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FACULTY OF ENGINEERING No.

Revised Syllabus for the
B.E. (Information Technology)

(From 2006-2007)

UNIVERSITY OF PUNE

Price : Rs. 30/-

UNIVERSITY OF PUNE

Structure of B.E. (Information Technology) 2003

Term – I

Subject Code No.	Subject	Teaching Scheme		Examination Scheme				Total Marks
		Lect.	Pract.	Paper	T/W	Pract	Oral	Total
414441	Information System Security	4	2	100	50	–	50	200
414442	Advanced Database Management	4		100	–	–	–	100
410443	Object Oriented Modeling & Design	4		100	–	–	–	100
414444	Software Testing & Quality Assurance	4		100	–	–	–	100
414445	Elective – I	4		100	–	–	–	100
414446	Computer Lab Practice – I	–	4	–	50	50	50	150
414447	Project Work	–	2	–	–	–	–	–
	Total	20	8	500	100	50	100	750

Total of Part I(A) 28 Hrs. 750

Term – II

Subject Code No.	Subject	Teaching Scheme		Examination Scheme				Total Marks
		Lect.	Pract.	Paper	T/W	Pract	Oral	Total
414448	System Operation & Maintenance	4	–	100	–	–	–	100
414449	Distributed System	4	–	100	–	–	–	100
414450	Information Retrieval	4	–	100	–	–	–	100
410451	Elective – II	4	2	100	50	–	50	200
414452	Computer Lab Practice – II	–	4	–	50	–	50	100
414447	Project Work	–	6	–	100	–	50	150
	Total	16	12	400	200	–	150	750

Total of Part II (B) 28 Hrs 750
Grand Total 1500
(A) + (B)

Elective –I

1) Bio Informatics
2) Mobile Computing
3) GIS & Remote Sensing
4) Organizational Behavior &management Concept

Elective - II

1) Artificial Intelligence
2) Software Architecture
3) Real Time System
4) Embedded System

414441 : Information System Security.

Teaching Scheme : **Examination Scheme :**
Lectures : 4 Hrs/ Week **Theory : 100 marks**

Unit I :

Introduction & Foundations

The Basic Components , Threats , Policy and Mechanism , Assumptions and Trust , Assurance, Operational Issues, Human Issues , Protection state, Access control Matrix model, protection state transitions, Copying, Owning, and the attenuation of privilege, The general questions and basic foundational results,. Trojan Horses, Computer Viruses, Computer Worms, Other forms of malicious logic.

Unit II :

Policy

Security Policy , Types of Security Policy , The role of Trust, Types of Access control, Policy languages, Example: Academic computer Security policy, Security and Precision, Goals of Integrity policies , Biba Integrity Model , Clark –Wilson Integrity Model, Chinese wall model of hybrid policies , Clinical information systems security policies.

Unit III :

Cryptography

What is Cryptography, Classical cryptosystems, Secrete Key cryptography, Public Key Cryptography, Cryptographic Checksums , Session and Interchange Keys, Key Exchange , Key Generation, Cryptography Key Infrastructures, Storing and Revoking Keys, Digital Signature, Digital certificates.

Unit IV :

Advanced Cryptography

Problems of cipher techniques, Stream and Block ciphers, Networks and Cryptography, Example protocols such as secure electronic mail: PEM, SSL, IPSec, Authentication basic, Passwords, Challenge and response, Biometrics

Unit V :

Implementation: System

Overview, Design Principles, What is Identity? , Files and Objects, Users, Groups and Roles, Naming Certificate, Identity on the Web, Access control Lists, Information flow basics and backgrounds, Compiler based mechanism, Execution based mechanism, Example Information flow controls.

Unit VI :

Vulnerability, Auditing, IDS (Intrusion Detection System)

Introduction, Penetration Studies, Vulnerability Classifications, Protection analysis model, Auditing Definition, Anatomy of an auditing system, Designing an auditing system, Principle & basic of Intrusion detection, Models, Architecture, Organization of Intrusion detection System, Intrusion response.

Book Refrence :

Matt Bishop, "computer security – Arts& Science", Pearson Publication.

414441 : Information system security Lab.

TeachingScheme :	**Examination Scheme :**
Practical : 2 Hrs/ Week.	**T/ W : 50 marks.**
	Oral : 50 Marks.

Assignments :

1. Configure proxy server
2. Implementation of protocol analyse/ sniffer
3. Download free tool for port scanning and test it
4. Find the IP address of remote machine
5. Design Security policy for a commercial organization
6. Implement access control list for a router, example ACLs for router 1721
7. Write a client server socket program in which server will authenticate client using authentication algorithm.
8. Download vulnerability scanning tool. Generate the report for any sample network ex. Free tool as Nessus

9. Implement a secret key algorithm.

10. Implement a public key algorithm

11. Simulate SYN flood attack

12. Implement a virtual LAN using a Router and a manageable switch

13. Implement SSL protocol

Staff In charge should suitably frame assignment on theabove topics. Student will submit the term work in the form of a journal which will include assignments with problem statement, implementation and result.

414442 : Advanced Database Management.

Teaching Scheme : **Examination Scheme :**
Lecturers : 4 Hrs. / Week **Theory : 100 Marks**

Objectives :

To learn and understand advances in Database System Implementations
To learn and understand various database architectures and applications.

Prerequisites :

DBMS
Visual Programming

Unit – I :

Parallel databases

Introduction, Parallel database architecture, I/O parallelism, Inter-query and Intra-query parallelism, Inter-operational and Intra-operational parallelism, Design of parallel systems

Unit – II :

Distributed Databases

Introduction, DDBMS architectures, Homogeneous and Heterogeneous Databases, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control in distributed databases, Availability, Distributed query processing , Directory systems

Unit – III :

Web based systems

Web based systems – Overview of client server architecture, Databases and web architecture, N-tier architecture, Business logic – SOAP

XML – Introduction, XML DTD's, Domain specific DTD's , Querying XML data

Unit – IV :

Data Warehousing

Introduction to Data warehousing, architecture, Dimensional data modeling- star, snowflake schemas, fact constellation, OLAP and data cubes, Operations on cubes, Data preprocessing – need for preprocessing, data cleaning, data integration and transformation, data reduction

Unit –V :

Data Mining

Introduction to data mining, Introduction to machine learning, descriptive and predictive data mining, outlier analysis, clustering – k means algorithm, classification – decision tree, association rules – apriori algorithm, Introduction to text mining, Baysian classifiers.

Unit – VI :

Advanced Topics

Information retrieval – overview , Relevance ranking using terms and hyperlinks, synonyms, homonyms, ontologies, Indexing of documents, measuring retrieval effectiveness , web search engines, Information retrieval and structured data .

Text Books :

1. Abraham Silberschatz, Henry Korth, S. Sudarshan, Database system concepts, 5th Edition, McGraw Hill International Edition
2. Jiawei han, Micheline Kamber, Data Mining : Concepts and systems , Morgan Kaufmann publishers

Reference Books :

1. Rob Coronel, Database systems : Design implementation and management, 4th Edition, Thomson Learning Press
2. Raghu Ramkrishnan, Johannes Gehrke, Database Management Systems, Second Edition, McGraw Hill International Edition

410443 : Object Oriented Modeling and Design

Teaching Scheme : Lectures 4 Hours /Week

Examination Scheme : Theory : 100 Marks

Objectives of the course :

1. Introduction to Modeling and Design of software, firmware and business processes.
2. Introduce UML 2.0 and its diagrams as a modeling tool for large and complex systems.
3. Understand the concepts being modeled in UML.

UNIT 1 :

Introduction to OMG Standards : MDA, MOF, XMI,CORBA , UML 2.0. UML History, UML 2.0 New Features.

Rational Unified Process emphasizing Inception, Elaboration, Construction, Transition Phases. 4+1 View architecture, Architectural approaches : Use case Centric, Architecture driven, Iterative approach, OO Concepts Review .

UNIT 2 :

Introduction to UML. UML MetaModel. Extensibility mechanisms like stereotypes, tagged values, constraints and profiles. OCL.
Overview of all diagrams in UML 2.0.

UNIT 3 :

Object diagrams , CRC method, Review of OO concepts.
Class diagrams, Classes and Relationships, Interfaces and ports, Templates, Active Objects, Advanced relationships generalization, association, aggregation, dependencies.
Composite structure diagrams including composite structures, collaborations.

UNIT 4 :

Interaction diagrams. Interaction Overview diagrams including interactions, signals, exceptions, regions, partitions, Sequence diagrams, Communication diagrams.

UNIT 5 :

State Machine diagrams, States, encapsulation of states, transitions, submachine, state generalization.
Timing diagrams, Activity diagrams, Activities, sub activities, signals, exceptions, partitions, regions.

UNIT 6 :

Support for modeling Architecture in UML. Package diagrams, Component diagrams, Deployment diagrams. Applications of UML in embedded systems, Web applications, commercial applications.
All diagrams are to be assumed for UML 2.0 for each diagram the need, purpose, Concepts, Notation, Forward Engineering, Reverse Engineering & Application must be considered.

Text Books :

1. Grady Booch, James Rumbaugh, Ivar Jacobson, "Unified Modeling Language User Guide", The 2nd Edition, Addison-Wesley Object Technology Series (Hardcover)
2. Dan Pilone, Neil Pitman, ''UML 2.0 in a Nutshell'' (In a Nutshell (O'Reilly).
3. Tom Pender, Eugene McSheffrey, Lou Varvels, Wiley ''UML 2 Bible".

Reference Books :

1. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado ''UML 2 Toolkit''
2. Martin Fowler, Addition Wesley, ''UML Distilled A Brief Guide to the Standard Object Modeling Language," Third Edition.

414444 : Software Testing And Quality Assurance.

Teaching scheme : **Examination Scheme :**
Lectures : 4 Hrs/Week **Theory : 100 marks**

UNIT 1 :

Testing Principles

Need of testing, Basic concepts – errors, faults, defects, failures, test bed, unit testing, integration testing, system testing, regression testing, alpha, beta and acceptance testing, functional testing, performance testing, stress testing, configuration testing, security testing, recovery testing, white box testing, black box testing, verification and validation

UNIT 2 :

Test Management

Testing Life Cycle – Roles and activities,

Test Planning – forming a test team, develop test plan and review

Test cases design strategies black box approach - random testing, equivalence class partitioning and boundary value analysis

Test case design strategies white box approach – test adequacy criteria, coverage and control flow graphs, paths, loop testing, mutation testing.

Test execution – build test data, execute test, record test results

Defect Life Cycle – defect data, life cycle of defect, defect tracking, defect detection stages, defect types, defect severity, defect analysis and prevention.

UNIT 3 :

Software Metrics

Scope of software metrics, Classifying software measures, Measurement basics – representational theory, scales, meaningfulness, What to measure – GQM technique. Control flow structure, Product quality metrics – MTTF, defect density, customer problems, customer satisfaction, function point., Metrics for software maintenance, In-process quality metrics.

UNIT 4 :

Quality Assurance

Quality concepts – quality, quality control, quality assurance, cost of quality

Software quality assurance – SQA activities, software reviews, inspections, audits, Software reliability Quality Attributes – correctness, reliability, usability, integrity, portability, maintainability, interoperability.

Ishikawa's Seven Basics Tools

UNIT 5 :

Quality Standards

CMM – Following KPAs : requirements management (RM), software project tracking and oversight (SPTO), software configuration management (SCM), organization process definition (OPD), software product engineering (SPE), peer reviews (PR), quantitative process management (QPM), defect prevention (DP), process change management.

Basic concepts of - ISO 9000 & 9001, CMMI, 6 sigma

UNIT 6 :

Trends And Research

Object Oriented Testing : Testing OOA and OOD Models, Object Oriented Testing strategies, Testing methods at class levels

Client Server Testing, web application testing, testing security.

Text Books :

1. Iiene Burnstein , "Practical Software Testing", Springer Publication.
2. William E Perry, "Effective Methods for Software Testing", Second Edition, Wiley Publication.
3. Norman E. Fenton "Software Metrics A Rigorous and Practical Approach", Second Edition, Thomson Publication.

References Books :

1. Stephen H. Kan "Metrics and Models in Software Quality Engineering" Pearson Education.
2. Pressman, 'Software Engineering", Fifth Edition, TATA McHill.
3. Pankay Jalote ''CMM Practice'' Pearson Education.

414445 : Bioinformatics. (Elective-I)

Teaching Scheme : **Examination Scheme:**
Lectures : 4 Hrs/Week **Theory : 100 Marks**

UNIT I :

Introduction & Information Retrieval

Introduction ,Historical overview, Bioinformatics Applications, major databases, data management, data analysis, molecular biology **(8)**

UNIT II :

Data Visualization & Statistics

Sequence Visualization ,structure visualization ,user interface,animation verses simulation ,general purpose technologies,stastical concepts,microarrays ,imperfect data,quantitive randomness,data analysis ,tool selection ,stastics of alignment,clustering and classification. **(8)**

UNIT III :

Data mining and pattern matching

Methods & Technology overview ,infrastructure ,pattern recognition & discovery ,machine learning ,text mining & tools,dot matrix analysis ,substitution matrics,dynamic programming,word methods,Bayesian methods ,multiple sequence alignment ,tools for pattern matching. **(8)**

UNIT IV :

Modeling ,simulation & collabration

Drug discovery,fundamentals,protein structure,system biology,collabration & communications,standards,Issues. **(8)**

UNIT V :

Bioinformatics tools

Introduction ,working with FASTA,working with BLAST,filtering and capped BLAST,FASTA & BLAST algorithms & comparison **(8)**

UNIT VI :

Further Scope

Introduction to environmental biotechnology,introduction to generic engineering. **(8)**

Text Books :

1. S.C.Rastogi,N.Mendiratta,P.Rastogi "Bioinformatics-Methods & Application", [RMR]PHI
2. Bryan Bergeron, "Bioinformatics Computing", Pearson Eduction[BB].

Reference Books :

1. Imtiyaz Alam Khan(IAK) "Elementery Bioinformatics",Pharma Book Syndicate.
2. Indu Shekhar Thakur(IST) "Environmental Biotechnology",IK International Publication.

414445 : Mobile Computing (Elective-I)

Teaching Scheme : **Examination Scheme :**
Lectures : 4 Hrs/Week **Theory : 100 marks**

Unit 1

Introduction :

Mobility of Bits and Bytes ,Wireless-The Beginning , Mobile Computing , Dialogue Control , Networks , Middleware and Gateways , Application and Services (Contents) , Developing Mobile Computing Applications , Security in Mobile Computing , Standards- Standard Bodies

Mobile Computing Architecture :

History of Computers , History of Internet , Internet-The Ubiquitous Network, Architecture for Mobile Computing , Three – Tier Architecture , Design Considerations for Mobile Computing , Mobile Computing through Internet , Making Existing Application Mobile-Enabled.

Mobile Computing Through Telephony :

Evolution of Telephony , Multiple Access Procedures , Mobile Computing Through Telephone , developing an IVR Application ,Voice XML , Telephony Application Programming Interface (TAPI).

Unit 2

Emerging Technologies :

Introduction , Bluetooth ,Radio Frequency Identification (Rfid) , Wireless Broadband (WiMAX) , Mobile IP , Internet Protocol Version 6 (Ipv6) , Java Card.

Global System For Mobile Communications (GSM) :

Global System for Mobile Communications , GSM Architecture , GSM Entities , Call Routing in GSM, PLMN Interfaces ,Gsm Addresses and Identifiers , Network Aspects in GSM ,GSM Frequency Allocation ,Authentication and Security.

Short Message Service(SMS) :

Mobile Computing over SMS , Short Message Services (SMS) , Value Added Services through SMS , Accessing the SMS Bearer.

Unit 3

General Packet Radio Service (GPRS) :

Introduction , GPRS and Packet Data Network , GPRS Network Architecture , GPRS Network Operations , Data Services in GPRS , Applications for GPRS , Limitations of GPRS , Billing and Charging in GPRS .

Wireless Application Protocol (WAP) :

Introduction , WAP ,MMS , GPRS Applications.

CDMA AND 3G :

Introduction , Spread-Spectrum Technology ,Is-95,Cdma versus GSM ,Wireless Data , Third Generation Networks , Applications on 3G.

Unit 4

Wireless LAN :

Introduction , Wireless LAN Advantages , IEEE 802.11 Standards , Wireless LAN Architecture , Mobility in Wireless LAN , Deploying Wireless LAN , Mobile Ad hoc Networks and Sensor Networks , Wireless LAN Security , WiFi Versus 3G.

Internet Networks and Interworking :

Introduction , Fundamentals of Call Processing , Intelligence in the Networks ,
SS#7 Signaling , IN Conceptual Model (INCM) , Softswitch , Programmable Networks , Technologies and Interfaces for IN.

Client programming :

Introduction , Moving Beyond the Desktop , A Peek under the Hood : Hardware Overview , Mobile Phones ,PDA , Design Constraints in Applications for Handled Devices.

Unit 5

Programming for the PALM O.S. :

Introduction , History of Palm OS Architecture, Application Development , Communication in Palm OS, Multimedia , Enhancements in the Current Release .

Wireless Devices With Symbian OS :

Introduction to Symbian OS , Symbian OS Architecture, Applications for Symbian , Controls and Compounds Controls, Active Objects , Localization , Security on the Symbian OS.

15 J2ME :

Java in the Handset , The Three-Prong Approach to Java Everywhere , Java 2 Micro Edition (J2ME) Technology , Programming for CLDC , GUI in MIDP , UI design issues , Multimedia, Record Management System , Communication in MIDP , Security Considerations in MIDP , Optional Packages.

Unit 6

Wireless Devices with Windows CE:

Introduction , Different Flavors of Windows CE , Windows CE Architecture , Windows CE Development Environment .

Voice over Internet Protocol and Convergence :

Voce over IP , H.323 Framework for Voice over IP, Session Initiation protocol (SIP) , Comparision between H.323 and SIP , Real Time Protocols , Convergence Technologies , call Routing , Voice over IP Applications , IP Multimedia Subsystem(IMS) , Mobile VoIP.

Security Issues in Mobile Computing :

Introduction , Information security , Security techniques and Algorithms ,security Protocols ,Public Key Infrastructure ,Trust , Security Models ,Security Frameworks for Mobile Environment.

Text Book :

Asoke. K Talukder and Roopa R. Yavagal. "Mobile Computing (Technology ,Applications and Service Creation)",TATA McGRAW HILL

Reference :

1. Jachan Schiller ,Adison Wesely, "Mobile Communication"
2. Yi-Bing Lin, Wiley, "Wireless and Mobile Network Architecture"

414445 : GIS and Remote Sensing (Elective-I)

Teaching Scheme : **Examination Scheme :**
Lectures : 4 Hrs/Week **Theory : 100 marks**

Unit 1 : Remote Sensing Fundamentals

Remote Sensing - Basic Principles :

Electromagnetic remote sensing, energy sources, energy interactions with Earth's surface Materials.

Microwave Remote sensing :

The radar principle, factors affecting microwave measurements, radar wavebands, SLAR systems, sar, Interpreting sar images, geometrical characteristics.

Remote Sensing platform and Sensors :

Satellite system parameters, sensor parameters, imaging sensor systems, Earth resources satellites, meteorological satellites, OCEANSAT-1, (IRS-4), IKONOS satellite series.

Unit 2 : Image Processing

Digital Image Processing :

Basic character of digital images, preprocessing, registration, enhancement, spatial filtering, transformations, classification, image classification and GIS.

Visual Image Interpretation :

Types of pictorial data products, Image interpretation strategy, image interpretation process, overview of image interpretation equipments.

Unit 3 : GIS and Maps

Fundamentals of GIS :

Root of GIS, overview of information system, the four Ms, GIS definition and terminology, GIS queries, GIS architecture, models of GIS, framework for GIS, GIS categories, levels/scales of measurement

Map Language :

Map as a model, classification of maps, spatial referencing ststem, map projections, commonly used map projections, grid systems, computer in map production, digital database in a GIS, linkage of GIS to remote sensing

Unit 4 : Spatial Data Modeling and Management

Spatial Data Modeling :

Stages of GIS data modeling, graphic representation of spatial data, raster GIS models, vector GIS models.

GIS Data Management :

Data base management systems, GIS data file management, database models, storage of GIS data object based data models, temporal topology, organizational strategy of DBMS in GIS

Unit 5 : Data Input, Quality and Analysis

Data Input and Editing :

The data stream, data input models, data input methods, GPS for GIS data capture, data editing.

Data Quality Issues :

Components of data quality, accuracy, precision and resolution, consistency, completeness, sources of error in GIS, GIS output, modeling errors and error evaluation.

Data Analysis and Modeling :

Format conversion, data medium conversion, spatial measurement methods, buffering techniques, overlay analysis, modeling surfaces, modeling networks.

Unit 6 : GIS Applications

Integration of remote sensing and GIS

Urban and municipal applications

Text Books :

1. M. Anji Reddy, "Remote Sensing and Geographical Information Systems", B S Publications, Second Edition.

2. Heywood & Raju, "Introduction to Geographical Information Systems" Pearson Education

Reference Books :

1. George B Korte, "The GIS Book", Onword press (Thomson Learning), 5th Edition.

2. Peter A Burrough and McDonell, "Principles of Geographical Information Systems", Oxford University Press, 1998

414445 : Organisational Behavior & Management concept (Elective-I)

Teaching Scheme : **Examination Scheme :**
Lectures : 4 Hrs/Week **Theory : 100 marks**

Unit 1

Organisation Bechavior :

The discipline of Organizational Behavior

Definition-importance of its study in the work situation-different models of organosational behavior i.e. autocratic, custodial, supportive, collegial and SOBC.

Managing self competency, communication competency, perception and attribution-perception process, selection organization, attributions, motivation process, content and process models of motivation, motivating performance, goal setting and reward systems.

Unit 2 :

Individual

Motivation process-different types of motives-intrapersonal conflict-frustration and defence mechanism-study of select theories of work motivation-Douglas Mc-Gregor's theory 'X' and 'Y'-Abraham Maslow's theory of need Hierarchy-Fredric Herzberg's two factor theory of motivation-Vector Vroom's expectancy theory of motivation-morale-relationship of morale to productivity-measurement of morale.

Stress Management-concept of stress-sources of stress-ill-effects of stress on humans-management of stress.

Unit 3 :

Group and Impersonal processes

Group and team behavior, development, team effectiveness, decision making, power and behavior.

Managing human resources, human resource planning, hiring and training, performance appraisal. Conflict management, levels of conflict, conflict handling and management.

Unit 4 :

Organisation

Organisational design-various organisational structures and their effects on human behavior-organisational climate-organisational culture.

Leadership

Definition-its importance to the organisation-leadership style-approaches to the study of leadership-trait, behavioral and situational approaches-Fiedler's contingency model-Hersey and Blanchard's Theory, Black and Moutan's Theory, path and Goal Theory.

Management of change-forces responsible for change-resistance to change-overcoming resistance to change-introduction of change in the organisation -organisation development-organizational effectivness.

Conflict Management-traditional vis-a-vis modern view of conflict constructive conflict-conflict process-strategies for conflict resolution.

Unit 5 :

Management of change-forces

Forces responsible for change-resistance to change overcoming resistance to change-introduction of change in the organisation-organisation development-organisational effectiveness.

Conflict Management - traditional vis-a-vis modern view of conflict constructive conflict-conflict process-stratgies for conflict resolution.

Unit 6 :

The Emeriiging Organisation

Total Quality Management-techniques of TQM-Re-engineering-empowerment, bench marking-downsizing-learning organisations.

Case studies, tool and techniques for strategy organisation behavior.

Reference Books :

Stephen Robbins, "Organisational Behavior", Prentice Hall of India.

414446 : Computer Lab Practical I

TeachingScheme :	Examination scheme :
Practical : 4 Hrs/ Week	T/W : 50 marks
	Practical : 50 marks.
	Oral : 50 marks.

Advance Database Management

1. Evaluate queries involving stored procedures & triggers based on any database.
2. Explore & implement SQL query optimization or query evaluation based on any database
3. Design database using XML & evaluate queries.
4. Write a 'C, program for multiple transaction single database.
5. Write a 'C' program to implement R trees for any database application.
6. Write recursive queries & evaluate them Implement any data or mining algorithm.

Object Oriented Modeling & Design

A71 following assignments are to be done with any hypothetical system using UML 1.0 or 2.0
Implement any A of the assignments using any CASE tool. The remaining two assignment are to be study assignment.

1. Design use case diagram.
2. Design class diagram & composite structure diagram.
3. Design activity diagram & state diagrams.
4. Design sequence & communication diagrams.
5. design development & component diagrams.
6. Design interaction overview diagrams.

Software Testing & Quality Assurance :

1. Generate test cases for a ready Database with frontend application using manual testing.
2. Test a ready 'C' program using automated testing tool.
3. Test a ready VB- Oracle / Access application using automated testing tool.

Staff in charge will prepare 6 mini project which will based on Advance Data Base Management(ADBM) Which will be implemented supported by Object Oriented Modeling & Design (OOMD) and testing.

Student will submit term work in form of a journal which will have full documented report of each mini project. Staff in charge will maintain a full record of continuous assessment with grades. These sheet must be available during term work assessment.

Candidate will submit journal for term work assessment by internal & external examiner. Practical examination will be based on the mini project assignment. Practical examination will not be on drawing only UML diagram.

Oral examination will be on the term work submitted by candidate. Candidate will have the C.D. of the mini project to demonstrate of necessary.

414447 : Project work

Teaching Scheme :
Practical : 2 Hrs/ Week

The Student will undertake one project over the academic year, which will involve the design of a system or sub system in the area of Information Technology and Computer Science and Engineering.

The aim of project is to allow the student to study the feasibility of implementing project and planning project, studying existing system, tools available and state of art software testing procedures and technology with use of case tools.

The project must involve the detail Software design Specification, Data Structure Layout, File Design, Testing with complete documentation and user interface. With life cycle testing and as an executable package.

The project will be undertaken preferably by a group of at least 4 student who will jointly work and implement the project. The group will select a project with approval of the guide (Staff- members assigned) and submit the name of the project with a synopsis of not more than 2 to 3 pages not later than the second week of August in the academic year. A preliminary report by the group must be submitted and certified at the end of Semester I. The preliminary report must minimally contain literature survey, project specification, SRS, plan of execution, preliminary design. This is compulsory for the grant of first term.

The group will submit at the end of Semester II.

(A) The workable project.

(B) Project report in the form of bound journal complete in all respect – 1 copy for the Institute and 1 copy of each student in the group for certification.

The term work will be accessed by the examiners in consultation with the guide. Oral examination will be based on the project work completed by the candidates. Preliminary report must also be presented during the oral examination.

The project report contain the details.

1. Problem definition and requirement specification, acceptance test procedure (ATP).
2. System definition-requirement Analysis.
3. System design.
4. System implementation – code documentation – dataflow diagrams/ algorithm, protocols used.
5. Test result and procedure – test repot as per ATP.
6. Platform choice use.
7. Conclusions.
8. Appendix tools used , References.

Documentation will use UML approach with presentation, Category, Use Case, Class Diagrams etc.

414448 : System Operations And Maintenance.

Teaching scheme : **Examination Scheme :**
Lectures : 4 Hrs/Week **Theory : 100 Marks**

Unit 1

Operations, Business & Marketing Support System :

Status, definitions, Markets of operations, Business and marketing support, market drivers for support system, documentation, organization structures of provider, Service request & change:
Technology, trends, trends with support system.

Unit 2

Management Protocol:

Product & service their portfolio, telecommunication oriented management protocols, middleware solutions, enterprise oriented management protocols, web for telecom provider, LDAP.

Unit 3

Customer Care & Billing Process:

Customer care, customer interface, sales process, customer QOS management, calls rating, discounting, Invoicing, IP billing, Economics of billing.

Unit 4

Inventory management process:

Inventory, service creation, Planning, Network planning, service order process, service configuration, security management, Network operational management.

Unit 5

Support, documentation & management :

Management frames works, suite framework product for support system, customer care, order processing, monitoring applications for service level agreement.

Unit 6

Workforce management for service provider :

Building team, job profile & responsibilities, enabling new technologies for work force management bench marking.

Reference Books :

Kornel Terplan, John Wiley, "OSS Essentials: Support systems solutions"

414449 : Distributed Systems

Teaching scheme : **Examination Scheme:**
Lecturers: 4 Hrs/ Week. **Theory: 100 Marks.**

Unit 1 :

Introduction.

Introduction to distributed Systems, examples of distributed systems, characteristics, goals, hardware and software concepts, design issues, resource sharing and the web, challenges.
System Models: Introduction, Architectural Model, Fundamental Models, and Client Server Models.

Unit 2 :

Communication

Interprocess Communication: Message oriented Communication, Stream Oriented Communication
Layered Protocols: Lower Level, Transport Level and Higher-level Protocols.
Distributed Objects: RPC & LRPC, Remote Method Invocation, Events and Notifications.

Unit 3 :

Distributed File Systems.

Distributed File Systems: SUN NFS, CODA, Other DS, Comparisons.
Name Services: Name Entities, Locating Mobile Entities, Removing unreferenced entities, Case Studies: DNS Directory, Global Name Service, X 500 DS

Unit 4 :

Synchronization.

Time and Global States: Clock Synchronization, Logical clocks, global state.
Co-ordination: Election Algorithms, mutual exclusion, Distributed Transaction.

Unit 5 :

Fault Tolerance.

Process Resilience, Reliable client server communication, Reliable group communication, Distributed Commit and Recovery.

Unit 6 :

Case Studies.

Case Studies on CORBA, Grid and Clusters.

Text Books :

1. Andrew S. Tanenbaum & Maarten van Steen, "Distributed Systems – Principles and Paradigms", Publisher: PHI.
2. George Coulouris, Jean Dollimore & Tim Kindberg, "Distributed Systems – Concepts and Design" Publisher: Pearson (LPE)

Reference Book :

1. By Pradeep K. Sinha, "Distributed Operating Systems – Concepts and Design", Publication: PHI.

414450 : Information Retrieval.

Teaching scheme : **Examination Scheme :**
Lecturers : 4 Hrs/ Week. **Theory : 100 Marks.**

Objective :

To deal with IR representation, storage, organization, & access to information items.

Unit 1

Basic Concepts of IR, Data Retrieval & Information Retrieval, IR system block diagram. Automatic Text Analysis.

Luhn's ideas, Conflation Algorithm, Indexing and Index Term Weighing, Probabilistic Indexing.Automatic Classification, Measures Of Association, Different Matching Coefficient, Classification methods, Cluster Hypothesis.Clustering Algorithms, Single Pass Algorithm, Single Link Algorithm, Rochhio's Algorithm and Dendograms. **(8)**

Unit 2

File Structures, Inverted file, Suffix trees & suffix arrays, Signature files, Ring
Structure.

IR Models, Basic concepts, Boolean Model, Vector Model, Fuzzy Set Model. Search Strategies- Boolean search ,serial search, cluster based retrieval, Matching Function.
XML Data Model, X Query, Evaluation of XML Queries **(10)**

Unit 3

Performance Evaluation- precision & recall, alternative measures reference collection(TREC Collection) Users Interface & Visualization

HCI Concepts, Information access process , starting point , query specification (7)

Unit 4

Libraries & Bibliographical system- Online IR system ,OPACs, Digital libraries-Architecture issues ,document models , representation & access, prototypes , projects & interfaces , standards. (7)

Unit 5

Multimedia IR models & languages- data modeling , query languages Indexing & searching- generic multimedia indexing approach , one dimensional time series, two dimensional color images, automatic feature extraction (8)

Unit 6

Searching the Web, Challenges, Characterizing the Web, Search Engines,
Browsing, Meta searchers.Parallel IR – MIMD Architectures.

Distributed IR – Collection Partitioning, Source Selection, Query Processing (8)

Text Books :

1. Yates & Neto, "Modern Information Retrieval", Pearson Education.
2. C.J.Rijsbergen, "Information Retrieval", (www.dcs.gla.ac.uk)

Reference Books :

1. Ramkrishan- Mcgraw, "Database Management Systems", –Hill Publication.
2. Proceedings of International Symposium on machine translation NLP & TSS.

410451 : Artificial Intelligence (Elective-II)

Teaching Scheme : **Examination Scheme :**
Lectures : 4 Hrs/Week **Theory : 100 Marks**

Unit I :

Artificial Intelligence Concepts

Introduction to AI, characteristics of Intelligence, AI Techniques, Block Diagram, Criteria for Success,
State Space Search, Production System, Problem Characteristics.

Heuristic search techniques – Generate-And-Test, Hill Climbing, cnstraint satisfaction & Game Playing
Minmax Search procedure, Alpha – beta Cutoffs, Waiting for quiescence.

UNIT II :

Knowledge representation.

Approaches & Issues in Knowledge Representation Prepositional Logic, Inference rules in prepositional logic , Knowledge representation in predicate logic ,resolution, natural deduction

Fuzzy Logic, Semantic nets, frames, scripts & conceptual dependency, TMS

Unit III

Perception

Definition & types of Perception, Vision, Speech Recognition,
Understanding – What is understanding? Understanding as constraint satisfaction, Waltz algorithm.
NLP – Steps in the process, syntactic processing, Semantic Analysis, Discourse and pragmatic processing

UNIT IV :

Planning

Introduction to planning, Components of a planning systems, Goal stack Planning, Non- Linear planning, Block world, Hierarchical planning, least commitment stratagy, planning versus programming.

UNIT V :

Learning & Neural Networks

Introduction, learning as Induction, Failure-driven learning, learning by Beingtold, learning by exploration, learning languages.
Learning in Neural Networks

Perceptrons, Back propagation Networks, unsupervised learning, Application of Neural network.

UNIT VI

AI languages & Expert systems

Introduction to prolog, Recursive rules, How prolog answers questions, syntax & meaning of
prolog programs, prolog in AI

Architecture of expert system, expert system shell, explanation, knowledge Acquisition, Case Studies of an expert system.

Reference :

1. Elaine Rich and Kerin Knight, "Artificial Intelligence"
2. Krishna Mehrotra, Sanjay Rawika K. Mohon, "Artificial Neural Network"
3. Eugane, Charniak Frew Mc Dermott, "Introduction to artificial intelligence"
4. Ivan Bratko ,Pearson, "Education PROLOG-programming for Artificial Intelligence"

410451 : Artificial Intelligence Lab

Teaching Scheme :
Practical : 2 Hrs/Week

Examination Scheme :
Term Work : 50 marks
Oral : 50 marks

Staff members should frame any six assignment based on following topics :

1. implementation of A* algorithm using 8 puzzle problem(sliding files)
2. implementation of AO* algorithm
3. unification algorithm implementation
4. truth mentainance system using prolog
5. implementation of minmax search procedure for game playing
6. passing method implemetation using prolog
7. development of expert system using prolog

Guidelines

1. Staff member should frame assignments in such a way that, there is a variation in assignment programs
2. same algorithm can be implemented for different problems
3. students can be given choice of language(c/c++/Java) for implementation
4. Oral examination should based upon the assignment on the term work.

410451 : Real Time Systems (Elective – II)

Teaching Scheme : Lectures 4 Hours /Week

Examination Scheme : Theory : 100 Marks

Objectives :

To get an overview of design and evaluation issues of RTS, Real Time Communication and Operating Systems.

Unit 1 :

Introduction to RTS

Definition of RTS, Issues in real time computing – Constraints,Structure of RTS, Typical real time applications – Digital Control ,.Signal ProcessingCharacterizing RTS, Performance measures of RTS – properties of performance measure, Performability – cost function and hard deadline – Estimating program real time, Analysis of source code, pipelining, dependencies.

Unit 2 :

Task Assignment and scheduling

Uniprocessor scheduling algorithms-RM,EDF,IRIS, Task Assignment – Algorithms- RM,EdDF,MOS,FAB, Precedence conditions, Fault tolerance scheduling, Elements of Multiprocessor scheduling algorithm.

Unit 3 :

Programming Languages, Tools & Databases

Language Characteristics, Data typing, Control structures, Facilitating hierarchical decomposition, Packages, Error handling, Overloading & Generics, Use of POSIX Programming API in RTS.Basic definition of databases,

Real Time versus General Purpose databases, Main memory databases, Transaction priorities, Aborts, Concurrency control issues, Two phase approach to improve predictability, Maintaining serialization consistency, Databases for hard Real Time Systems.

Unit 4:

Real Time Communication

Network topologies- Sending messages, Network architecture issues, Protocol – Contention based, Token based , Stop & Go Multihop Protocol, The Pooled Bus, Hierarchical Round Robin , Deadline based, Fault tolerant Routing, MAC,RT LAN, CSMA based DCR, Real Time communication with periodic and aperiodic messages.

Unit 5 :

Real Time Operating Systems

Time services and scheduling mechanism, processor Reserves and Resource Kernel , Open Systems Architecture, Capabilities of commercial RTOS, Predictability of general purpose OS

Unit 6 :

Fault Tolerance and Reliability

Fault types, detection, error containment, Redundancy-Hardware, Software, Time , Information redundancy, Data diversity, Reversal checks, Malicious or Byzantine failures, Integrated failure handling, Reliability models and hardware redundancy and software error models, fault tolerance synchronization in hardware and software.

3. Extend the part one of assignment 1, by adding push button walk signals at the traffic intersection. A push button walk signal works as follows: whenever a person wants to cross a road, he pushes the appropriate button on his side of the road and within a time period W, his walk signal turns green. While his signal is green, the traffic on the remaining roads should be allowed to continue as appropriate. There will be 8 such buttons in our scenario.
4. Implement the two contention based protocols taught in class – 'Virtual Time CSMA' (VTCSMA - L) and 'Window Protocol'. Compare their performances in terms of the number of packets that meet their deadlines.
    - In both cases, keep the number of nodes and the sequence of packets (along with their deadlines) same, so that their performances can be compared.
    - Run VTCSMA for 3 different values of the virtual clock rate and the window protocol for 3 different values of the initial window size.
    - Make suitable assumptions if required and state them clearly.
    - The coding can be done in any language of your choice.
5. Write a report on 'Hard Real-Time Databases'. Describe how you would construct a hard real-time database, where missing of even a single deadline is unacceptable. Mention the features you would provide and explain how you would implement them

410451 : Software Architecture (Elective – II)

Teaching Scheme :
Lectures 4 Hours /Week

Examination Scheme :
Theory : 100 marks

Objectives of the course :

1. Introduction to Software architecture as a discipline
2. Introduction to current architecture approaches.
3. Introduction to software Architecture strategies.

UNIT 1 :

Architecture Business Cycle, What is software architecture , why is software architecture important. Documenting software architectures.

UNIT 2 :

Understanding quality attributes , architecture and quality attributes, achieving quality attributes.

UNIT 3 :

Design Patterns: history, principles and expectations. Ways of using patterns. Study of a number of representative patterns like Singleton, Factory, Adaptor, Façade, Proxy, Pipes And Filter, Event Listener, Iterator, Observer, Mediator.

UNIT 4 :

Introduction to three tier and N Tier Web Architectures, XML, Client side technologies DHTML, Java Applets, Active X controls, Server side technologies JSP, JSF, Java Servlets.

410451:- Embedded System (Elective II)

Teaching Scheme :
Lectures : 4 Hrs/Week

Examination Scheme :
Theory : 100 Marks

Unit 1 :

Introduction to Embedded System

Components of Embedded System & it's Classification, Characteristic of embedded system. Review of Microprocessors & Microcontrollers, Introduction to embedded processor, Digital Signal Processor, Application Specific Specific System Processor, Multiprocessor systems using General Purpose Processor. CISC and RISC Processor architectures and exemplary instruction set, Exemplary ARM Processor.

Unit 2 :

System Hardware

Management of Power Supply, Clocking Unit, Real Time Clock and Timers, Reset Circuitry and Watchdog Timer. Structural Units of Processor, Processor and Memory Selection, Memory Map Of Embedded System DMA, Interfacing Processors, Memories and I/O. Example architecture of Mototrala68HC/05, 68HC/08, PIC Microcontroller 16F84,AVR AT9052313, Evaluation Board Concept.

Unit 3 :

I/O interfacing

I/O devices, ADC/DAC, Optical Devices such as LED/LCD Display devices, Opto Isolator, Relay & stepper motor, Timers & counting devices, serial communication using I2C, CAN, RS232, & USB Device drivers & interrupt servicing inter process communication & synchronization Multiple Processors, Multiple Task, threads & routines, Os & Embedded System model

Unit 4 :

Programming Concepts, Embedded System Programming C & C++

Software development cycle, Assemble lang., High Level Lang. C program Elements, Micros & Function, Data types, Data structures, Modifiers, Statement, Loops & Pointers, Ques & Stacks, List & Order List, Embedded System Programming In C++ & Java. C Program Compliers & Cross Compliers, In Circuit emulator.

Unit 5 :

Real Time Operating Systems

Real Time & embedded System Os, Interrupt Routines in RTOS environment, RTOS Task Scheduling models. Interrupt Latency & Response time, Strategy for synchronization between the processes, ISR, OS functions & tasks for resource management Embedded Linux, internals : Linux Kernal for device drivers & embedded system, OS security issue, Mobile OS. RTOS Programming Tool : Micro C/OS -II VxWorks

Unit 6 :

Overview & Applications of Embedded System

Case Study of coding for Vending machine system using MUCOSRTOS, Case study coding for send application layer byte streams on A TCP/IP Network Using RTOS Vx works, Case study of an Embedded System for an adapting Cruise control System in a car, Case Study in Embedded system for Smart Card.

Reference Book :

1. Raj Kamal.''Microcontrollers, Architecture, Programming, Interface & System Design'' Pearson Education
2. Sriam Iyer, Pankaj Gupta, ''Embedded Real time Systems Programming'' Tata Mc Graw Hill.
3. Tammy Nergaard , ''Embedded Systems Architecture - A Comperhensive Guide For Engineering & Programming'', Elesevier Publication.

414447 : Project work.

TeachingScheme :
Practical : 6Hrs/ Week

Examination Scheme :
T/W : 100 marks.
Oral : 50 marks.

The Student will undertake one project over the academic year, which will involve the design of a system or sub system in the area of Information Techanology and Computer Science and Engineering.

The aim of project is to allow the student to study the feasibility of implementing project and planning project, studying existing system, tools available and state of art software testing procedures and technology with use of case tools.

The project must involve the detail Software design Specification, Data Structure Layout, File Design, Testing with complete documentation and user interface. With life cycle testing and as an executable package.

The project will be undertaken preferably by a group of at least 4 student who will jointly work and implement the project. The group will select a project with approval of the guide (Staff- members assigned) and submit the name of the project with a synopsis of not more than 2 to 3 pages not later than the second week of August in the academic year. A preliminary report by the group must be submitted and certified at the end of Semester I. The preliminary report must minimally contain literature survey, project specification, SRS, plan of execution, preliminary design. This is compulsory for the grant of first term.