B.E. Information Technology

2008 Course

Proposed in 2011-12

(Faculty of Engineering)

Structure of B.E. (Information Technology) 2008 Course
Proposed in 2011-12

Part – I

Sub No.	Subject	Teaching Scheme		Examination Scheme				Marks Total
		Lect	Pract	Theory	Term Work	Pract.	Oral	
		(Hrs. / Week)						
414441	Information Assurance and Security	4	2	100	50	--	50	200
410443	Object Oriented Modeling and Design	4	--	100	--	--	--	100
414442	Software Testing and Quality Assurance	4	--	100	--	--	--	100
414443	Elective – I	4	--	100	--	--	--	100
414444	Elective – II	4	--	100	--	--	--	100
414445	Computer Lab Practices I	--	4	--	50	50	--	100
414446	Project Work	--	2	--	50	--	--	50
Total		**20**	**08**	**500**	**150**	**50**	**50**	**750**
Total of Part I		**28**						**750 Marks**

B.E. (Information Technology Course) Part – II

Sub No.	Subject	Teaching Scheme		Examination Scheme				Marks Total
		Lect	Pract	Theory	Term Work	Pract.	Oral	
		(Hrs. / Week)						
414448	Distributed System	4	--	100	--	--	--	100
414449	Information Retrieval	4	--	100	--	--	--	100
414450	Elective – III	4	2	100	50	--	50	200
414451	Elective – IV	4	--	100	--	--	--	100
414452	Computer Lab Practices II	--	4	--	50	50	--	100
414447	Project Work	--	6	--	100	--	50	150
Total		**16**	**12**	**400**	**200**	**50**	**100**	**750**
Total of Part II		**28**						**750 Marks**
Total of Part – I & Part – II								**1500 Marks**

Elective – I
1. Advance Database Management
2. Artificial Intelligence
3. Compiler Deign
4. Advanced Operating Systems

Elective – II
1. Embedded System
2. Mobile Computing
3. Multimedia Systems

Elective – III
1. Real Time System
2. Software Architecture
3. Advanced Graphics
4. Advance Computer Networks

Elective – IV
1. Bio Informatics
2. Neural Network and Expert System
3. Geo Informatics Systems
4. Open Elective

Semester - I

Information Technology

2008 Course

414441: Information Assurance and Security

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisite: Data Communication and Computer Networks
Objectives: Understand the essentials of information security**.**
Learn the algorithms for implementing security

Unit I Security Fundamentals (8 Hrs.)
Introduction, Terminology, Attacks, Security Goals : Authentication, Authorization, Cipher Techniques: Substitution and Transposition, One Time Pad, Modular Arithmetic, GCD, Euclid's Algorithms, Chinese Remainder Theorem, Discrete Logarithm, Fermat Theorem, Block Ciphers, Stream Ciphers. Secret Splitting and Sharing.

Unit II Cryptography (8 Hrs.)
Symmetric Key Algorithms: DES, AES, BLOFISH, Attacks on DES. Modes of Operations, Linear Cryptanalysis and Differential Cryptanalysis. Public Key Algorithms: RSA, Key Generation and Usage, ECC. Hash Algorithms: SHA-1, MD5.

Unit III Key Management (8 Hrs.)
Introduction, Key Management: Generations, Distribution, Updation, Digital Certificate, Digital Signature, PKI. Diffiee Hellman Key Exchange. One Way Authtication, Mutual Authentication, Neeham Schroeder Protocol.

Unit IV Network Security (8 Hrs.)
Layer Wise Security Concerns, IPSEC- Introduction, AH and ESP, Tunnel Mode, Transport Mode, Security Associations, SSL- Introduction, Handshake Protocol, Record Layer Protocol. IKE- Internet Key Exchange Protocol. Intrusion Detection Systems: Introduction, Anomaly Based, Signature Based, Host Based, Network Based Systems.

Unit V Security Management and Applications (6 Hrs.)
ISO 27001 Security Standard: Introduction, Evolution of standard, Organizational Context, Implementation, Certifications and benefits. Electronic Payment: Introduction, Payment types, Smart Cards, Chip card transactions and attacks, Payment over internet, Mobile Payments, Electronic Cash.

Unit VI Cyber Crimes & Laws (6 Hrs.)
Introduction, Computer Forensics, Online Investgative tool, tracing and recovering electronic evidence, Internet fraud, Identity Theft, Industrial Espionage, Cyber Terrorism. Indian IT laws: Introduction and briefs of Law clauses.

Text Books :

1. Bruice Schneier, "Applied Cryptography- Protocols, Algorithms and Source code in C", 2nd Edition, Wiely India Pvt Ltd, ISBN 978-81-265-1368-0
2. Bernard Menezes, "Network Security and Cryptography", Cengage Learning, ISBN-978-81-315-1349-1

Reference Books :

1. Nina Godbole, " Information Systems Security", Wiley India Pvt Ltd, ISBN -978-81-265-1692-6
2. Willaim Stallings, "Computer Security : Principles and Practices", Pearson Ed. ISBN : 978-81-317-3351-6
3. Mark Merkow, " Information Security-Principles and Practices", Pearson Ed. 978-81-317-1288-7
4. CK Shyamala et el., "Cryptography and Security", Wiley India Pvt Ltd, ISBN 978-81-265-2285-9
5. Berouz Forouzan, "Cryptography and Network Security", 2 edition, TMH, ISBN : 9780070702080

410443: Object Oriented Modeling and Design

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisites: Software Engineering

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

Unit I Introduction to OMG Standards: MDA, MOF, XMI, CORBA, UML 2.0. UML History, UML 2.0 New Features. Introduction to UML, UML Meta Model Conceptual Model of UML, Extensibility mechanisms like stereotypes, tagged values, constraints and profiles. OCL. Overview of all diagrams in UML 2.0. (8 Hrs.)

Unit II 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, Overview of Use Case Diagram. (6 Hrs.)

Unit III CRC method, Class diagrams, Classes and Relationships, Advanced Classes, Advanced relationships generalization, association with its adornments, dependencies, realization. Interfaces and ports. Packages & diagrams.
Instances, Active Objects & object diagram, Composite structure diagrams including composite structures, collaborations (8 Hrs.)

Unit IV Interaction diagrams. Interaction Overview diagrams including interactions, signals, exceptions, regions, partitions, Sequence diagrams, Communication diagrams. (8 Hrs.)

Unit V Activity diagrams, Activities, sub activities, Events &signals, exceptions, partitions, regions. State Machine diagrams, States, encapsulation of states, transitions, submachine, state Generalization. Timing diagrams. Processes & threads, time & space, Modeling reactive object. (6 Hrs.)

Unit VI Support for modeling Architecture in UML. Component diagrams, Deployment diagrams. Collaborations. Pattern & framework.
Applications of UML in embedded systems, Web applications, commercial applications. (6 Hrs.)

Note: All diagrams are to be assumed for UML 2.0 *for* each diagram the need, purpose, Concepts, Notation, Forward Engineering, and Reverse Engineering for class diagram 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.
2. Dan PHone, 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, Addision Wesley, "UML Distilled A Brief Guide to the Standard object Modeling Language", Third Edition

414442: Software Testing and Quality Assurance

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisites: Software Engineering

Objectives: Introduction to software testing lifecycle.
Understanding various types of software tests and quality control standards

Unit I Testing Principles (6 Hrs.)

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

Unit II Test Management (6 Hrs.)

Testing Life Cycle – Roles and activities,
Test Planning – forming a test team, develop test plan review
Test Cases design strategies
black box approach: random testing, equivalence class partitioning and boundary value analysis.
white box approach: test adequacy criteria, coverage and control flow graphs, paths, loop testing, mutation testing.
Test execution: build test data, life cycle of defect, defect tracking, defect detection stages, defect detection stages, defect types, defect severity, defect analysis and prevention.

Unit III Software Metrics (6 Hrs.)

Scope of software metrics, Classifying software measures, Measurement basics – representational theory, scales, meaningfulness, What to measure – GOM 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 IV Quality Assurance (6 Hrs.)

Quality concepts – quality, quality control, quality assurance, cost of quality
Software quality assurance – SQA activities, software reviews, inspections, audits, Software reviews, inspections, audits, Software reliability Quality Attributes: correctness, reliability, usability, integrity, portability, maintainability, interoperability. Ishikawa's Seven Basic Tools

Unit V Quality Standards (6 Hrs.)

Basic concept of – ISO 9000 & 9001, CMM, six sigma.

Unit VI Development of CMM (8 Hrs.)

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

Text Books :

1. Iien 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 McGraw Hill.
3. Pankay Jalote "CMM Practice" Pearson Education.

414443: Elective I – Advance Database Management

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisites: Database Management systems

Objectives: Understand the salient features of various types of databases, transaction management, data warehousing and data mining

Unit I Overview (8 Hrs.)

PL/SQL – Introduction to PL/SQL – Declare, begin statements, Variables, Control Structure, PL/SQL Transactions – Savepoint, Cursor, PL/SQL Database Objects – Procedures, Functions, Packages, Triggers.

Programmatic SQL – Embedded SQL, Dynamic SQL, and ODBC Standard.

Unit II Transaction processing and concurrency control (8Hrs.)

Definition of Transaction and ACID properties. Transaction Processing - Transaction-processing monitors, transactional workflows, main-memory databases, real-time transaction systems, long-duration transactions, transaction management in multi-databases. Concurrency Control – Locks, Optimistic Concurrency Control (Backward and Forward validations), Timestamping Concurrency Control.

Unit III Object-based databases and xml (8 Hrs.)

Object-based databases – Complex data types, structured types and inheritance in SQL, table inheritance, array and multiset types in SQL, object-identity and reference types in SQL, implementing O-R features, Persistent programming languages, OO vs OR. XML – Structure of XML, Document Schema, Querying and Transformation, API in XML, XML applications.

Unit IV Data warehousing (8 Hrs.)

Introduction to Data Warehousing – Concepts, Benefits and Problems, DW Architecture – Operational Data, load manager, meta data, DW Data flows – inflow, upflow, meta flow, DW tools and technologies – Extraction, cleansing and transformation tools, DW DBMS, admin and management tools, data marts – reasons and issues, Data Warehousing using Oracle.

Data Warehousing Design – Designing, Dimensionality modeling, Design methodology, DW deign using Oracle.

Unit V Olap and data mining (8Hrs.)

On-line Analytical Processing – OLAP BenchMarks, applications, benefits, tools, categories, extensions to SQL, Data mining – introduction, techniques, predictive modeling, tools. Data mining algorithms – Apriori, Decision tree, k-means, Bayesian classifier.

Unit VI Database security (8 Hrs.)

Security and integrity threats, Defence mechanisms, Statistical database auditing & control. Security issue based on granting/revoking of privileges, Introduction to statistical database security. PL/SQL Security – Locks – Implicit locking, types and levels of locks, explicit locking, Oracles' named Exception Handlers.

Text Books:

1. A. Silberschatz, H. Korth and S. Sudarshan, "Database System Concepts", Fifth Edition, McGraw-Hill International Edition.
2. Thomas Connolly and Carolyn Begg, "Database Systems – A Practical Approach to Design, Implementation and Management", Third Edition, Low Price Edition.

Reference Books:

1. Ivan Bayross, "SQL, PL/SQL – The Programming Language of ORACLE", Third Revised Edition, BPB Publication.
2. Jiawei Han and Micheline Kamber, "Data Mining – Concepts and Techniques", Second Edition, Elsevier.
3. M. Gertz, and S. Jajodia, "Handbook of Database Security- Application and Trends", 2008, Springer.

414443: Elective I – Artificial Intelligence

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisites: Discrete mathematics, basic probability theory and statistics
Knowledge of any programming language and data structures

Objectives

- Introduction to the basic principles and applications of Artificial Intelligence.
- Understanding of the basic areas of artificial intelligence such as problem solving, knowledge representation, reasoning, planning, perception, vision and learning
- Students will also be able to design and implement key components of intelligent agents and expert systems of moderate complexity in C++/Java and/or Lisp or Prolog and evaluate their performance.

Unit I Introduction to AI and intelligent agents (8 Hrs.)

What is Artificial Intelligence? The Turing Test, AI Problem, AI Techniques, Foundation of Artificial Intelligence

Intelligent Agents – Agents and environments, Good behavior, nature of environments, structure of agents, problem solving agents

Application of AI and Swarm intelligent systems

Unit II Heuristics search and game playing (8 Hrs.)

Defining the problem as a state space search, production system, problem characteristics

Heuristic search techniques- Generate and test, Hill Climbing, Best-First Search, Constraint satisfaction problems (CSP)

Application of search in Game playing – Minimax search procedure, Adding alpha-beta cutoffs, additional refinement, State of Art Game programs.

Unit III Knowledge representation & NLP (8 Hrs.)

Representation and mapping, Approach & Issues in knowledge representation, Prepositional logic

First order logic – representation revisited, syntax and semantics for first order logic, using first order logic, Knowledge engineering in first order logic, inference in First order logic, unification and lifting

Weak-slot and filler structure, Strong slot and filler structures. Reasoning Under Uncertainty – Nonmonotonic reasoning, logic for Nonmonotonic reasoning

Natural Language Processing- Introduction, Steps in the process, Spell checking

Unit IV Planning and perception (8 Hrs.)

Planning – Block world problem, components of a planning systems, Goal stack planning, Non-linear planning, Hierarchical planning, least commitment strategy

Perception – Image formation, Image processing operations, Extracting 3D information, Object Recognition, Using vision for manipulation and navigation

Unit V Learning and expert system (8 Hrs.)

What is learning?, Forms of learning, Rote learning, learning by taking advice, Learning in problem solving, Induction leaning, Explanation based learning, Formal learning theory. Connectionist models- learning in Neural network

Architecture of expert system, expert system shell, explanation, knowledge Acquisition, Two case studies of an expert system.

Unit VI AI Programming and Advanced AI (8Hrs.)

AI Programming: Converting English to Prolog facts and Rules, Prolog Terminology, Arithmetic operation, Matching, Backtracking, Cuts, Recursion, Lists. Prolog in Artificial Intelligence

Advanced AI: Genetic Algorithms, Parallel & Distributed AI

Text Books :

1. Elaine Rich and Kevin Knight, Shivashankar Nair, “Artificial Intelligence”, 3rd Edition, Tata McGraw-Hill, ISBN-10- 0070087709, ISBN-13- 9780070087705
2. Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, 2nd Edition, Pearson Education / Prentice Hall of India, ISBN: 0137903952

Reference Books :

1. George F. Luger , “Artificial Intelligence: Structures and Strategies for Complex Problem Solving”, Pearson, ISBN-10: 0321545893
2. N.P. Padhy, “Artificial Intelligence And Intelligent Systems”, Oxford University Publishers, ISBN 9780195671544
3. Ivan Bratko, “PROLOG : Programming for Artificial Intelligence”, Pearson Education, 3 Edition, ISBN10: 0-201-40375-7
4. Saroj Kaushik, “Artificial Intelligence”, Cengage Learning, , ISBN-13: 9788131510995

414443: Elective I - Compiler Design

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisite: System Software Programming

Objectives: To introduce principles behind the design of common programming language features
To understand the details of all phases of compilers
To apply the phases of compiler on object oriented programming languages.

Unit I High Level languages; Programming Paradigms; Compilers and their structure, Types of the compilers (8Hrs.)
Syntax and Notations; Regular Expressions and Lexical Syntax; Context Free Grammars; Lexical Analysis

Unit II Parsing – Top Down Parsing; Recursive Descent Parsing; Bottom up Parsing, LR parsing & LALR parsing; Ambiguity (6 Hrs.)

Unit III Abstract Syntax Trees; Semantic Actions, Control Flow; Loops and Loop Invariants, Types; Type Checking (8 Hrs.)

Unit IV Procedures/Functions; Calls; Parameter Passing; Scope and Scope Rules, Runtime Memory Models; Activations Records (Frames); Activation Stacks (Call Stacks) (8Hrs.)

Unit V Intermediate Representation; Basic Blocks and Conditional Branches; Instruction Selection; Liveness Analysis; Register Allocation (8 Hrs.)

Unit VI Program Structuring; Data Abstraction & Information Hiding; Modules & Objects and Object Orientation; Class-based and Object-based Languages, Inheritance; Derived Classes; Notion of Self, Implementation of Object Oriented Languages (8 Hrs.)

Text Books :

1. Ravi Sethi, "Programming Languages – Concepts and Constructs". 2nd Edition, Pearson,
2. Andrew Appel, "Modern Compiler Implementation in C", Cambridge University Press.

Reference Books :

1. JP Bennett, "Introduction to Compiling Techniques", Tata McGrawHill Edition, 2002
2. H Alblas and A Nymeyer, "Practice and Principles of Compiler Building with C", PHI, 1998
3. Andrew Appel, "Modern Compiler Implementation in C", Cambridge University Press
4. O'Reilly, LEX and YACC,

414443: Elective I – Advanced Operating Systems

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisite: Basics of Operating systems
Objectives: To understand and explore advanced OS concepts
To study OS Design and internals

Unit I Introduction (8Hrs.)
Operating System Architecture, multitasking, multiuser, multiprocessing, multi- threading OS, Operating System Services for process management, process scheduling concepts, system calls for process management, process communication and synchronization concepts, memory and I/O management overview, UNIX commands for system administration.

Unit II Multitasking OS :Design and implementation (8Hrs.)
Kernel of multitasking OS :services, process state transitions, functional specification, implementation considerations, system list ,ready list and its manipulation, IPC and synchronization, process management , interrupt management

Unit III Multiprocessor systems (8Hrs.)
Introduction, parallel hardware and interconnections, types of multiprocessor OS, Sharaing OS, mutiprocesor OS design considerations, threads, thread scheduling, kernel mode processes, multiprocessor synchronization, implementation of mutual exclusion.

Unit IV Memory management (8Hrs.)
overview, Pages, Zones, kmalloc, vmalloc, slab layer, slab layer allocator, deallocator ,statically allocating on the stack, High memory mapping. Non contiguous memory management

Unit V I/O systems (8Hrs.)
I/O device types, I/O structure, Driver interfaces, disk device driver access strategies, unification of files and I/O devices, generalized disk device drivers, disk caching, I/O scheduler.

Unit VI File system (8Hrs.)
File system organization, operations, implementation, file descriptors, file blocks allocaton, mapping of file blocks ,System Calls for the file system: open, read, write , lseek, Close. mounting and un mounting file systems, link, unlink ,file system abstractions, VFS, file system maintenance, file security

Text Books :

1. Milan Milenkovic,"Operating systems Concepts and design",Milan Milenkovic TMGH second edition.
2. charles crowly,"Operating systems a design oriented approach" , TMGH
3. Maurice *J*. Bach, "The design of the UNIX Operating System", Prentice Hall India, ISBN-81-203-0516- 7
4. Daniel Bovet: "Understanding the Linux kernel", 3rd edition, O'Reilly

Reference Books :

1. Andrew S. Tanenbaum ,"Modern Operating Systems", , ISBN-13: 978-81-203-2063-5, PHI.
2. Richard Stevens ,"UNIX Network Programming", ISBN-978-81-203-0749-0, PHI.
3. Kay Robbins, Steve Robbins,"UNIX Systems Programming Communication, Concurrency and Threads",2nd Edition, Jun 2003, Hardback, ISBN13: 9780130424112.
4. Robert Love ,"Linux Kernel Development", ISBN 81-297-0359-9, Pearson Education

414444: Elective II - Embedded System

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisite: Digital circuits and Logic Design, Knowledge of microcontrollers, microprocessors
Objectives: Understand the basics of embedded systems and its applications

Unit I Introduction to Embedded System (8 Hrs.)

Definition of Embedded System & its classification, characteristics of embedded systems, design parameters/Metrics of embedded systems. Components of embedded systems with review of Microprocessor & Microcontrollers, introduction to embedded processor, Digital signal processor, Application specific system processor, Multiprocessor systems using General Purpose Processor

Unit II System Processor (8Hrs.)

Standard Single purpose processors: Peripherals, Introduction, Timers, Counters and watchdog Timers, UART, Pulse Width Modulators, Clocking unit, Real Time Clock Reset Circuitry. Processor and memory organization, processor and memory selection, Memory Types, Memory map and addresses.

Unit III I/O Interfacing (8 Hrs.)

I/O devices: ADC/DAC, Optical Devices such as LED/LCD Display devices, Keyboard controller, Timer & counting devices, serial communication using I2C, SPI,CAN, RS232, & USB. Device drivers & interrupt service Mechanism: ISR concepts and ISR handling mechanisms

Unit IV Programming Concepts, Embedded System Programming C & C++ (8Hrs.)

Assemble language high level lang. C program Elements, Micros & Function, Data types, Data Structures, Modifiers, Statement, loops & Pointers, queues & Stacks, List & order list, Embedded System Programming in C++ & Java. C Program Compilers & Cross Compilers. In Circuit emulator. Software engineering practices in the embedded software development process.

Unit V Real Time Operating Systems (8 Hrs.)

Real Time & embedded system OS: off the shelf operating Systems, Embedded OS, Real Time OS, hand held OS. RTOS Tashk and task scheduling, Interrupt Latency & Response time, Strategy for synchronization between the processes, ISR, OS functions & tasks for resource management, Semaphores, message Queue, mailbox, pipes, signals, event registers, memory management, priority Inversion problems and solutions.

Unit VI Overview & Applications of Embedded System (8 Hrs.)

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, Case Study of Digital camera.

Text Books :

1. Rajkamal, “Embedded System Architecture Programming Design”, Tata Graw Hill Publication
2. Dr. K.V.K.K. Prasad, “Embedded / Real time System : Concepts, Design & Programming – Black book”, Dreamtech Press Publication
3. Jonathan Valvano, “Embedded Microcomputer Systems - Real Time Interfacing”, CENGAGE Learning.
4. Peckol, “Embedded System”, Wiley Publishers
5. David Simon,”An Embedded Software Primer ”

Reference Books :

1. Sriam Iyer, Pankaj Gupta, “Embedded Real time Systems Programming” Tata Graw Hill
2. Tammy Nergaard, “Embedded System Architecture – A Comprehensive Guide For Engineering & Programming”, Elesevier Publication
3. Steve Heath Ëmbedded Systems Design”, Elesevier publication.

414444: Elective II – Mobile Computing

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisite: Computer Networks
Objective: Understanding the fundamentals involved in technologies of Mobile computing

Unit I Introduction (8Hrs.)

Introduction – PCS Architecture, Cellular Telephony, Cordless Telephony and Low-Tier PCS, Generations of Wireless Systems, Basic Cellular System, Concept of Frequency reuse channels, Cells Splitting

Mobility Management – Handoff, Roaming Management, Roaming Management under SS7

Handoff Management – Handoff Detection, Strategies for Handoff Detection, Channel Assignment, Link Transfer Types, Hard Handoff, Soft Handoff

Unit II GSM (8 Hrs.)

GSM System Overview - GSM Architecture, Location Tracking and Call Setup, Security, Data Services, Unstructured Supplementary Service Data,

GSM Network Signaling – GSM MAP Service Framework, MAP Protocol Machine, MAP Dialogue, Examples of MAP Service Primitives

GSM Mobility Management – GSM Location Update, Mobility Databases, Failure Restoration, VLR Identification Algorithm, VLR Overflow Control

Unit III GSM Services (8 Hrs.)

GSM Short Message Service – SMS Architecture, SMS Protocol Hierarchy, Mobile-Originated Messaging, Mobile – Terminated Messaging, DTE-DCE Interface International Roaming for GSM – International GSM Call Setup, Reducing the International Call Delivery Cost

GSM Operations, Administration, and Maintenance – Call Recording Functions, Performance Measurement and Management, Subscriber and Service Data Management Mobile Number Portability – Fixed Network Number Portability, Number Portability for Mobile Networks, Mobile Number Portability Mechanisms, Implementation Costs for Mobile Number

Portability Mobile Prepaid Phone Services – Wireless IN approach, Service node approach, Hot billing approach, Comparison of prepaid solutions

Unit IV Mobile Data Networks (8Hrs.)

General Packet Radio Service (GPRS) – GPRS Functional Groups, GPRS Architecture GPRS Network Nodes, GPRS Interfaces, GPRS Procedures, GPRS Billing, Evolving from GSM to GPRS

Wireless Application Protocol (WAP) – WAP Model, WAP Gateway, WAP Protocols WAP UAProf and Caching, Wireless Bearers for WAP, WAP Developer Toolkits, Mobile Station Application Execution Environment

Third-Generation Mobile Services - Paradigm Shifts in Third-Generation Systems W-CDMA and cdma2000, Improvements on Core Network, Quality of Service in 3G Wireless Operating System for 3G Handset, Third-Generation Systems and Field Trials, Other Trial Systems, Impact on Manufacture and Operator Technologies

Unit V Mobile Network Layer (8 Hrs.)

Mobile IP: Goals, assumptions and requirements, entities and terminologies, IP packet delivery, agent discovery, registration, tunneling and encapsulation, optimization, reverse tunneling, IPv6, DHCP, MANET : routing, destination sequence distance vector, dynamic source routing, alternative matrics, protocol overview

Unit VI Emerging Mobile Technologies (8 Hrs.)

Bluetooth, Wireless Broadband (WiMAX), RFiD, Java Card., WLL, W-LAN, UMTS, Spread Spectrum Technologies

Text Books :

1. Yi Bing Lin,”Wireless and Mobile Network Architectures”, Wiley Publications
2. Jochen Schiller,”Mobile Communications”,Pearson Education

Reference Books :

1. Asoke Talukder and Roopa Yavagal,”Mobile Computing”, Tata McGraw Hill
2. William C.Y.Lee, “Mobile Cellular Telecommunications”, McGraw Hill

414444: Elective II – Multimedia Systems

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisites :

- Digital Electronics
- Data Structures and Files

Objectives :

- To learn the storage and processing of various Multimedia components.
- To learn the advance graphics.

Unit I Introduction: (8Hrs.)

What is multimedia, Goals and objectives, characteristics of multimedia presentation, multimedia applications, Multimedia building blocks, multimedia and internet,

Multimedia architecture, Windows multimedia support, hardware support, distributed multimedia applications, streaming technologies, multimedia database systems, Multimedia authoring tools, overview of multimedia software tools, multimedia Document Architecture,

(MHEG, SGML, ODA, OMF etc.)

Text: Types of text, Text compression: Huffman coding, LZ & LZW, text file formats: TXT, DOC; RTF, PDF, PS.

Unit II Digital Image Processing (8 Hrs.)

Basic Image fundamentals, Image data types, image File formats - (BMP, TIFF, JPEG, PCX etc), Image acquisition, storage processing, Communication, and display, Image enhancement: Enhancement by point processing, Spatial filtering.

Image compression: Types of compression: lossy & lossless, symmetrical & asymmetrical, intraframe & interframe Hybrid JPEG, Lossless: RLE, Shannon- Fano algorithm, Arithmetic coding. Lossy: Vector quantization, fractal compression technique, transform coding, psycho-analysis, and interframe correlation. Hybrid: JPEG-DCT

Unit III Audio and audio compression (8 Hrs.)

Nature of sound waves, characteristics of sound waves, psycho-acoustic, and elements of audio systems: Microphone, amplifiers, speakers, synthesizer, MIDI, digital audio, CD formats. Audio file formats: WAV, AIFF, VOC, AVI, MPEG Audio File formats, RMF, WMA

audio compression techniques such as DM, ADPCM and MPEG

Unit IV Video (8 Hrs.)

Video signal formats, Video transmission standards: EDTV, CCIR, CIF, SIF, HDTV, digitization of video, video recording systems: VHS, Video Compact Cassette, DVCAN, Camcorder, Lesser disc, VCD, DVD-video, micro-MV, Video file formats: MOV, RealVideo, H-261, H-263, cinepack. Nerodigtal, Video editing, DVD formats

Unit V Virtual Reality and Multimedia (8 Hrs.)

Concept, Forms of VR, VR applications, VR devices: Hand Gloves, Head mounted tracking system, VR chair, CCD, VCR, 3D Sound system, Head mounted display. Virtual Objects

Basics of VRML.

Unit VI Animation (8 Hrs.)

Uses of animation, types of animation, principles of animation, Techniques of animation: Onion Skinning, Motion Cycling, masking, Flip Book animation, Rotoscoping & blue-screening, color cycling, morphing, animation on the web, 3D animation, Creating animation using Flash,3D-Max

Text Books :

1. Ranjan Parekh, "Principles of Multimedia", TMH, ISBN 0-07-058833-3
2. Ralf Steinmetz and Klara Nahrstedt "Multimedia Computing, Communication and Applications", Pearson Education.

Reference Books :

1. Ze-Nian Li, Marks S. Drew, "Fundamentals of Multimedia", Pearson Education.
2. Nigel Chapman and Jenny Chapman, "Digital Multimedia", Wiley
3. A. K. Jain,"Fundamentals of Digital Image Processing", PHI
4. Gonzalez, Woods, "Digital Image Processing" Addison Wesley
5. Mark Nelson, "Data Compression Book ", BPB.
6. Judith Jeffcoate ,"Multimedia in Practice":, Pill.
7. Robert Reinhardt, Snow Dowd, “Flash 8 Bible”
8. Keith Peters, “Foundation AS Animation: Making Things Move!”
9. Sanford Kennedy, “3ds max Animation and Visual Effects Techniques”

414441: Information Assurance and Security Laboratory

Teaching scheme:
Practical: 2 Hours/Week

Examination scheme:
Term Work: 50 Marks
Oral: 50 Marks

Section A Programming

1. Writing program in C++ or Java to implement RSA algorithm for key generation and cipher verification
2. Write a Client – Server programm in C++ or Java for authentication verification.
3. Develop and program in C++ or Java based on number theory such as chinese remainder or Extended Euclidian algorithm. (Or any other to illustrate number theory for security)

Section B Cryptography Library (API)

1. Writing program in C++, C# or Java to implement RSA algorithm using Libraries (API)
2. Writing program in C++, C# or Java to implement SHA-1 algorithm using Libraries (API)
3. Writing program in C++, C# or Java to implement AES algorithm using Libraries (API)

Section C Security Tools

1. Configure and demonstrate use of IDS tool such as snort.
2. Configure and demonstrate use of Traffic monitoring tool such as Wireshark with security perspective.
3. Configure and demonstrate use of velnerability assessment tool such as NESSUS
4. Implement web security with Open SSL tool kit

Students should submit the term work in the form of a journal. Each assignment has to be well documented with problem definition, theory and code documentation. Staff in charge will assess the assignments continuously and grade or mark each assignment on completion date, declared for each assignment.

Note: Oral examination will be based on the term work submitted by the student and the associated theory of the subject.

414445: Computer Lab Practices I

Teaching Scheme:
Practical: 4 Hours/Week

Examination Scheme :
Term Work: 50 Marks
Practical: 50 Marks

Part A Object Oriented Modeling & Design

Select a hypothetical system of sufficient complexity/ Select a Real Time system of sufficient complexity and implement assignment 1 to 9 using any UML 2.0 Tool.

1. Prepare a SRS plan & Draw use case diagram.
2. Design class diagram & composite structure diagram.
3. Apply advanced notations to same class diagram & do forward engineering.
4. Study reverse engineering using C++ code/java code for class diagram.
5. Draw package diagram.
6. Design sequence & communication diagrams {vice versa}.
7. Design interaction overview diagrams
8. Design activity diagram & state diagrams.
9. Design component & deployment & diagrams.

Every Project group should implement assignment 1 to 9 for their project definition using any UML 2.0 Tool.

Part B Software Testing and Quality Assurance

1. Manual Testing
   a) Write black box test cases for an application using Test Director tool.
   b) Perform white box testing – Cyclomatic complexity, data flow testing, control flow testing
2. Automated Testing
   Perform Black Box testing using automated testing tool on an application.
   Testing Points to be covered – data driven wizard, parameterization, exception handing
3. Defect Tracking :
   a. Log the test results in Test Director
   b. Prepare a Defect Tracking Report / Bug Report using MS-Excel or Defect Tracking Tool like BugZilla
4. a. Calculate Software Metrics for an application using FP analysis method.
   b. Prepare any two of the Ishikawa's Seven tools listed below for an application
      1. The cause-and-effect or Ishikawa diagram
      2. The check sheet
      3. The control chart
      4. The histogram
      5. The Pareto chart
      6. The scatter diagram
      7. Stratification

Note : All 04 assignments are compulsory.

Recommended Tools

a) Quick Test Professional – preferred
b) Win Runner
c) Load Runner
d) Silk Test
e) Rational Robo

Suggested Applications (not mandatory) – front end (VB) – back end (Oracle / MS Access)

a) Calculator – Integer operations, add, sub, div
b) Login Form and successful & failed login pages.
c) Inventory management – atleast 2 forms
d) Library management - atleast 2 forms
e) Training & Placement Cell system
f) Online reservation system

Reference Books :

a) Software Testing Techniques : Boris Beizer : dreamTech
b) Software Testing Tools : Dr. KVKK Prasad : dreamTech

414446: Project Work

Teaching Scheme: **Examination scheme:**
Practical: 2 Hours/Week **Term work: 50 Marks**

The Student will undertake one project over the academic year, which will involve the analysis, design of a system or sub system in the area of Information Technology and Computer Science and Engineering.
The project will be undertaken preferably by a group of at least 4 students who will jointly work and implement the project. The group will select a project with approval of the guide (Staff-member assigned).

The aim of project is to allow the students to study the feasibility of the project, planning project, studying existing systems, tools available to implement the project and state of art software testing procedures and technology with use of case tools.
Every group must submit the preliminary project report of the project in **LATEX** by the end of first month from the commencement of the first term. It should have the following details in it.

1. Introduction
2. Aims and objectives
3. Literature survey
4. Problem statement
5. Project Requirements
6. Proposed architecture/ high level design of the project
7. Project plan

A panel of examiner will evaluate the viability of project and allot the term work marks.

The group will submit at the end of semester II.

a) The Workable project.
b) Project report (in **LATEX**) 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 work completed by candidates. Preliminary report must also be presented during the oral examination.

The project report contains 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 report 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.

Semester - II

Information Technology

2008 Course

414448: Distributed System

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisite : Operating System and Computer Networks
Objective : Understand the fundamentals of distributed environment in complex application

Unit I Introduction (5 Hrs.)

Introduction to Distributed Systems: Goals, Architecture, Examples of Distributed Systems, Characteristics, Hardware and Software Concepts, Design Issues, Challenges.

System Models: Architectural models, fundamental models and Failure Model.

Unit II Inter-process Communication and Coordination (7 Hrs.)

Message Passing Communication: Communication Primitives, Message Synchronization and Buffering, Pipe, Pipe and Socket APIs, Group Communication, Multicasting

Remote Procedural Call: Basic Operation, Implementation and Call Semantics, Failure Handling, LRPC

Object Oriented Distributed Computing Technologies – Basics, design issues of various technologies like RMI and CORBA with semantics and executions.

Unit III Synchronization and Election (7 Hrs.)

Clock Synchronization: Logical and Physical Clocks, Algorithms and Uses

Mutual Exclusion: Centralize, Distributed and Token Ring Algorithms, Comparison

Logical Clocks: Lamport's Logical Clock, Vector Clocks

Global State: Needs, Properties and Various Global States

Election Algorithm: Bully and Ring Algorithm

Unit IV Distributed File Systems (7 Hrs.)

Introduction, Characteristics, File Service Architecture

Sun Network and CODA File System: Overview of NFS, Communication, Processes, Naming,

Synchronization, Consistency and Replication, Fault Tolerance and Security

Naming Services: Case Study of Global Name Service and X.500 Directory Service

Unit V Distributed Shared Memory (7 Hrs.)

Replication: Introduction, Reasons for Replication, Object Replication and Scaling Technique

Distributed Shared Memory: Design and Implementation Issue;

Data Centric Consistency Models - Strict, Sequential, Casual, PRAM, Weak, Release, Entry

Client-Centric Consistency Models: Eventual, Monotonic Reads, Monotonic Writes, Read Your Writes, Writes Follow Reads

Unit VI Fault Tolerant and Recovery (7 Hrs.)

Fault Tolerance: Concepts, Failure Models, Failure Masking by Redundancy

Process Resilience: Design Issues, Failure Masking and Replication, Agreement in Faulty Systems

Recovery: Introduction, Check-pointing, Message Logging – Synchronous and Asynchronous, Adaptive Logging

Text Books :

1. George Coulouris, Jean Dollimore & Tim Kindberg, “Distributed Systems – Concept and Design” 4th Edition, Publisher: Pearson (LPE). ISBN – 978-81-317-1840-7
2. Andrew S. Tanenbaum & Maarten van Steen”, Distributed Systems – Principles and Paradigms”, Publisher: PHI.

Reference Books :

1. Randay Chow, Theodore Johnson, “Distributed Operating System and Algorithm Analysis”, Publisher: Pearson (LPE). ISBN – 978-81-317-2859-8

414449: Information Retrieval

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

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

Unit I 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 Hrs.)

Unit II File Structures, Inverted file, Suffix trees & suffix arrays, Signature files, Ring Structure, IR Models, Basic concepts, Boolean Model, Vector Model, and Fuzzy Set Model. Search Strategies, Boolean search, serial search, and cluster-based retrieval, Matching Function (6 Hrs.)

Unit III Performance Evaluation- Precision and recall, alternative measures reference collection (TREC Collection), Libraries & Bibliographical system- Online IR system, OPACs, Digital libraries - Architecture issues, document models, representation & access, Prototypes, projects & interfaces, standards (6 Hrs.)

Unit IV Taxonomy and Ontology: Creating domain specific ontology, Ontology life cycle (8 Hrs.)

Distributed and Parallel IR: Relationships between documents, Identify appropriate networked collections, Multiple distributed collections simultaneously, Parallel IR - MIMD Architectures, Distributed IR – Collection Partitioning, Source Selection, Query Processing

Unit V Multimedia IR models & languages- data modeling, Techniques to represent audio and visual document, query languages Indexing & searching- generic multimedia indexing approach, Query databases of multimedia documents, Display the results of multimedia searches, one dimensional time series, two dimensional color images, automatic feature extraction. (8 Hrs.)

Unit VI Searching the Web, Challenges, Characterizing the Web, Search Engines, Browsing, Mata searchers, Web crawlers, robot exclusion, Web data mining, Metacrawler, Collaborative filtering, Web agents (web shopping, bargain finder,..), Economic, ethical, legal and political issues.. (6 Hrs.)

Text Books :

1. Yates & Neto, "Modern Information Retrieval", Pearson Education, ISBN 81-297-0274-6
2. C.J. Rijsbergen, "Information Retrieval", (www.dcs.gla.ac.uk)
3. I. Witten, A. Moffat, and T. Bell, “Managing Gigabytes”
4. D. Grossman and O. Frieder “Information Retrieval: Algorithms and Heuristics”

Reference Books :

1. Mark leven, “Introduction to search engines and web navigation”, John Wiley and sons Inc., ISBN 9780-170-52684-2.
2. V. S. Subrahamanian, Satish K. Tripathi “Multimedia information System”, Kulwer Academic Publisher
3. Chabane Djeraba, ”Multimedia mining A highway to intelligent multimedia documents”, Kulwer Academic Publisher, ISBN 1-4020-7247-3

414450: Elective III – Real Time System

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

Objective: To get an overview of design and evaluation issues of RTS, Real Time Communication and operating systems.

Unit I Introduction to Real Time Systems (8 Hrs.)

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

Unit II Task Assignment and scheduling (8 Hrs.)

Types of tasks, Timings, precedence, resource constraints, classification of scheduling algorithms, priority driven approach for periodic and aperiodic task, Non preemptive method(EDD), preemptive methods(EDF and LST), Rate monotonic, deadline monotonic, EDF and its variants for periodic tasks, Resource and resource access scheduling protocols: blocking and priority inversion, priority inheritance and priority ceiling protocols

Unit III Programming languages, tools and databases (8 Hrs.)

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 IV Real Time Communication (8 Hrs.)

Network topologies- Sending messages, Network architecture issues, Protocol - Contention based, Token based. Stop & Go Multi hop Protocol. The Pooled Bus.

Hierarchical Round Robin Deadline, based. Fault tolerant Routing, medium access control protocols of broadcast networks, Internet and resources reservation protocols.

Unit V Real Time Kernel and Operating Systems (8 Hrs.)

Time services, features of RTOS, Program and processes Threads, sharing resources,

Resources management: memory management and process management, fore ground/background systems, operating system architecture, Real time POSIX standards, capabilities of RTOS.

Unit VI Fault Tolerance and Reliability, UML For Real Time Systems (8 Hrs.)

Fault types, detection, error containment, Redundancy- Hardware, Software, Time, Information redundancy, Data diversity. Reversal checks, Malicious or Byzantine failures, Integrated failure handling, Reliability models: Hardware and software error models, Modeling for time, resource, schedulability, performance, RT UML profile

Text Books :

1. C.M. Krishna ,"Real Time systems", Tata Mc Graw Hills publications
2. Jane W.S. Liu,"Real Time Systems", Pearson Education
3. Douglass,"Real Time UML", Pearson Education
4. Peckol,"Embedded System", WILEY publications

Reference Books :

1. Stuart bennet, "Real Time Computer control, An Introduction " Pearson Publications
2. C. Sivraman Murthy and G.Maniraman, "Resource Management in real time systems and Network" MIT ISBN – 51-203-2682-2

414450: Elective III – Software Architecture

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Objectives :

- Introduction to the software architecture as a discipline.
- Introduction to current architecture approach.
- Introduction to software architecture strategies.

Unit I	Architecture Business cycle, What is software architecture, why software architecture is important, documenting software architectures.	(8Hrs.)
Unit II	Understanding quality attributes, architecture and quality attributes, achieving quality attributes.	(8 Hrs.)
Unit III	Design patterns: History, Important principles behind design patterns, Programing the interface and concept of delegation. Study of a commonly used representative design patterns Singleton, Adapter, Factory method, Strategy, State, Façade, Observer, Iterator.	(8Hrs.)
Unit IV	Types of architectures styles and their comparison. Introduction to Three tier architecture [Presentation, business and persistence layers]. Concept of loose coupling, Addressing Quality attributes through multi tier architecture. Introduction to XML, Advantages of coupling through xml, structure of XML.	(8 Hrs.)
Unit V	Introduction to Web servers and Application servers, Introduction to Java EE, Introduction to concept of Messaging, Introduction to Enterprise Java Beans, concept of Entity beans, Session bean, message beans, use of EJBs in three tier architecture. Introduction to Web services.	(8 Hrs.)
Unit VI	Components, Interfaces, IUNKNOWN, DLL servers, Introduction to .NET architecture, .NET assemblies, .NET remoting, .NET web services.	(8 Hrs.)

Text Books :

1. Len Bass , Paul Clements , Rick Kazman, " Software Architecture in practice ", second edition (Hardcover)
2. Eric J. Braude," Software Design From programming to architecture " Boston Univ ISBN: 0-471-20459-5," 2004

Reference Books :

1. Dale Rogerson, " Inside Com (Microsoft Programming series" (paperback)
2. James L. Weaver, Kevin Mukhar, James p. Crume(Publisher) Begineeing J2EE1.4 from Novice to Professional (Apress Beginner series) (paperback)
3. Eritch Gamma, Richard Helm, Ralph Johnson, John Vlissides,"Design Patters : Elements of reusable Object oriented Software" (Addision-wesley professional computing series) (Hardcover)

414450: Elective III – Advanced Graphics

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisite : Computer Graphics

Objectives :

- Provide solid grounding in three dimensional modeling mechanisms.
- Introduce students to techniques in virtual reality, solid modeling and animation

Unit I Brief Review of 3D modeling and 3D object Representation (8 Hrs.)
3D display methods, Polygon surfaces, polygon meshes, Curved lines and surfaces, Quadratic surfaces, Spline representation and specification B-Spline curves and surfaces.

Unit II Animation (8Hrs.)
Introduction, Devices for producing animation ,Conventional and Computer assisted animation, Animation languages, Basic rules of animation, Methods of controlling animation, frame-by-frame animation techniques, real-time animation techniques

Unit III Solid Modeling (8Hrs.)
Representing solids, Primitive instancing, sweep representations, Boundary representations, spatial-partitioning representations, constructive solid geometry, user interfaces for solid modeling, comparison of representations.

Unit IV Illumination models, color models and applications (8 Hrs.)
Basic illumination models, Polygon rendering methods, Basic ray tracing methods and algorithms, color models: RGB, CMY, HSV, HLS, YIQ, conversion between color models, color selection and application.

Unit V Rendering (8Hrs.)
Introduction, Basics of illumination and shading models, Transparency, Shadows and textures, Ray tracing from the light source, cone, beam and pencil tracing.

Unit VI Virtual Reality (8 Hrs.)
Basics, Devices for virtual reality, Virtual reality languages, Applications

Text Books :

1. Donald Hearn & M. Pauline Baker, "Computer Graphics C version", 2nd Ed, Pearson Education.
2. David F. Rogers, "Procedural Elements for Computer Graphics", 2nd Ed – Tata McGraw Hill Edition.

References Books:

1. M.N. Sinha, A.D.Udai, "Computer Graphics",Tata McGraw Hill Edition.
2. Foley, Dam, Feiner, Hughes,"Computer Graphics Principles & Practice", 2nd Ed, Pearson Education.
3. Hill, Kelly, "Computer Graphics using OpenGL", 3rd Ed, Eastern Economy Edition.

414450: Elective III – Advance Computer Networks

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisite : Computer Network

Objective : To introduce students to a set of advanced topics in networking and lead them to the understanding of the networking research

Unit I Introduction (8 Hrs.)

Requirements , Network architecture , Networking principles, Network services and Layered architecture , Network services and Layered architecture , Future networks (Internet , ATM , Cable TV, Wireless – Bluetooth, Wi-Fi, WiMax, Cell phone)

Unit II Advanced Technologies (8 Hrs.)

Virtual circuits, Fixed size packets, Small size packets, Integrated service, History, Challenges, ATM Network protocols, IP over ATM, Wireless networks : Wireless communication basics, architecture, mobility management, wireless network protocols. Ad-hoc networks Basic concepts, routing; Bluetooth (802.15.1), Wi-Fi (802.11), WiMAX (802.16), Optical Network : links, WDM system, Optical LANs, Optical paths and networks.

Unit III Performance of Networks (8 Hrs.)

Control of networks: objectives and methods of control, Circuit switched networks, Datagram and ATM networks. Mathematical background for control of networks like Circuit switched networks, Datagram and ATM networks

Unit IV Advanced Routing - I (8 Hrs.)

Routing architecture , Routing between peers (BGP) , IP switching and Multi-Protocol Label Switching (MPLS), MPLS Architecture and related protocols , Traffic Engineering (TE) and TE with MPLS , NAT and Virtual Private Networks (L2, L3, and Hybrid), CIDR –Introduction , CIDR addressing, CIDR address blocks and Bit masks

Unit V Advanced Routing - II (8 Hrs.)

Mobile IP- characteristics, Mobile IP operation, Security related issues. Mobility in networks. Voice and Video over IP (RTP, RSVP, QoS) IPv6: Why IPv6, basic protocol, extensions and options, support for QoS, security, etc., neighbor discovery, auto-configuration, routing. Changes to other protocols. Application Programming Interface for IPv6.

Unit VI Ad Hoc Networking (8Hrs.)

An Introduction, A DoD Perspective on Mobile Ad Hoc Networks, DSDV: Routing over a Multihop Wireless Network of Mobile Computers, Cluster-Based Networks, DSR: The Dynamic Source Routing Protocol for Multihop Wireless Ad Hoc Networks

Text Books:

1. Larry L. Peterson, Bruce S ,"Computer Networks: A Systems Approach", 4th edition, Davie Publisher: Elsevier/Morgan Kaufmann, ISBN: 13:978-0-12-370548-8; 10:0-12-370548-7
2. Douglas E. Comer,"Internetworking with TCP/IP Vol –I",5th Edition Publisher: Prentice Hall, 5th edition.
3. Jean Walrand and Pravin Varniya,"High Performance Communication Networks" second edition Publisher: Morgan Kaufmann Publisher Elsevier ISBN: 1-5580-574-6 Indian ISBN: 81-8147-652-2
4. Charles E. Perkins, "Ad Hoc Networking", PEARSON , ISBN:9788131720967

Reference Books:

1. Sam Halabi, “Metro Ethernet”, Publisher: Cisco Press ISBN: 158705096X
2. A. S. Tanenbaum, “Computer Networks”, Publisher: Pearson Education;
3. Krishna M. Sivalingham, Suresh Subramaniam,”Emerging Optical Network Technologies”, Publisher: Springer ISBN: 0-387-22582-X
4. Wayne Grover, “Mesh Based Survivable Networks”, Publisher: Prentice Hall, ISBN: 013494576X
5. W. R. Stevens ,”TCP/IP Illustrated, Volume 1,2,3”, Publisher: Pearson Education
6. Advanced Computer Network published by dreamtech ISBN : 978-93-5004-013-3

414451: Elective IV – Bio Informatics

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Unit I Introduction (8 Hrs.)
Introduction, Historical overview, Bioinformatics Applications, Bioinformatics Major databases, Molecular biology

Unit II Data Visualization & Statistics (8Hrs.)
Sequence Visualization, Structure visualization, statistical concepts, micro arrays, imperfects data, quantitative randomness, data analysis, tool selective, statistics of alignment, clustering and classification.

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

Unit IV Modeling, Simulation & Collaboration (8 Hrs.)
Drug discovery, fundamentals, protein structure, System biology, collaboration & communications, standards, Issues.

Unit V Bioinformatics tools (8Hrs.)
Introduction, working with FASTS, working with BLAST, FASTA & BLAST algorithms & comparison

Unit VI Further Scope (8 Hrs.)
Introduction to environmental biotechnology, introduction to generic engineering.

Text Books :

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

Reference Books :

1. Imtiyaz Alam Khan (IAK) "Elementary Bioinformatics", Pharma Book Syndicate.
2. Indu Shekhar Thakur (IST) "Environmental Biotechnology", IK International Publication.
3. A.D. Baxevanis and B.F. Ouellettee ,"Bioinformatics, A Practical Guide to the Analysis of Genes and Proteins"
4. David W. Mount,"Bioinformatics: Sequence and Genome Analysis".
5. Stuart M. Brown,"Essentials of Medical Genomics".
6. Jean-Michel Claverie & Cedric Notredame ,'Bioinformatics for Dummies".
7. Ian Korf, Mark Yandell, and Joseph Bedell," Blast "

414451: Elective IV – Neural Network and Expert System

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Prerequisite: Artificial Intelligence
Objectives: Understand the neural network basics and concept of expert system

Unit I Introduction to Artificial Neural Networks (8 Hrs.)
Biological Neural Networks, Pattern analysis tasks: Classification and Clustering, Computational models of neurons, Basic structures and properties of Artificial Neural Networks, Structures of Neural Networks Learning principles

Unit II Feedforward Neural Networks (8 Hrs.)
Perceptron, its learning law , Pattern classification using perceptron, Single layer and Multilayer feed forward Neural Networks (MLFFNNs), Pattern classification and regression using MLFFNNs, ADALINE : The Adaptive Linear Element, its Structure and Learning laws, Error back propagation learning, Fast learning methods: Conjugate gradient method, Auto associative Neural Networks, Bayesian Neural Networks

Unit III Radial Basis Function Networks and Pattern Analysis (8 Hrs.)
Regularization theory, RBF networks for function approximation , RBF networks for pattern classification
Kernel methods for pattern analysis: Statistical learning theory, Support vector machines for pattern classification, Relevance vector machines for classification.

Unit IV Self organizing maps and feedback networks (8 Hrs.)
Pattern clustering,, Topological mapping, Kohonen's self, organizing map
Feedback Neural Networks : Pattern storage and retrieval ,Hopfield model, Boltzmann machine, Recurrent Neural Networks

Unit V Expert Systems Architectures: (8 Hrs.)
Introduction, Rule Based System Architecture, Non-Production System Architecture, Dealing with uncertainty, Knowledge Acquisition and Validation

Unit VI Shells and Case Studies (8 Hrs.)
Expert System Shells , Knowledge System Building Tools for
Expert System, Expert System tools case study – MYCIN – EMYCIN -ELIZA
Knowledge Management (Wiki Web case study)

Text Books :

1. B.Yegnanarayana, "Artificial Neural Networks", Prentice Hall of India
2. Satish Kumar, "Neural Networks – A Classroom Approach", Tata McGraw,Hill
3. Dan W. Patterson., "Introduction to Artificial Intelligence and Expert Systems", PHI, New Delhi, 2001.

Reference Books :

1. S.Haykin, "Neural Networks – A Comprehensive Foundation", Prentice Hall
2. C.M.Bishop, "Pattern Recognition and Machine Learning", Springer, 2006
3. A.J.Gonzalez and D.D.Dankel, "Engineering of Knowledge Based Systems" Prentice Hall

414451: Elective IV – Geo Informatics Systems

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

Objectives: Understand the bird's eye view of geographical Information system and its applications

Unit I Digital Image Processing Fundamentals (8 Hrs.)

Basic character of digital images, preprocessing, registration, enhancement, spatial filtering, transformations, classification,

Visual Image Interpretation: Types of pictorial data products, image interpretation strategy, image interpretation process, basic elements of image interpretation.

Unit II Foundations of Remote Sensing (8 Hrs.)

Basic Principles of remote sensing, Electromagnetic remote sensing process,

Microwave Remote Sensing:

The radar Principle, factors affecting microwave measurements, radar wavebands, SLAR

Systems, SAR, Interpreting SAR images, geometrical

Remote Sensing platform and Sensors: Satellite system parameters, sensor parameters, imaging sensor systems, Earth recourses satellite series.

Unit III GIS Fundamentals (8 Hrs.)

GIS: Definition, evolution, components, approaches, Geospatial data, GIS operations.

GIS architecture, models of GIS, framework for GIS, GIS categories, level / scales of measurement.

Map projections, Map as a model, classification of maps, map scale, cartographic symbolization, types of map, spatial referencing system, map projections, grid systems, computer in map production, digital database in a GIS, linkage of GIS to remote sensing

Unit IV Spatial Data Management (8 Hrs.)

Existing GIS data, Metadata, conversion of existing data, creating new data, geometric transformations, Describing data quality and errors, Sources of errors in GIS, Finding and modeling errors in GIS, Managing GIS error, types of errors- RMS error, location error, topological error, spatial data accuracy. Attribute data in GIS, Spatial data processing.

Unit V Data Modeling and Analysis (8 Hrs.)

Data Exploration, types of data queries, Vector data analysis- buffering, overlay, distance measurement, pattern analysis, Raster Data analysis- different types of operations, comparison of vector and raster based data analysis.

Basic elements of GIS modeling- Binary models, Index models, Process models

Unit VI Applications and development (8 Hrs.)

Urban and Municipal Applications- introduction and methodology.

GIS implementation and Project Management – Software Engg. as applied to GIS, GIS project planning, System Analysis and user requirements studies, geospatial database design methodology, GIS application software design methodology, system implementation and maintenance, Geospatial Information Domain, issues and trends in GIS development.

Text Books :

1. M. Anji Reddi, “Remote Sensing and Geographical Information Systems”, B. S. Publications, Third Edition, 2006, Second reprint 2009
2. Kang-tsung Chang, “Introduction to Geographical Information Systems”, Tata McGraw Hill, Fourth Edition, 2008

Reference Books :

1. C.P.Lo, Albert K. W. Yeung, “Concept and techniques of Geographic Information Systems”, PHI, Second Edition, 2007
2. Heywood and Raju, “Introduction to Geographical Information Systems” Pearson Education, 2009

414451: Elective IV – Open Elective

Teaching Scheme:
Lectures: 4 Hours/Week

Examination Scheme:
Theory: 100 Marks

In this subject, a student can opt for a subject from other branch of engineering. An institution may design the syllabus of a subject in consultation with a software company. This syllabus will be approved by the University authorities and the students can opt for the subject as an open elective.

414450: Elective III – Real Time System Lab

Teaching Scheme:
Practical: 2 Hours/Week

Examination Scheme :
Term Work: 50 Marks
Oral: 50 Marks

Assignment No 1

a) Design and develop the code for controlling traffic lights at an intersection. Consider an intersection with two, two-way streets A traffic light will normally be green for G seconds, yellow for Y seconds and red for R seconds. During the night for a certain period of time, the intersection will automatically suspend normal service and its lights will flash yellow.
   1. Develop an object oriented design.
   2. Using programming language.
   3. Make suitable assumptions and state them clearly.

b) Performance analysis and Run time estimation of the Traffic light System
   1. Define accomplishment levels for the system and calculate its performabilitv.
   2. Analyze the source code to estimate the execution time of different modules.
   3. Make suitable assumptions and state them clearly.

Assignment No 2

Frame a problem statement to implement RMA scheduling for periodic tasks (Minimum 03 tasks) for a uniprocessor with certain time period and deadline and check the following parameters:
   a) Compute total CPU Utilization.
   b) Necessary and Sufficient condition for optimum scheduling.
   c) Time Demand Analysis (Draw the graph between Time demand function and Time)
   d) Implement above system and find out total work load carried out.

Assignment No 3

Implement the two contention based protocols — '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 as 2,4 and 8 time units
   - Protocol for 3 different values of the initial window size (i.e. 10,20 ,40)
   - Make suitable assumptions if required and state them clearly. The coding can be done in any language of your choice.

Assignment No 4

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.

Assignment No 5

Install Real Time Linux as RTOS on Linux using real time patches for RTLinux – 2.4 (Open Source).

Assignment No 6

Design object oriented diagrams using UML 2.x for problem statement 1 in the list for all possible cases.

414450: Elective III – Advance Computer Network Lab

Teaching scheme:
Practical: 2 Hours/week

Examination scheme:
Term work: 50 Marks
Oral: 50 Marks

Guidelines for framing the assignments :

The faculty in charge will frame minimum 6 to maximum 8 assignments such that the students get hands on the concepts they study in each unit of electives

414450: Elective III – Advance Graphics Lab

Teaching scheme:
Practical: 2 Hours/week

Examination scheme:
Term work: 50 Marks
Oral: 50 Marks

Guidelines for framing the assignments :

The faculty in charge will frame minimum 6 to maximum 8 assignments such that the students get hands on the concepts they study in each unit of electives.

414450: Elective III – Software Architecture Lab

Teaching scheme:
Practical: 2 Hours/week

Examination scheme:
Term work: 50 Marks
Oral: 50 Marks

Part A: Design Patterns

1. Implement iterator design pattern in language of your choice and submit it along with a write-up with its specification.
2. Implement observer design pattern in language of your choice and submit it along with a write-up with its specification
3. Implement strategy design pattern in language of your choice and submit it along with a write-up with its specification

Part B: Architectural

1. Study a case study of any website or any other large system and its architecture for fault Tolerance, scalability, performance, transaction management and other quality attributes
2. Study and submit a report for any of the MVC based Frameworks

Part C: Web development, Middleware and Web services

1. Prepare a representative paper design of a hypothetical system using components, interfaces and its deployment issue with UML 2.0
2. Explore' and Implement JAVA based XML processing
3. Implement a sample EJB based application or develop a small web application using java technology or dot net technology

414452: Computer Lab Practices II

Teaching Scheme:
Practical: 4 Hours/Week

Examination Scheme :
Term Work: 50 Marks
Practical: 50 Marks

Part A Distributed Systems

1. Implement a program in Linux using C/C++ to implement Client-Server architecture using Socket programming.
   (In the assignment when user stores a file on a server, the server splits the file and stores the file on two or more servers. Whenever the user retrieves the file, the server retrieves the file again from different serves forwards all the fragments to the user and display it as a single file.)
2. Write a program to implement bulletin-board using concept of broadcast and remove the message when read by the entire users.
3. Write a program to implement Simple Remote Calculator Service using RMI which can be used from a client Program.

Case Study on Cloud Computing

(Ref – Cloud Computing and SOA Convergence in your Enterprise – A step by Step Guide – by David S. Linthicum (PEARSON – ISBN – 978-81-317-3358-5))

- Definition, What's new, Benefits, Drawbacks, All the services -(DAAS, AAAS, Process as a Service, Platform as a Service, Info as a Service, Integration as a Service, Security as a Service, Storage as a Service, Governance/Management as a Service, TAAS, Infrastructure as a Service.)

Part B Information Retrieval

1. Develop a text processing system which provides the summary of the text by giving weightage to the words appearing in the text. (Use - Luhn's concept of automatic text analysis & Working concept of conflation algorithm.)
2. Implementation of Single-pass Algorithm for Clustering. (consider 4 to 5 files)
3. Implementation of Inverted Index.
4. Case Study – (Ref- Content Management Bible 2nd Edition Bob Boiko, Wiley, ISBN-978-0-7645-7371-2, E-book available)
   Content Management System-Definition, Format, Structure, Functionalities and Various tools

414447: Project Work

Teaching Scheme:
Practical: 6 Hours/Week

Examination Scheme :
Term Work: 100 Marks
Oral: 50 Marks

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

The group will submit at the end of semester II.

a) The Workable project.
b) Project report (in **LATEX**) 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 work completed by candidates. Preliminary report must also be presented during the oral examination.

The project report contains the details.

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

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