

FACULTY OF ENGINEERING

Syllabus for the
M.E. C.S.E. (Information Technology)
(w.e.f 2008-2009)

UNIVERSITY OF PUNE

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Ad. Hoc B.O.S. in Information Technology
University of Pune

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Note:- This syllabus is subject to change without prior notice by the concerned BOS

10/01/2008

Proposed structure M.E. CSE (Information Technology) to be implemented from July-2008

Term-I

Subject Code	Subject Title	Teaching Scheme		Examination Scheme				
		Lect.	Pract.	Paper	TW	Oral	Total	Credits
514401	Performance and Evaluation of Computer Systems	03	--	100	--	--	100	3
514402	Software Engineering Methodologies	03	--	100	--	--	100	3
514403	Advanced Operating Systems	03		100			100	3
514404	Elective-I	03	--	100	--	--	100	3
514405	Elective-II	03	--	100	--	--	100	3
514406	Laboratory Practice-I	--	06		50		50	3
514407	Seminar-I		04		50		50	2
	Total	15	10	500	100		600	20

Term-II

Subject Code	Subject Title	Teaching Scheme		Examination Scheme				
		Lect.	Pract.	Paper	TW	Oral	Marks	Credits
514408	Advanced Computer Architecture	03	--	100	--	--	100	3
514409	Advanced Trends in Database Systems	03	--	100	--	--	100	3
514410	Information Technology Project Management	03	--	100	--	--	100	3
514411	Elective-III	03	--	100	--	--	100	3
514412	Elective-IV	03	--	100	--	--	100	3
514413	Laboratory Practice-II	--	06		50		50	3
514414	Seminar-II	--	04	--	50	--	50	2
	Total	15	10	500	100		600	20

Term-III

Subject Code	Subject Title	Teaching Scheme		Examination Scheme				
		Lect.	Pract.	Paper	TW	Oral	Total	Credits
514415	Seminar-III	--	04	--	50	--	50	2
514416	Project stage-I	--	06	--	50	--	50	6
	Total	--	10	--	100		100	8

Term-IV

Subject Code	Subject Title	Teaching Scheme		Examination Scheme				
		Lect.	Pract.	Paper	TW	Oral	Marks	Credits
514416	Project stage-II*	--	12	--	150	50	200	12
	Total	--	12	--	150		200	12

Subject Code	Elective-I	Subject Code	Elective-II
514404 A	Software Architecture	514405 A	Information Assurance and Security
514404 B	Real Time and Embedded Systems	514405 B	Compiler Design
514404 C	Adhoc Networks	514405 C	Geographical Information Systems

Subject Code	Elective-III	Subject Code	Elective-IV
514411 A	Internet and Web Technologies	514412 A	Component Based Development
514411 B	Advanced Topics in Operating Systems	514412 B	Advanced Network Programming
514411 C	Mobile Computing and M Commerce	514412 C	High Performance Computer Networks
514411 D	User Interface Design	514412 D	Open Elective II (Self Study)** / Service Oriented Architecture

** Open Elective - Institute will Interact with Industry to offer a need based topic.
 –BOS Information Technology will declare the list of subjects which can be taken under open elective.

514401 : Performance And Evaluation Of Computer System

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Overview of Performance Evaluation:

Introduction, Selection of Techniques and Metrics, measuring the reporting performance, Benchmark suites, Amdahl's law, SPEC CPU benchmarks, SPEC 95, 2000, server, memory, I/P Performance
Types of workloads, art of workload selection, workload characterization and techniques. Program execution monitors, Analytical modelling for performance.

2. Digital Networks:

X.25 based networks / ISDN, B-ISDN and ATM Technology, protocol stack, ATM switches architecture, ADSL. IP based network, IP addressing, routing IP traffic over ATM n/w, MPLS, GMPLS technology, Voice over IP.

3. Probability Theory and use for evaluation:

Notion of probabilities and basic properties, Continuous random variables, Bayes theorem, conditional probabilities, Discrete and Continuous random variables, Probabilities Generation function & Laplace transform, Transformation generation methods. Use for performances evaluation in networking. Linear regression models.

4. Stochastic Processes:

Stochastic processes, first and second order statistics, stationery stochastic processes, spectral densities, Brownian Motion Process, Ergodicity.

5. Queuing Theory and Models:

Queuing models, Little theorem application, Markov chain formulation. Discrete time and Continuous time Markov Chains (DTMC, CTMC), MMD, Queuing system M/M/1, M/M/1/K, M/M/S/, M/M/∞ queue analysis m-server case. Multimensional Markov chain application in Circuit Switching.

6. Queuing Theory and Application:

M/G/1 Queue, generalization of M/G/1 theory application to ATM. Imbedding instants in the M/G/1 theory M/G/1 with geometrically distributed messages. Chain imbedded to cell transmission, message transmission completion. Queue balance equation, Finite buffer case, Mean Value Analysis.

7. Network Analysis:

Local area Network analysis, standard comment based analysis, contention based protocols, demand assignment protocols, nodes in packet switches networks, performance analysis of data link layer, Network layer. Traffic control and congestion in ATM networks, TCP/IP Traffic control.

8. Simulation:

Introduction to simulation, simulation modelling and analysis in computer systems and networks, analysis of simulation results, Random Number generation, Statistical analysis of simulation.

Reference Books :

1. *The Art of Computer Systems Performance Analysis*, by Raj Jain, Wiley, New York, NY, April 1991.
2. *Queuing Theory and Telecommunication* by Giovanni Grambene, Springer 2005
3. *High Speed Networks and Internets, Performance and Quality of Service*, W. Stallings, 2nd Ed., Prentice Hall, 2002.
4. *Performance Evaluation of Communication Networks*, G.N. Higginbottom, Artech House, 1998.
5. *Computer Systems Performance Modelling*, C.H. Sauer and K.M. Chandy, Prentice Hall.
6. *Simulation Modelling and Analysis by Law and Kelton*, McGraw Hill.
7. "The Practical Performance Analyst", Neil J. Gunther, McGraw Hill, 1998
8. "Queueing Networks and Markov Chains", G. Bolch, et al., Wiley 1998.
9. "Queueing Theory Vol. I and Vol. II", L.Klenrock.
10. "Introduction to Computer System Performance Evaluation", K. Kant, McGRAW Hill, 1992.
11. "Probability, Stochastic Processes, and Queuing Theory", Randolph Nelson, Springer Verlag, 1995.

514402 : Software Engineering Methodologies

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Software Process Models:

Software Process Framework, Process Patterns, Personal and Team Process Models, Process Models: Waterfall Model, Incremental Models, Evolutionary Models, Iterative Development, The Unified Process, Agile process, Process Assessment, CMMI, Impact of Processes and Outcomes, Process Selection and applicability

2. Requirements Engineering

Requirements Engineering Tasks, Requirement Elicitation Techniques, Software Requirements: Functional, Non-Functional, Domain, Requirements Characteristics and Characterization, Requirement qualities, Requirement Specification, Requirement Traceability, System Analysis Model Generation, Requirement Prioritization

3. UML 2.0 Concepts

Programming In Small Versus Programming In Large, UML 2.0 History/ New Features MDA/ MOF/ XMI/ CORBA, Introduction to UML Metamodel , Extensibility Mechanisms and its usage, Introduction to OCL ,Specification techniques of diagrams in UML

4. Behavioral Model

Use Cases, Use Case Diagram Components, Use Case Diagram , Actor Generalization, Include and Extend, Template for Use Case Narrative , Using Use Cases Data Dictionary: Finding the Objects, Responsibilities, Collaborators, and Attributes , CRC Cards

5. Dynamic Behavior:

Sequence diagrams, object lifelines and message types, Refining sequence diagrams, Implementing memory in objects using state machines, States, events and actions, Nested machines and concurrency, Modeling methods with activity diagrams, Activity Diagrams: Decisions and Merges, Synchronization, Drilling Down, Iteration, Partitions, Parameters and Pins, Expansion Regions, Swimlanes, concurrency and synchronization, Communication Diagram, Timing Diagrams

6. Design Engineering :

Design quality, Design Concepts, The Design Model, Introduction to Pattern-Based Software Design, Architecture styles: Main program with sub program style, Abstract data type style, Repository, Layered.

Architectural Design: Software Architecture, Data Design and Architectural Design, User Interface Design: Rules, User Interface Analysis and Steps in Interface Design, Design Evaluation

7. Object Oriented Design :

Design of Objects, Design and Factoring , Design of Software Objects ,Features and Methods, Cohesion of Objects , Coupling between Objects , Coupling and Visibility, Inheritance, Establishing The Object Model, Refining classes and associations, Analysis model vs. design model classes, Categorizing classes: entity, boundary and control, Modeling associations and collections, Achieving reusability, Reuse through delegation , Identifying and using service packages

8. Principles of Testing :

Testing Concepts: Purpose of Software Testing, Testing aspects: Requirements, Test Scenarios, Test cases, Test scripts/procedures, Strategies for Software Testing, Testing Activities, Mistakes, Faults & Failures, Testing, Debugging & Root Cause Analysis, Software Items, Component & Units, Verification & Validation, Test Bed, Traceability and Testability, Attributes of Testable Requirements, Test Matrix, Benefits of Formal Test Documentation

White-Box Testing: Test Adequacy Criteria, Static Testing, Structural Testing, Code Complexity Testing, Mutation Testing

Black-Box Testing: Test Case Design Criteria, Requirement Based Testing, Positive and Negative Testing, Boundary Value Analysis, Equivalence Partitioning, State Based Testing, Compatibility Testing, User Documentation Testing, Domain Testing

9. Project Planning and Estimation :

Project Activities, Structures and Frameworks, Developing Realistic Estimates Integrating the Schedule and Critical Path, Introduction to Complex Projects, Assessing Project Viability, Managing Stakeholders, Introduction to Function Points, Empirical Estimation, COCOMO II model, Software Measurement Framework, Ishikawa's Seven tools, Process Assessment and patterns, CMMI –IPPD, Product and Process attributes

Reference Books:

1. Ian Sommerville, Software Engineering, 7th Edition, Addison-Wesley, 2004,ISBN 81- 7758-530-4
2. Grady Booch, James Rumbaugh, Ivar Jacobson, “Unified Modeling Language Users Guide”, 2nd Edition, Addison- Wesley, ISBN – 0321267974.
3. Jim Arlow, Ila Neustadt, “UML 2 and Unified Process: Practical Object Oriented Analysis and Design. ”, 2nd Edition, Addison- Wesley, ISBN – 0321321278.
4. Tom Pender, “UML Bible”, John Wiley & sons, ISBN – 0764526049.
5. Desikan, Ramesh, ‘ Software Testing: principles and Practices’, Pearson Education, ISBN 81-7758-121-X.
6. Burnstein, “Practical Software Testing”, Springer International Edition, ISBN 81-8128-089-X
7. William E. Perry, “ Effective Methods for Software Testing”, John Wiley and Sons, ISBN 9971-51-345-5
8. Stephen H. Kan, “Metrics and Models in Software Quality Engineering”, Pearson Education, ISBN 81-297-0175-8

514403 : Advanced Operating System

Teaching Scheme

Lectures: 3 Hrs/week

Examination Scheme

Theory: 100 Marks

Total Credits : 03

1. Distributed computing systems fundamentals:

Introduction to Distributed computing systems, Models, Popularity.
Distributed computing system. Design issues of Distributed operating system.
Distributed computing environment.

2. Message Passing:

Features of a good Message Passing System. Issues in IPC by Message Passing
Synchronization, Buffering, Multidatagram Messages, Encoding and Decoding of
Message Data, Process Addressing, Failure handling,

3. Remote Procedure Calls:

RPC Model, Implementing RPC Mechanism. Stub Generation. RPC
Messages, Marshaling Arguments and Results. Server Management, Parameter-
Passing semantics, call semantics, Communication protocols for RPC's, Client-
Server Building, Exception handling, Security RPC in Heterogeneous
Environments, Lightweight RPC.

4. Distributed Shared Memory:

General Architecture of DSM systems. Design and implementation Issues of
DSM, Granularity, Structure of Shared Memory Space. Consistency models,
Replacement strategy, Thrashing. Synchronization: Clock Synchronization. Event
Ordering, Mutual Exclusion, Deadlock, Election Algorithms.

5. Resource Management:

Features of global scheduling algorithm. Task assignment approach, Load-
Balancing and Load approach.

6. Process Management:

Introduction, Process Migration, Treads.

7. Distributed File Systems:

Features of good DFS, File models, File Accessing models. File- Sharing
Semantics, File-Caching schemes, File Replication, Fault Tolerance, Automatic
Transactions, Design Principles, Case study: DCE Distributed File Service. Sun
NFS, OSF, DCE.

9. Case Study:

Case study of Chorus, Mach, Amoeba and OSF distributed Environment,
Solaris.

Reference Books:

1. Distributed Operating Systems concepts and design - P.K.Sinha(PHI).
2. Advanced Operating System - Singhal
3. Distributed Systems concepts and design-G.Coulouris,J.Dollimore & T. Kindberg
4. Modern Operating System - A.S. Tanenbaum(PHI).

514404 A : Software Architecture (Elective - I)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Introduction to Software Architecture :

Software Architecture ,Relationships to Other Disciplines ,Multi-Disciplinary Overview ,
Foundations of Software Architecture , Software architecture in the context of the overall software life cycle, Architectural Styles, CASE study of Architectures

2. Software Architecture Design :

Designing, Describing, and Using Software Architecture, IS2000: The Advanced Imaging Solution, Global Analysis, Conceptual Architecture View, Module Architecture View, Styles of the Module Viewtype, Execution Architecture View, Code Architecture View. Component-and-Connector Viewtype, Styles of Component-and-Connector Viewtype, Allocation Viewtype and Styles, Documenting Software Interfaces, Documenting Behavior, Choosing the Views, Building the Documentation Package

3. Archetype Patterns :

Archetypes and Archetype Patterns, Model Driven Architecture with Archetype Patterns.

Literate Modeling, Archetype Pattern. , Customer Relationship Management (CRM) Archetype Pattern, Product Archetype Pattern, Quantity Archetype Pattern, Rule Archetype Pattern.

4. Introduction to Design Patterns :

Design Patterns, Creational Patterns, Patterns for Organization of Work, Access Control Patterns, Service Variation Patterns, Service Extension Patterns

5. Pattern Types :

Object Management Patterns Adaptation Patterns, Communication Patterns, Architectural Patterns, Structural Patterns, Patterns for Distribution, Patterns for Interactive Systems

Adaptable Systems, Frameworks and Patterns, Analysis Patterns

6. Advanced Patterns :

Patterns for Concurrent and Networked Objects, Patterns for Resource Management, Pattern Languages, Patterns for Distributed Computing

7. Enterprise Architecture Integration :

Defining EAI, Data-Level EAI, Application Interface-Level EAI, Method-Level EAI, User Interface-Level EAI, The EAI Process—Methodology or Madness, An Introduction to EAI and Middleware, Transactional Middleware and EAI, RPCs, Messaging, and EAI, Distributed Objects and EAI, Database-Oriented Middleware and EAI, Java Middleware and EAI, Implementing and Integrating Packaged Applications—The General Idea, XML and EAI, Message Brokers—The Preferred EAI Engine, Process Automation and EAI.

8. Enterprise Architecture Patterns :

Layering, Organizing Domain Logic, Mapping to Relational Databases, Web Presentation, Domain Logic Patterns, Data Source Architectural Patterns, Object-Relational Behavioral Patterns, Object-Relational Structural Patterns, Object-Relational Metadata Mapping Patterns, Web Presentation Patterns, Distribution Patterns, Offline Concurrency Patterns.

Reference Books:

1. Applied Software Architecture ,Christine Hofmeister, Robert Nord, Deli Soni, Addison-Wesley Professional; 1st edition (November 4, 1999) ,ISBN-10: 0201325713 , ISBN-13: 978-0201325713
2. Essential Software Architecture, Ian Gorton Springer; 1 edition (2006) ISBN-10: 3540287132 ISBN-13: 978-3540287131
3. Documenting Software Architectures: Views and Beyond Paul Clements, *Software Engineering Institute*, Felix Bachmann Len Bass, *Software Engineering Institute* David Garlan James Ivers Reed Little Robert Nord Judith Stafford Publisher: Addison-Wesley Professional 2003 ISBN-10: 0201703726 ISBN-13: 9780201703726
4. Pattern-Oriented Software Architecture Volume 1, 2, 3, 4, 5 by Frank Buschmann, Hans Rohnert, Kevin Henney, Douglas C. Schmidt, Publisher: Wiley; 1 edition (August 8, 1996-2004) ISBN-10: 0471958697 ISBN-13: 978-0471958697
5. Design Patterns: Elements of Reusable Object-Oriented Software (Addison-Wesley Professional Computing Series) by Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides Publisher: Addison-Wesley Professional; 1st edition (January 15, 1995) ISBN-10: 0201633612 ISBN-13: 978-0201633610
6. Patterns of Enterprise Application Architecture, Martin Fowler, Addison-Wesley Professional, 2003, ISBN-10: 0321127420 ISBN-13: 9780321127426
7. Enterprise Integration: An Architecture for Enterprise Application and Systems Integration, Fred A. Cummins, Wiley; 2002 ISBN-10: 0471400106 ISBN-13: 978-0471400103

514404 B : Real - Time and Embedded Systems (Elective - I)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Embedded Architecture :

Embedded Computers, Characteristics of Embedded Computing Applications, Challenges in Embedded Computing system design, Embedded system design process- Requirements, Specification, Architectural Design, Designing Hardware and Software Components, System Integration, Formalism for System Design- Structural Description, Behavioral Description, Design Example: Model Train Controller

2. Embedded Processor And Computing Platform :

ARM processor- processor and memory organization, Data operations, Flow of Control, SHARC processor- Memory organization, Data operations, Flow of Control, parallelism with instructions, CPU Bus configuration, ARM Bus, SHARC Bus, Memory devices, Input/output devices, Component interfacing, designing with microprocessor development and debugging, Design Example : Alarm Clock.

3. Networks :

Distributed Embedded Architecture- Hardware and Software Architectures, Networks for embedded systems- I2C, CAN Bus, SHARC link ports, ethernet, Myrinet, Internet, Network-Based design- Communication Analysis, system performance Analysis, Hardware platform design, Allocation and scheduling, Design Example: Elevator Controller.

4. Real-Time Characteristics :

Clock driven Approach, weighted round robin Approach, Priority driven Approach, Dynamic Versus Static systems, effective release times and deadlines, Optimality of the Earliest deadline first (EDF) algorithm, challenges in validating timing constraints in priority driven systems, Off-line Versus On-line scheduling.

5. System Design Techniques :

Design Methodologies, Requirement Analysis, Specification, System Analysis and Architecture Design, Quality Assurance, Design Example: Telephone PBX- System Architecture, Ink jet printer- Hardware Design and Software Design, Personal Digital Assistants, Set-top Boxes.

Reference Books :

1. Wayne Wolf, Computers as Components: Principles of Embedded Computing System Design, Morgan Kaufman Publishers, 2001.
2. Jane.W.S. Liu Real-Time systems, Pearson Education Asia, 2000
3. C. M. Krishna and K. G. Shin , Real-Time Systems, ,McGraw-Hill, 1997 Frank Vahid and Tony Givargi, Embedded System Design: A Unified Hardware/Software Introduction, John Wiley & Sons, 2000.

514404 C : Adhoc Networks (Elective - I)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Introduction :

Introduction-Fundamentals of Wireless Communication Technology - The Electromagnetic Spectrum - Radio Propagation Mechanisms - Characteristics of the Wireless Channel - IEEE 802.11a,b Standard – Origin Of Ad hoc: Packet Radio Networks - Technical Challenges - Architecture of PRNETs - Components of Packet Radios – Ad hoc Wireless Networks -What Is an Ad Hoc Network? Heterogeneity in Mobile Devices - Wireless Sensor Networks - Traffic Profiles - Types of Ad hoc Mobile Communications - Types of Mobile Host Movements - Challenges Facing Ad Hoc Mobile Networks-Ad hoc wireless Internet

2. Ad Hoc Routing Protocols :

Introduction - Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks - Classifications of Routing Protocols -Table-Driven Routing Protocols - Destination Sequenced Distance Vector (DSDV) - Wireless Routing Protocol (WRP) - Cluster Switch Gateway Routing (CSGR) - Source-Initiated On-Demand Approaches - Ad Hoc On-Demand Distance Vector Routing (AODV) - Dynamic Source Routing (DSR) -Temporally Ordered Routing Algorithm (TORA) - Signal Stability Routing (SSR) - Location-Aided Routing (LAR) - Power-Aware Routing (PAR) - Zone Routing Protocol (ZRP)

3. Multicast routing In Ad Hoc Networks :

Introduction - Issues in Designing a Multicast Routing Protocol - Operation of Multicast Routing Protocols - An Architecture Reference Model for Multicast Routing Protocols -Classifications of Multicast Routing Protocols - Tree-Based Multicast Routing Protocols- Mesh-Based Multicast Routing Protocols - Summary of Tree-and Mesh-Based Protocols - Energy-Efficient Multicasting - Multicasting with Quality of Service Guarantees - Application-Dependent Multicast Routing - Comparisons of Multicast Routing Protocols

4. Transport Layer, Security Protocols :

Introduction - Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks - Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks -Classification of Transport Layer Solutions - TCP Over Ad Hoc Wireless Networks -Other Transport Layer Protocols for Ad Hoc Wireless Networks - Security in Ad Hoc Wireless Networks - Network Security Requirements - Issues and Challenges in Security Provisioning - Network Security Attacks - Key Management - Secure Routing in Ad Hoc Wireless Networks

5. Qos and Energy Management :

Introduction - Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks -Classifications of QoS Solutions - MAC Layer Solutions - Network Layer Solutions - QoS Frameworks for Ad Hoc Wireless Networks Energy Management in Ad Hoc Wireless Networks –Introduction - Need for Energy Management in Ad Hoc Wireless Networks - Classification of Energy Management Schemes - Battery Management Schemes - Transmission Power Management Schemes - System Power Management Schemes

References Books :

1. C. Siva Ram Murthy and B.S. Manoj “Ad Hoc Wireless Networks: Architectures and Protocols”, Prentice Hall PTR,2004
2. C.K. Toh, Ad Hoc Mobile Wireless Networks: Protocols and Systems, Prentice Hall PTR ,2001
3. Charles E. Perkins, Ad Hoc Networking, Addison Wesley, 2000

514405 A : Information Assurance And Security (Elective - II)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Fundamental Concepts:

Motivation for security, Basics of computer networks, Internet, Network tools and utilities.

2. Introduction to Security Concepts:

Threats and vulnerabilities in today's digital world; Security terminology, Common attacks.

3. Hacker techniques:

Gathering information, becoming part of a network, launching attacks, hacker tools.

4. Securing a system:

Firewalls, Safe web surfing

5. Securing a transaction:

Encryption, digital signatures, virtual private networks

6. Cyber Crime:

Internet fraud, Identity theft, Industrial espionage, Cyber terrorism

7. Tools and Techniques for Security:

Security hardware and software, intrusion detection systems, security standards.

8. Emerging Areas:

Wireless security, anti-virus and anti-phishing tools, computer forensics, biometrics, establishing security plans and risk mitigation.

514405 B : Compiler Design (Elective - II)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Compiler structure:

Analysis-synthesis model of compilation, various phases of a compiler, tool based approach to compiler construction.

2. Lexical analysis:

Interface with input, parser and symbol table, token, lexeme and patterns. Difficulties in lexical analysis. Error reporting. Implementation. Regular definition, Transition diagrams, LEX.

3. Syntax analysis:

CFGs, ambiguity, associability, precedence, top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence grammars, LR parsers (SLR, LALR, LR), YACC.

4. Syntax directed definitions :

Inherited and synthesized attributes, dependency graph, evaluation order, bottom up and top down evaluation of attributes, L- and S-attributed definitions.
Type checking: type system, type expressions, structural and name equivalence of types, type conversion, overloaded functions and operators, polymorphic functions.

5. Run time system:

Storage organization, activation tree, activation record, parameter passing, symbol table, dynamic storage allocation.

6. Intermediate code generation:

Intermediate representations, translation of declarations, assignments, control flow, Boolean expressions and procedure calls. Implementation issues.

7. Code generation and instruction selection:

Issues, basic blocks and flow graphs, register allocation, code generation, dag representation of programs, code generation from dags, peep hole optimization, code generator generators, specifications of machine.

Reference Books :

1. A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools , Addison-Wesley
2. C. Fischer and R. LeBlanc. Crafting a Compiler , Benjamin Cummings, 1991.
3. C. Fischer and R. LeBlanc. Crafting a Compiler in C , Benjamin Cummings.
4. A. C. Holub. Compiler Design in C , Prentice-Hall Inc., 1993.
5. Appel. Modern Compiler Implementation in C: Basic Design , Cambridge Press.
6. Appel. Modern Compiler Implementation in Java: Basic Design , Cambridge Press.
7. Fraser and Hanson. A Retargetable C Compiler: Design and Implementation , Addison-Wesley.
8. Dhamdhere. Compiler Construction , McMillan India.
9. Holmes. Object Oriented Compiler Construction , Prentice Hall.
10. Holmes. Building your own Compiler with C++ , Prentice Hall.
11. Wirth. Compiler Construction , Addison-Wesley.

514405 C : Geographical Information Systems (Elective - II)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

Aims: To understand fundamental concepts and principles of Geographical Information Systems.

1. Fundamentals of GIS and Cartography :

Roots of GIS, Four M's, Definition, GIS Architecture, Models of GIS, Framework for GIS, GIS Categories, Map as a Model, Spatial Referencing System, Map Projections, Commonly Used Map Projections, Grid Systems, Cartographic Symbolization, Types of Maps, Typography, Map Design, Map Productions, Map Applications.

2. Data Management, Models and Quality Issues :

Conceptual Models, Geographical Data Models, Data Primitives, Data Types - Raster and Vector Approach, Data Modeling and Spatial Analysis, Sources of Geographical Data, Data Collectors and Providers, Creating Digital Data Sets, Data Presentation, Data Updating, Data Storage, Spatial Data Costs, Quality of GIS Output, Sources of Errors in Spatial Data, Factors affecting Reliability of Spatial Data, Faults from Assumptions.

3. 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.

4. 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.

5. Terrain Mapping, Geocoding and Segmentation :

Interpolation, Visualization of Continuous Surfaces, Data Sources for Interpolations, Methods for Interpolations, Global Interpolation, Local Deterministic Methods, Comparison of Global and Local Method, Optimal Interpolation Using Geo Statistics – Kriging, Variogram, Geocoding, Applications of Geocoding, Dynamic Segmentation, Applications of Dynamic Segmentation.

6. Issues and Applications in GIS :

Changes in Technology, Data Supply and Users, Role of Satellite Imagery and Data Sets, Urban and Municipal Applications, Other Applications.

Reference Books:

1. Peter A Burrough and McDonell, "Principles of Geographical Information Systems", Oxford University Press, 1998.
2. M. Anji Reddi, "Remote Sensing and Geographical Information Systems", B. S. Publications, Second Edition, 2001.
3. George B Korte, "The GIS Book", Onword press, Thomson Learning, 5th Edition, 2003.
4. Kang-tsung Chang, "Introduction to Geographical Information Systems", Tata McGraw Hill, Third Edition, 2003.

514406 : Laboratory Practice – I

Teaching Scheme

Practicals: 6 Hrs/week

Examination Scheme

Term Work: 50 Marks

Total Credits : 03

Experiments/Assignments based on 514401,514403 and Elective Subjects and/or small project. The lab in charge should frame minimum of five assignments.

514407 : Seminar – I

Teaching Scheme

Practicals: 4 Hrs/week/student

Examination Scheme

Term Work: 50 Marks

Total Credits : 02

The students will deliver a talk on their experience during the semester referring to at least two research papers and will deliver a seminar on topic of current interest in Information technology, computer science , and Engineering field. The student is expected to review and study at least four research papers from IEEE transactions based on the theory subjects

514409 : Advance Trends in Database Systems

Teaching Scheme

Lectures: 3 Hrs/week

Examination Scheme

Theory: 100 Marks

Total Credits : 03

1. Distributed databases :

Schemas, Architectures, Queries, Transactions, implementation aspects.

2. Data warehousing :

Data preprocessing, Data Warehousing; Warehouse DBMS, multidimensional data warehouses, data warehouse architectures. Data cubes, Dashboards, BI

3. Data Mining :

KDD process, Data mining applications, Data mining Techniques and Algorithms , frequent Patterns, association rules , correlation, classification, prediction

4. Introduction to Active databases syntax, semantics and applications.

5. Introduction to Object Databases .OR mapping classes and inheritance, TP Monitors and architecture of TP systems

6. Web mining introduction, crawling the web, web search and information retrieval

Reference Books :

1. Avi Silberschatz Henry F. Korth S. Sudarshan Database System Concepts Fifth Edition McGraw-Hill
2. Jiawei Han and Micheline Kamber Data Mining: Concepts and Techniques, 2nd ed.
3. Chakrabarti, S. (2002). Mining the Web: Discovering knowledge from hypertext data. Morgan-Kaufman.
4. M. Jarke, M. Lenzerini, Y. Vassiliou, P. Vassiliadis (ed.), Fundamentals of Data Warehouses, Springer-Verlag, 1999
5. Advanced Database Systems (The Morgan Kaufmann Series in Data Management Systems) (Hardcover) by Carlo Zaniolo (Author), Stefano Ceri (Author), Christos Faloutsos (Author), Richard T. Snodgrass (Author), V.S. Subrahmanian (Author), Roberto Zicari (Author)
6. Database Systems: An Application Oriented Approach, Complete Version, 2/E Michael Kifer, Arthur Bernstein, Philip M. Lewis
7. Java Persistence with Hibernate
Second Edition of Hibernate in Action, Christian Bauer and Gavin King

514410 : Information Technology Project Management

Teaching Scheme

Lectures: 3 Hrs/week

Examination Scheme

Theory: 100 Marks

Total Credits : 03

1. Introduction to IT project management :

Project management context, pre-project scenario

2. Project management processes :

Product oriented processes, project oriented processes, processes by life cycle, processes by knowledge areas

3. Project integration management :

Develop project charter, Develop project management plan, Direct and manage project execution, monitor and control project integrated change control procedure, close project

4. Scope management :

Scope planning, scope definition, creating Work Breakdown Structure, Scope verification, scope management

5. Schedule management :

Activity definition, activity sequencing, activity resources estimation, schedule development, schedule control

6. Cost management :

Cost estimating, cost budgeting, cost control

7. Quality management :

Planning for quality, quality assurance, quality control

8. Risk management :

Risk management planning, risk identification, risk analysis, risk response planning, risk monitoring and control

9. Procurement management :

Planning for procurements, planning for contracting, requesting seller responses, seller selection, contract administration, contract closure

10. Human resources management ;

Human resources planning, acquiring project team, developing project team, managing project team

11. Communications management :

Communications planning, information distribution, managing stakeholders

12. Project closing and beyond

Reference Books:

- 1.. Information Technology Project management,
by S.A., Kelkar, Prentice hall of India , 2nd Edition (2007)
- 2.. A guide to Project Management Body of Knowledge
Project Management Institute, USA, (3rd Edition, 2004)
- 3.. Project Management by J.M. Nicholas, Prentice Hall of India, (2004)
- 4.. Information Technology Project Management
by Kathy Schwalbe, Course technology, Thomson Learning, (2000)
- 5.. Information Technology Project Management, by Joseph Phillips
Tata McGraw Hill, (2002)

514411 A : Internet and Web Technologies (Elective - III)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Name Services and Configuration :

DNS,DHCP,X500 Directory Services,LDAP, Internet Security, Authentication and Encryption, Watermarks, Firewall, SSL, Digital Signatures, Kerberos,

2. Network Management :

Infrastructure for Network Management, Intranet Standard Management framework, SMI, MIB, SNMP,CGI Scripts, Scripting Language, Perl, PHP, Java Script and VB Script, Internet Servers, Proxy Server, Search Engine.

3. Web Services :

Web services, Evolution and differences with Distributed computing, XML, WSDL, SOAP, UDDI, Transactions, Business Process Execution Language for Web Services, WS-Security and the Web services security specifications, WS-Reliable Messaging, WS-Policy, WS-Attachments. Web 2.0 technologies Introduction to Ajax, Ajax Design Basics, JavaScript, Blogs, Wikis, RSS feeds.

4. Content Delivery and Preparation :

Introduction to WWW, TCP/IP, HTTP, FTP, UDP, N-Tier, Markup Languages VRML– HTML, DHTML, DNS, URL, Browsers, Platform for Web Services Development

MVC Design Pattern, .NET, J2EE Architecture, J2EE Components & Containers, Specification, Application servers, Struts

5. Dynamic Web Programming :

Java Applets, Java script, JSP, JSTL, ASP, PHP, Servlets, Servlet Life cycle, C#, Component Technologies, Java beans, CORBA, Introduction to EJBs, JDBC, Secure Electronics Transactions over Web, Secure E-mail, SSL, TLS, Network layer Security.

6. APIs :

Java Mail API, JNDI, JMS, Introduction and evolution of Portals, Portal Application Development, Overview of IBM Portlet API, Overview of JSR 168 API, Developing sample JSR 168 portlet, Overview of Internationalization and localization.

Reference Books :

1. Ravi Kalakota and Andrew B Whinston, “Frontiers of Electronic commerce”, Addison Wesley,
2. Eric Ladd, Jim O’ Donnel, “ Using HTML 4, XML and Java”, Prentice Hall of India – QUE,

3. Jeffy Dwight, Michael Erwin and Robert Niles, "Using CGI", prentice Hall of India – QUE,
4. Scot Johnson, Keith Ballinger, Davis Chapman, "Using Active Server Pages", Prentice Hall of India,
5. Margaret Levine Young, "Internet and WWW", 2nd Edition, Tata McGraw Hill,
6. Herbert Schildt, The Complete Reference – Java 2 , 4th Edition, Tata McGraw Hill,
7. Keyur shah, "Gateway to Java Programmer Sun Certification", Tata Mc Graw Hill
8. Deitel & Deitel, Java How to Program, Prentice Hall
- 9.
10. Margaret Levine Young, "Internet and WWW", 2nd Edition, Tata McGraw Hill,
11. Herbert Schildt, The Complete Reference – Java 2 , 4th Edition, Tata McGraw Hill,
12. Keyur shah, "Gateway to Java Programmer Sun Certification", Tata Mc Graw Hill
13. Deitel & Deitel, Java How to Program, Prentice Hall

514411 B : Advance Topics in Operating Systems (Elective - III)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Introduction to Operating Systems Internals :

Study and comparison of different operating system architectures: Windows, Linux, Solaris

2. Process Management :

Windows: System Mechanisms, Management Mechanisms, Startup and Shutdown, Process, Threads and Jobs

Linux: Process Descriptor and Task Structure, Process Creation, Implementation of threads, Process Termination, Process Scheduling,

3. Memory Management :

Windows: Memory manager & its services, System memory pools, Virtual address space layout, address translation, page fault handling.

Linux: Pages, Zones, kmalloc, vmalloc, slab layer, slab layer allocator, statically allocating on the stack, High memory mapping.

4. File Management :

Windows: Windows file system formats, FS driver architecture, troubleshooting FS problems, NTFS design goal and features, NTFS drivers, NTFS on disk structure.

Linux: Common File system Interface, File Abstraction Layer, Unix File System, VFS, Dentry Object, Super block Object, Inode Object, File Object, Data structure associated with File systems.

5. I/O Management :

Windows: I/O system components, Device drivers, IO processing, PnP manager.

Linux: Anatomy of block device, Buffer & Buffer Heads, the bio structure, Request queue, I/O scheduler.

6. Device driver for printer and network card for linux and windows. :

Study effect of different parameters of setting of TCP/IP for linux and windows OS. Creating device driver for linux and windows

Textbooks:

1. Jim Mauro, Richard McDougall: "Solaris Internals: Core Kernel Architecture", 2nd Edition, Pearson Education
2. Robert Love: "Linux Kernel Development", 2nd edition, Pearson Education.
3. Daniel Bovet: "Understanding the Linux kernel", 3rd edition, O'Reilly Publications
4. Mark Russinovich, David Solomon: "Windows Internals", 4th edition, Microsoft Press

514411 C : Mobile Computing and M Commerce (Elective - III)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

Introduction:

Generations of mobile computing, Spectrum allocation, Standard Bodies, Players in the Wireless Space, three tier architecture of mobile computing, Mobile Computing through Internet, Basic cellular system, concept of frequency reuse channels, hand-off mechanism, cell splitting

1. GSM & GPRS :

GSM features and Architecture , Network Aspects in GSM ,GSM Frequency Allocation, Mobility management, hand-off mechanisms, cell splitting, Security issues used in GSM, GPRS features and architecture, network operations, data services in GPRS, applications and limitations, SMS and MMS services architecture and operation details

2. Emerging Telecommunication Technologies :

Introduction, bluetooth, EDGE, UMTS, Wireless Broadband (WiMAX), Mobile IP, Java Card, WLAN, Ad-hoc Networks, Sensor Networks, Spread Spectrum technology, CDMA, Third generation networks and applications, WAP: Model, architecture & protocol stack

3. 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

4. M-Commerce :

Introduction to m-commerce :Emerging applications, different players in m-commerce, m-commerce life cycle
Mobile financial services, mobile entertainment services, and proactive service management

5. Management of mobile commerce services :

Content development and distribution to hand-held devices, content caching, pricing of mobile commerce services
The emerging issues in mobile commerce : The role of emerging wireless LANs and 3G/4G wireless networks, personalized content management, implementation challenges in m-commerce, futuristic m-commerce services

Text Book:

1. Mobile Computing (Technology, Applications and Service Creation)
Asoke. K Talukder and Roopa R. Yavagal.TATA McGRAW HILL
- 2.Mobile Communication : Jachan Schiller, Adison-Wesley.
Wireless and Mobile Network Architecture : Yi-Bing Lin, Wiley
Mobile Commerce: Technology, Theory and Applications by Brian
Mennecke and Troy J. Strader, Idea Group Publishing

Refrence Books :

1. Mobile Commerce and Applications, Upkar Varshney, A tutorial at IEEE International Conference on Wireless Communications (WCNC)
2. Mobile Commerce: Frameworks, Applications and Networking Support, ACM/Kluwer Journal on Mobile Networks and Applications (MONET), June 2002 (Upkar Varshney and Ron Vetter)
3. Location-based Mobile Commerce Services, ACM Transactions on Internet Technology, August 2003, (Upkar Varshney)
4. Mobile Commerce: An Emerging Frontier, IEEE Computer, Oct 2000 (Varshney and others)
5. Group-oriented Mobile Services, ACM/Kluwer Journal on Mobile Networks and Applications (MONET), 2004 (Upkar Varshney)

514411 D : User Interface Design (Elective - III)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Introduction to Human-Computer Interaction as an emerging field :

Disciplines contributing to HCI, Human Information Processing
Psychology of everyday things, Importance of human factors in
design – cultural , emotional , technological, business,Need Satisfaction
curve of technology,Levels of human computer interaction

2. Foundations of User Interface Design (U.I.D) :

Goals of UID, Goal directed Design, User Interface Models,
Understanding and Conceptualizing Interface, Psychology of users designing
for collaboration and communication, Process of Interaction Design, Standards
& Guidelines, Usability Testing, GIU.

3. UCD Models , UCD methodology :

User centered design life cycle - cooperative , participative , contextual
Understanding users , user experience levels , human information processing
- i/o channels ISO 13407,Human memory , user study techniques , user
models,User research - Personas, , scenarios , story boarding
Focus Groups , Card Sorting , Questionnaires , Interviews , On-site
observation,Role Playing, Walkthroughs,

4. User research :

[O,interviews,questionnaires](#),social interaction & emotional design,

5. Interaction Design :

Goals of interaction design , Interaction design strategies
Task analysis & design , GOMS model , navigation design , screen design
Defining interactivity , types of interactions , interaction models
Interaction models , styles, Advancements in interaction devices
Ergonomics principles in interaction design

6. Design - Types participatory :

Scenario/task based , usage centered , user centered,
User interface models, Interface metaphors and conceptual models
User support systems – online help, documentation
Accessibility of User Interfaces
Heuristics , Principles , patterns in interaction design
HCI frameworks, Architectural patterns for user interface
Designing for effectiveness , comprehension , satisfaction

7. Evaluation criteria for UI testing :

Usability Testing , Suitability Testing , Accessibility Testing
Testing methods - Think Aloud , Video taping , Customer Satisfaction
questionnaires
Advantages & disadvantages of user centered design
Case studies in UCD

8. Usable Web - Web Site Usability :

Web User Interfaces , Rich web experience design
Navigations , Links , Searching , Comparisons , Readability ,
Collaborative systems, groupware & coordination technology

9. Object Oriented User Interfaces (OOUI) :

Identifying needs and establishing requirement , Object Oriented User
Interface, Migrating GUI to Object Oriented User Interfaces.

10. Advanced UI – Techniques and Technology :

User Interface design, Toolkit, Help Advise, Wizard Testing and Modeling
Testing, PC –Internet user Interface.

Reference Books :

1. Elements of User Interface Design - Theo Mandel, John Wiley & Sons
2. Interaction Design – Preece, Roger, Sharp, John Wiley & Sons
3. Essentials of User Interface Design – Alan Cooper – Wiley India.
4. Object Modeling & User Interface Design - Mark Hamelen ,
5. Human Computer Interaction by Alan Dix

514412 A : Component Based Development (Elective - IV)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Introduction to Component Based Development :

Definition of Software Component and its Elements, The Component Industry Metaphor, Component Models and Component Services: Concepts and Principles, An Example Specification for Implementing a Temperature Regulator Software Component.

2. Case for Components :

The Business Case for Software Components, COTS Myths and Other Lessons Learned in Component-Based Software Development, Roles for Component-Based Development, Common High Risk Mistakes in Component-Based Software Engineering, CBSE Success Factors: Integrating Architecture, Process, and Organization

3. Software Component Infrastructure :

Software Components and the UML, Component Infrastructures: Placing Software Components in Context, Business Components, Components and Connectors: Catalysis Techniques for Defining Component Infrastructures, an Open Process for Component-Based Development, Designing Models of Modularity and Integration.

4: Management of CBD :

Measurement and Metrics for Software Components, The Practical Reuse of Software Components, Selecting the Right COTS Software: Why Requirements are Important, Build vs. Buy, Software Component Project Management Processes, The Trouble with Testing Software Components, Configuration Management and Component Libraries, The Evolution, Maintenance and Management of Component-Based Systems

5: Component Technologies

Overview of the CORBA Component Model, Transactional COM+: Designing Scalable Applications, The Enterprise JavaBeans Component Model, Choosing Between COM+, EJB, and CCM, Software Agents as Next Generation Software Components,

Reference Books:

1. Component Software ,Clemens Szyperski, Addison-Wesley Professional; 2 edition ,, 2002, ISBN-10: 0201745720, ISBN-13: 978-0201745726
2. Component-Based Software Engineering: Putting the Pieces Together George T. Heineman, William T. Councill, Addison-Wesley Professional, 2001 ISBN 1`0: 0201704854,ISBN-13:9780201704853

514412 B : Advanced Network Programming (Elective - IV)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. The Transport Layer: TCP and UDP with policy control :

TCP Connection Establishment and Termination, TIME_WAIT State, Port Numbers, Concurrent Servers, Buffer Sizes and Limitations.

2. Sockets and Socket Programming :

Introduction, Socket Address Structures, Value-Result Arguments, Byte Ordering Functions, Byte Manipulation Functions, socket Function. TCP Client-Server: TCP Echo Server, TCP Echo Client, Crashing of Server Host, Crashing and Rebooting of Server Host, Shutdown of Server Host. UDP Sockets: UDP Echo server, UDP Echo Client.

3. Routing Sockets :

Datalink Socket Address Structure, Reading and Writing, Interface Name and Index Functions

4. Name and Address Conversions :

Domain Name System, Functions. Advanced Name and Address Conversions: Functions and Implementation

5. IPv4 and IPv6 Interoperability :

IPv4 Client, IPv6 Server, IPv6 Client, IPv4 Server, IPv6 Address Testing Macros, IPV6_ADDRFORM Socket Option

6. Multicasting and Broadcasting :

Broadcast Addresses, Unicast versus Broadcast, Multicasting: Multicast Addresses, Multicasting versus Broadcasting on A LAN, Multicasting on a WAN, Multicast Socket Options, Simple Network Time Protocol, SNTP.

7. Threads :

Thread Functions: Creation and Termination, TCP Echo Server, Thread-Specific Data, Web Client and Simultaneous Connections

8. Client-Server Design Alternatives :

TCP Client Alternatives, TCP Test Client, Iterative Server, Concurrent Server, Thread Locking around accept, TCP Preforked Server, Descriptor Passing, TCP Concurrent Server, One Thread per Client, TCP Prethreaded Server.

Reference Books:

1. Richard Stevens, Bill Fenner, "UNIX network programming Volume-1 -The Sockets Networking API", 3rd edition.
2. W. Richard Stevens, "Advanced Programming in the Unix Environment", Addison Wesley.
3. UNIX Internals – "A new Frontier" , PHI

514412 C : High Performance Computer Networks (Elective - IV)

Teaching Scheme

Lectures: 3 Hrs/Week

Examination Scheme

Theory: 100 Marks

Total Credits: 03

1. Network Performance analysis :

Objectives and requirements for Quality of Service (QoS) in high performance networks. Architecture of high performance networks (HPN), design issues, protocols for HPN, VHF backbone networks, virtual interface architectures, virtual interface for networking, High-speed switching and routing - internet and PSTN IP switching techniques, SRP protocols, SRP authentication, and key exchange, comparison of TCP/IP, FTP, TELNET, queuing systems, network modeling as a graph

2. Gigabit Ethernet :

Architecture, standards, interface, applications, network design

3. High speed networks :

A. Frame relay: Frame relay protocols and services, frame relay congestion control

B. ATM: Architecture, protocol, switching, traffic and congestion control, flow control, error detection and control, traffic management, ATM service categories, ATM in LAN environment, classical IP over ATM

C. ISDN: ISDN overview, interfaces and functions, physical layer, Network layer, ISDN services

D. B-ISDN: Driving forces and need, B-ISDN standards and services, B-ISDN Functional Architecture, B-ISDN Transmission structure, B-ISDN protocol architecture

4. ADSL and DSL Technologies :

Background and technological capabilities, Standards and associations, Architecture, Conceptual overview of VDSL, Deployment Case study, Market status and future

5. Fiber Optics Communication:

GPON (Gigabit capable Passive Optical Network), SONET/SDH and comparison with other available standards, SAN (Storage Area Networks) and Fiber Channel, DWDM, and CWDM

6. Wireless Networks:

Overview of GSM & CDMA, 3G mobile technologies, UMTS, EDGE, WiFi, WiMax

Reference Books :

1. Jochetl Schiller: Mobile Communication: Addison Wesley.
2. Tanenbaum: Computer Networks: PHI
3. M Shwartz: Telecommunication Network Protocol Modeling And Analysis:
Addison Wesley
4. Gallangar: Data Networks: Prentice Hall
5. Fred Halsall: Data Communication Computer Networks, And Open Systems:
Addison Wesley
6. Kershanbaum : Telecommunication Network Design Algorithms: MGH
7. William Stallings: ISDN And BISDN
8. William Stallings: High Speed Networks
9. Computer Networks And Internet: Comer
10. Johnson: Fast Ethernet

514412 D : Open Elective (Self Study)**

Teaching Scheme

Lectures: 3hrs/week

Examination Scheme

Theory: 100 Marks

Total Credits : 03

** Open Elective - Institute will Interact with Industry to offer a need based topic.
–BOS Information Technology will declare the list of subjects which can be taken under open elective.

514412 D : Service Oriented Architecture (Open Elective)

Teaching Scheme

Lectures: 3 Hrs/week

Examination Scheme

Theory: 100 Marks

Total Credits : 03

1. SOA Fundamentals :

Defining SOA, Business Value of SOA, Evolution of SOA, SOA characteristics, concept of a service in SOA, misperceptions about SOA, Basic SOA architecture, infrastructure services, Enterprise Service Bus (ESB), SOA Enterprise Software models, IBM On Demand operating environment

2. SOA Planning and Analysis :

Stages of the SOA lifecycle, SOA Delivery Strategies, service-oriented analysis, Capture and assess business and IT issues and drivers, determining non-functional requirements (e.g., technical constraints, business constraints, runtime qualities, non-runtime qualities), business centric SOA and its benefits, Service modeling, Basic modeling building blocks, service models for legacy application integration and enterprise integration, Enterprise solution assets(ESA)

3. SOA Design and implementation :

Service-oriented design process, design activities, determine services and tasks based on business process model, choosing appropriate standards, articulate architecture, mapping business processes to technology, designing service integration environment (e.g., ESB, registry), Tools available for appropriate designing, implementing SOA, security implementation, implementation of integration patterns, services enablement, quality assurance

4. Managing SOA Environment :

Distributing service management and monitoring concepts, operational management challenges, Service-level agreement considerations, SOA governance (SLA, roles and responsibilities, policies, critical success factors, and metrics), QoS compliance in SOA governance, role of ESB in SOA governance, impact of changes to services in the SOA lifecycle

Reference Books :

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Prentice Hall Publication, 2005.
2. Norbert Bieberstein, Sanjay Bose, Marc Fiammante, Keith Jones, Rawn Shah, "Service-Oriented Architecture Compass: Business Value, Planning, and Enterprise Roadmap", IBM Press Publication, 2005.
3. *Sandy Carter*, "The New Language of Business: SOA & Web 2.0", IBM Press, 2007.
4. Thomas Erl, "Service-Oriented Architecture: A Field Guide to Integrating XML and Web Services", Prentice Hall Publication, 2004
5. Dave Chappell, "Enterprise Service Bus", O'Reilly Publications, 2004
6. Sanjiva Weerawarana, *Francisco Curbera*, *Frank Leymann*, *Tony Storey*, *Donald F. Ferguson*, "Web Services Platform Architecture: SOAP, WSDL, WS-Policy, WS- Addressing, WS-BPEL, WS-Reliable Messaging, and More", Prentice Hall Publication, 2005
7. Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Addison Wesley Publication, 2004

514413 : Laboratory Practice – II

Teaching Scheme

Practicals: 6 Hrs/week

Examination Scheme

Term Work: 50 Marks

Total Credits : 03

Experiments/Assignments based on 514409, 514411 and 514412 and/or small project.
The lab in charge should frame minimum of five assignments.

514414 : Seminar – II

Teaching Scheme

Practicals: 4 Hrs/week/student

Examination Scheme

Term Work: 50 Marks

Total Credits : 02

The students will deliver a talk on their experience during the semester referring to at least two research papers and will deliver a seminar on topic of current interest in Information technology, computer science , and Engineering field. The student is expected to review and study at least four research papers from IEEE transactions based on the theory subjects

514415 : Seminar – III

Teaching Scheme

Practicals: 4 Hrs/week/student

Examination Scheme

Term Work: 50 Marks

Total Credits : 02

The Student will deliver a seminar based on the survey made in selection of the topic for project. This will include presentation on papers referred in the topic selected for dissertation.

514416 : Project Stage – I

Teaching Scheme

Practicals: 6 Hrs/week

Examination Scheme

Term Work: 50 Marks

Total Credits : 06

Contents. Research and development projects based on problems of practical and theoretical interest. First part of a two semester long project activity. Problem definition, background research, development of overall project plan (detailed design, milestones, etc.) and meeting the research and development targets set up for the first part. Evaluation will be based on student seminars, written reports, and evaluation of the developed system and/or theories. It is expected that the student will submit at least one paper in journal or conference before submission of project stage II.

514416 : Project stage – II

Teaching Scheme

Practicals: 12 Hrs/week

Examination Scheme

Term Work: 150 Marks

Oral Marks : 50

Total Credits : 12

Contents. Second part of the two semester project. The primary objective is to meet the milestones formed in the overall project plan. Evaluation will be held periodically, and will be based on written reports, oral presentations and demonstration of results. The project will culminate in the production of a thesis by each individual student. Final evaluation will be according to the M.E., project evaluation guidelines.

