J.B.Kuo & J. H. Lou, "Low-voltage CMOS VLSI Circuits", Wiley, 1999
- P.J. Ashenden etal , "The System Designer's Guide to VHDL-AMS", Elsevier, 2005
- M. Abramovici etal, "Digital System Testing & Testable Design", Computer Science
- M.D.Ciletti, "Modeling, Synthesis and Rapid Prototyping with the Verilog HDL", Prentice Hall, 1999
- M. G. Arnold, "Verilog Digital – Computer Design", Prentice Hall (PTR), 1999
- S. Palnitkar , "Verilog HDL – A Guide to Digital Design and Synthesis", Pearson, 2003
- D.A.John & K. Martin, "Analog Integrated Circuit Design", Wiley , 1997

Syllabus for Unit Test

Unit Test 1	Unit I & II
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K30602 ELECTIVE II : SIMULATION AND MODELING

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 04 Hrs/week	Theory	: 70 Marks
Practical	: 02 Hrs/week	Duration	: 03 Hours
		Unit Test	: 30 Marks
		Termwork	: 25 Marks
		Oral	: 25 Marks

Unit -I (08 Hours)

Introduction :

Objectives of Modeling, System Theory: State Variables, Theory of Models : Analytic, Simulation, Measurement, Analytical Modeling

Unit –II (08 Hours)

Mathematical Background:

Probability Theory, Random Variables; Poisson Process. Markov Chains, Queuing Theory, Little's Law, M/M/1,M/M/1/k,M/M/C Queuing Models, M/G/1 (Impact Variation in Service Times)

Unit-III (08 Hours)

Petrinets:

Stochastic Petrinets (SPN), GSPN

Unit-IV (08 Hours)

Simulation Modeling:

Continuous & discrete Event, Simulation, Monte Carlo Simulation, Pseudo Random Number Generation, Nonuniform Random Variable Generation.

Unit-V (08 Hours)

Simulation Language Features:

Simpack, GPSS, GASP IV, CSIM

Unit-VI (08 Hours)

Estimation of Simulation :

Output/Output Matrix Confidence Intervals, Regenerative Simulation,

Method of Batch Means Case Studies, Analytic vs. Simulation Models Application to Operating Systems, Data Bases, Networks, Architecture, G/G/I, G/G/C Correlated Queues, Queuing Networks, Mean Value Analysis, GTPN, ESPN

Text Books/ References

- M.K. Molloy, "Fundamentals of Performance Modeling", McMillan
- R.Nelson, "Probability, Stochastic Process & Queuing Theory", Springer-Verilog
- Taha, "Operations Research", McGraw Hill

Syllabus for Unit Test

Unit Test 1	Unit I & II
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K30602 ELECTIVE II : REMOTE SENSING AND GIS

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 04 Hrs/week	Theory	: 70 Marks
Practical	: 02 Hrs/week	Duration	: 03 Hours
		Unit Test	: 30 Marks
		Termwork	: 25 Marks
		Oral	: 25 Marks

Unit -I (08 Hours)

Principles of Geographical Information Systems:

Theory of GIS supported by extensive practical exercises, Geographic information and spatial data types, Hardware and software; for GIS; Steps of spatial data handling, Database management systems, Spatial referencing, Data quality, Measures of location errors on maps, Satellite-based positioning, Spatial data input, Data preparation, Point data transformation, Analytical GIS capabilities; Retrieval and classification Overlay functions Neighborhood operations; Network analysis; error propagation , Data visualization.

Unit –II (08 Hours)

Cartography :

Cartography, Introduction to Cartography, Classification of maps, Types of data, Visual variables, Generalization, Symbolization, Map design, Map Layout, Diagrams Map Projection, Topographic mapping, and Production of large-scale maps and photo.

GIS Analysis, Planning & implementation:

Network analysis, Digital terrain modeling & analysis, Grid cell GIS modeling & analysis, GIS plan, Components of GIS plan, Phases: Planning, Analysis, Implementation, Successful Implementation of GIS, Management support, Leadership & vision, Data conversion & maintenance of Hardware & software, User training, Data communication, Software customization, User support, Funding.

Unit-III (08 Hours)

Maintenance & Management of GIS Database:

Centralized GIS database, Distributed GIS database, Master & transaction

GIS databases, Data maintenance issues, Financial & legal aspects of GIS: GIS costs, Ongoing costs, Savings, Additional benefits, GIS model for financial justification, Laws for access, pricing, privacy, liability, copyright, practice etc. Pitfalls of GIS: Failures, Outstanding benefits, Experimentation, Undefined goals, Lack of long term planning & management support, Computerizing existing problems, User involvement, Lack of user training and R & D support, Budget overrun / underestimation etc.

Unit-IV (08 Hours)

Advanced GIS:

Geo-information system and analysis, Raster data base design, GIS Vector based data structure/design, Data base creation for urban area analysis, Urban information system for resources and integrated developing planning, Urban modeling, GIS application case studies, Grid cell Data Processing, Principle of grid cell date processing, Rasterizing point, line and polygons, Selection of grid cell size and effect on data quality.

Unit-V (08 Hours)

Remote Sensing:

Fundamentals of RS ,Electromagnetic energy and Remote sensing, Sensors, platforms and RS data acquisition systems, Multispectral, Hyperspectral and Thermal sensors Radiometric aspects of remote sensing data, Geometric aspects of remote sensing data, Image enhancement and visualization, Image interpretation and classification, Microwave thermal remote sensing, Radar & Laser altimetry

Remote Sensing Application:

Agriculture and Soils, Forestry, Geosciences, Geology and water resources, Land use application, Environmental analysis and managements, Marine Science, Human Settlement analysis

Unit-VI (08 Hours)

Case study:

Land records, Utility management, Oil and Gas, Global change

Text Books/References

- G.B. Korte, "The GIS Handbook"
- Chang, Kang, Tsung (2004), "Programming Arc Objects with VBA CRC Press", Boka Raton Florida

Syllabus for Unit Test

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K30602 ELECTIVE II : SPEECH RECOGNITION AND PROCESSING

TEACHING SCHEME

Lectures : 04 Hrs/week
Practical : 02 Hrs/week

EXAMINATION SCHEME

Theory	: 70 Marks
Duration	: 03 Hours
Unit Test	: 30 Marks
Termwork	: 25 Marks
Oral	: 25 Marks

Unit -I (08 Hours)

Speech modeling: linguistics, physics of sound, speech production and acoustic tube modeling, acoustic phonetics, anatomy and physiology of the vocal tract and ear, hearing, and perception. Analog vocoders: channel vocoder, early secure voice systems, and formant vocoder Digital vocoders: Linear predictive coding (LPC), hybrid coders: voice excited vocoders, voice excited linear predictor, and residual excited linear predictor (RELP).

Unit –II (08 Hours)

Waveform coding : adaptive predictive coding (APC), analysis-by-synthesis coding [multipulse, regular pulse excitation(RPE), code-excited linear prediction (CELP), and low-delay CELP(LD-CELP)], subband coding, transform coding(TC), adaptive transform coding(ATC) and motion picture expert's group(MPEG) audio. Homomorphic speech processing: homomorphic derivation and properties, Complex and real Cestrum, homomorphic speech analysis, homomorphic deconvolution, and speech enhancement (channel equalization, echo reduction).

Unit-III (08 Hours)

Speech Synthesis: history, voice response, text-to-speech, formant synthesizer, concatenation synthesizers(phoneme, allophone, diphone, triphone, demisyllable and word/morpheme), and time scale modification Speech recognition: terms, isolated word recognition, continuous speech recognition, speaker (in)dependent, measures and distances (articulation index, log spectral distortion, Itakura-Saito, cepstral distance) and dynamic time warping (DTW).

Unit-IV (08 Hours)

Markov models: discussion of recognition problem, hidden Markov models (HMM), elements, "3 problems of HMMs", generation, training and recognition, feature vectors, left-to-right models, and phone modeling. Speech recognition: isolated word recognition HMM, Viterbi algorithm, continuous speech recognition HMM networks, discrete and continuous observation density HMMs, grammar, and the SPHINX recognizer.

Unit-V (08 Hours)

"Neural" nets: "neurons" and perceptrons, nonlinearities, training (e.g. back propagation), and comparison with knowledge based approaches. Speaker recognition: speaker verification/authentication vs speaker identification, closed vs open set, feature vectors (e.g. line spectrum pair and cepstrum), pattern matching (e.g. DTW, VQ, HMM), hypothesis testing, and errors.

Unit-VI (08 Hours)

Voice transformation, Speech processing hardware: digital signal processing (DSP) chips (TI, AT&T, Motorola) and Motorola, Applications of Speech recognition.

Text Books/References

- L.Rabiner & B. H. Jaung, "Fundamentals of Speech Recognition", Prentice Hall
- M. R. Schroeder, "Speech & Speaker Recognition"
- T. F. Quatieri, "Discrete-time speech signal processing: Principles & Practice", PH
- T. W. Parsons, "Voice & Speech Processing", McGraw-Hill
- Jelinek, "Statistical Methods of Speech Recognition", MIT Press
- Huang, Acero, Hon, "Spoken Language Processing", Prentice Hall
- Rabiner & Schafer, "Digital Processing of Speech Signals", Prentice Hall
- Donald G. Childers, "Speech Processing & Synthesis Toolboxes", John Wiley & Sons

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K30602 ELECTIVE II : USER INTERFACE DESIGN

TEACHING SCHEME

Lectures : 04 Hrs/week
Practical : 02 Hrs/week

EXAMINATION SCHEME

Theory	: 70 Marks
Duration	: 03 Hours
Unit Test	: 30 Marks
Termwork	: 25 Marks
Oral	: 25 Marks

Unit -I (08 Hours)

Principles of User Interaction:

Introduction, UI types, UI standards, UI Theory, Levels of Design, Visual design, Color, icons and graphics, Murphy's law of GUI design, Levels of UI Functionality, Knowledge and understanding of concepts such as: cognition, usability, ergonomics and hypertext, Keystroke-Level-Model (KLM), Characteristics Of Good Design, Knowledge and understanding of: characteristics such as: learn-ability, robustness, flexibility, usability, performance and accessibility.

Unit –II (08 Hours)

Goal:

Goal directed design, software design, the three models, Golden Rules of UI Design, Errors, User Centered Design: Awareness of concepts such as: target users, user modeling, user scenarios, localization and globalization Technological Constraints: Awareness of issues such as: screen resolution, design for printing.

Unit-III (08 Hours)

Form and Behavior:

Idioms and affordances, files, storage and retrieval, choosing platforms, Flow, posture and state, overhead and idiocy, interface design

Interaction:

Mouse, selection, manipulation, drag and drop

Cast and Gizmos:

Menus, dialog boxes, toolbars, Imperative and selection Gizmos, entry and display Gizmos, new gizmos

Guardian:

Error elimination, exceptions, undo

Unit-IV (08 Hours)

HMI:

Introduction, Applications, types, Applications of HMI/HCI in software industry

Case Study:

Case studies related to impact of GUI/HMI/HCI in software industry should be considered with a great depth,

Interactive Devices:

Interaction Device Categorization, Degrees of Freedom, Transfer Function Control-to-Display (C:D) Ratio, Interaction Tasks Keyboard : QWERTY, Linotype, DSK, Half-QWERTY, Locator, Soap Three State Model, Mouse, Stylus, Touch-tablet Analyzing input devices, Fitt's Law, Steering Law Contemporary Interactive Technologies: Knowledge and understanding of: mobile computing, PDAs, screen readers, voice recognition, touch screens and game peripherals (joysticks, light guns, dance mats etc)

Unit-V (08 Hours)

Java Swing GUI Framework:

Problems with AWT, Introduction to SWING, Features, MVC Design Pattern Swing Concepts, Declarations, Containers-JFrame, Extending JFrame, Components, Layout Managers, GroupLayout, Events, Swing and Threads

Unit-VI (10 Hours)

UI Development and Evaluation:

Formal Development Frameworks, LUCID, Obtaining User Feedback: Surveys, Ethnographic Observation, Participatory Design, Persona, Usability Labs, Experimental Design, Confounds, Choosing dependent/independent variables, Design Issues, Discount Usability Engineering, Heuristic Evaluation, Ten Usability Heuristics

Text Books/ References

- Dix, Finlay, Abowd & Beale, "Human Computer Interaction", PHI
- Preece, Rogers & Sharp, "Interaction Design", Paperback 544 pages (January 21, 2002) John Wiley
- David Benyon, Phil Turner, Susan Turner, "Designing Interactive Systems: People, Activities, Contexts, Technologies"
- Ben Shneiderman, "Designing the User Interface", fourth edition, Addison Wesley
- U. Maryland, "Guide to Usability for Software Engineers"
- Alan Cooper, "About Face: (3rd edition) The Essentials of Interaction Design", Wiley
- Norman D. A., "The Design of Everyday Things", New York, NY: Doubleday, 1990 ISBN: 0385267746
- Nielsen J., "Usability Engineering", Burlington, MA: Academic Press, 1994,

  ISBN: 0125184069
- Mullet K., and D. Sano, "Designing Visual Interfaces: Communication oriented techniques", Upper Saddle River, NJ: Prentice Hall, 1994. ISBN: 0133033899

Syllabus for Unit Test

Unit Test 1	Unit I & II
Unit Test 2	Unit III & IV
Unit Test 3	Unit V & VI

RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

A. T. K. T.

- A candidate who is granted term for M.Tech Semester-I will be allowed to keep term for his/her M.Tech. Semester-II examination even if he/she appears and fails or does not appear at M.Tech. Semester-I examination.
- A candidate who is granted term for M.Tech Semester-III will be allowed to keep term for his/her M.Tech. Semester-IV examination even if he/she appears and fails or does not appear at M.Tech. Semester-III examination.
- A student shall be allowed to keep term for M.Tech Semester-III even if he/she has a backlog of all Heads of passing in theory examination held at M.Tech Semester I & II taken together.
- A student has to secure 40% marks in theory and 50% marks in TW & oral as a condition of pass class. The overall percentage of marks of all semesters taken together should be more than 50% to declare the student to be passed.

CONTINUOUS ASSESSMENT

- The term work assessment will be based on the practical/assignment as described in the syllabus.
- Final assessment of termwork shall be done by pair of internal and external examiners jointly during the oral/practical examination schedule declared by the university. The teacher conducting practicals/assignments during the term shall maintain a record of continuous assessment. Every practical/term work/assignment shall be assessed continuously on the scale of 20 marks and weightage of 20 marks shall be distributed as follows:

Sr. No.	Activity	Marks
1	Timely Submission	04
2	Presentation	06
3	Understanding	10

This record of continuous assessment shall be made available to the examiners during Term work and oral examination. Examiner shall use this record for overall assessment of the performance of the student.

- Assessment of the seminar work and dissertation work shall be done continuously.

• Record of this assessment shall be made available during examination. The student should submit the dissertation stage-I report along with the dissertation stage-II report at the time of final submission.

CLASS

• The class should be awarded to the student on the basis of aggregate marks obtained together in both the semesters of the respective year by him/her. The award of class shall be as follows.

A	Aggregate 66% or more marks	First Class with Distinction
B	Aggregate 60% or more marks but less than 66%	First Class
C	Aggregate 55% or more marks but less than 60%	Higher Second Class
D	Aggregate 50% or more marks but less than 55%	Second Class
E	Aggregate 40% or more marks but less than 50%	Pass Class