B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMESTER VII

SUBJECT: DIGITAL SIGNAL PROCESSING

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term work: 25 Marks** **Oral Exam.: 25 Marks**

Objective: Digital Signal Processing continues to play an increasingly important role in the fields that range literally from A(astronomy) to Z(Zeugmatography. Of magnetic reasonance imaging) and encompass applications such as compact disc player, speech recognition, echo cancellations in communication systems, image enhancement, geophysical exploration, and noninvasive medical imaging. This Course aims to build concepts regarding the fundamental principles and applications of signals, system transforms and filters

DETAILED SYLLABUS

1. **Discrete Time Signals and systems**
   Discrete Time Signals, discrete time systems, analysis of discrete time LTI systems, discrete time systems described by differential equations, implementation of discrete- time systems, correlation of discrete –time systems

2. **Z- Transform**
   Definition and properties of Z- transform , rational Z- transforms, Inc\verse Z- transforms, one – sided Z- transform, analysis of LTI systems in Z- domain

3. **Frequency Analysis of Signals and systems**
   Frequency analysis, continuous time signals and discrete time signals, properties of fourier transform for discrete- time signals. Frequency domain characteristics og LTI systems, LTI system as a frequency selective filter, inverse systems and deconvolution

4. **Discrete Fourier Transform**
   Frequency domain sampling , properties of DFT, linear filtering method based on DFT, FFT algorithm. Applications of FFT, Geortzel algorithm, Qantisation effects in the computation of DFT

5. **Implementation of Discrete Time Systems**
   Structure of FIR systems, Structures of IIR Systems, Quantisation of filter coefficients, round-off effects in digital filters

6. **Design of Digital Filters**
   Design of FIR filters, design of IIR Filters from analog filters, frequency transformations, design of digital filters based on least- square method digital filters from analogue filters, properties of FIRdigital filters, design of FIR filters using windows, comparision of IIR and FIR filters, and linear phase filters

7. **Introduction to DSP**
   Co- processors, TMS 320C40/50, analog devices

8. **Applications**
   Image processing, control, speech, audio, telecommunication

BOOKS

Text Books:

1. J, G, Proakis, “INtroducation to Digital Signal Processing ” , PHI
2. Oppenhium and Schaffer, “Discrete Time Signal Processing”

References:

1. S.K. Mitra, “Digital Signal Processing”, TMH
2. T.J. Cavicchi, “Digital Signal Processing”, John Wiley
3. L.C. Ludeman , “Fundamentals of Digital Signal Processing”,
4. E.C. Ifeachor, B.W. Jjervis, “Digital Signal Processing”, Pearson Education
5. S. Sallivahanan. Digital Signal Processing”, TMH
6. Ashok Ambardar, “Analog and Digital Signal Processing”, Thompson Learning

TERM WORK
1. Term work shall consist of at least 10 practical experiments and two assignments covering the topics of the syllabus
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMESTER VII

SUBJECT: EMBEDDED SYSTEMS (ELECTIVE –I)

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term work: 25 Marks** **Oral Exam.: 25 Marks**

Objective: Embedded system tools and products are evolving rapidly. This course deals with various approaches to building embedded systems. It introduces unified view of hardware and software. The aim of this course is to make the students aware of the various applications of embedded systems

Pre – requisites: Microprocessors and C programming

DETAILED SYLLABUS

1. **An overview of embedded systems**
   Introduction to embedded systems, categories and requirements of embedded systems, challenges and issues related to embedded software development. Harware/ Software co- design, Introduction to IC technology

2. **Embedded software development**
   Concepts of concurrency, processes, threads, mutual exclusion and inter-process communication, models and languages for embedded software, synchronous approach to embedded system design, scheduling paradigms, scheduling algorithms, introduction to RTOS, basic design using RTOS

3. **Embedded C Language**
   Real Time methods, Mixing C and assembly, Standard I/O functions, Preprocessor directives, study of compilers and IDE, programming the target device

4. **Hardware for embedded systems**
   Various interface standards, various methods of interfacing, parallel I/O interface, blind counting synchronization and busy waiting, parallel port interfacing with switches, keypads and display units, Memory and high speed interfacing, interfacing of data acquisition systems, interfacing of controllers, serial communication interface, implementation of above concepts using C language

5. **Study of ATMEL RISC processor**
   Architecture, memory, Reset and interrupt functions, Parallel I/O ports, Timers/ counters, Serial Communication, Analog interfaces, Implementation of above concepts using C language

6. **Case Studies and Applications of embedded Systems**
   Applications to: Communication, networking, Database, process Control, Case Studies of: Digital Camera, Network Router, RTLinux

BOOKS

Text Books:

1. Raj Kamal, “Embedded Systems” , TMH
2. David E. Simon, “An Embedded software primer”, Pearson Education
3. Muhammad Ali Mazidi and Janice Gillespie Mazidi, “The 8051 Microcontroller and Embedded Systems”, Pearson Education

References:

1. Frank Vahid, Tony Gvargis, “Embedded System Design: A unified Hardware/ Software introduction ”, John Wiley
2. Craig Hollabaugh, “Embedded Linux”, Pearson Education
3. Daniel Lewis , “Fundamentals of Embedded Software”, Pearson Education
4. Barnett, Cox, O’Cull , “Embedded C Programming and the Atmel AVR”, Thomson Learning
5. Myke Predko. “Programming and Customizing the 8051 Microcontroller”, TMH

TERM WORK

1. Term work shall consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

- Four Experiments on micro controller based systems
- Four experiments using cross C Compiler and Linux
- Two Experiments using development tools like logic analyzer emulator and simulator
- Two experiments on case study of advanced embedded systems

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMESTER VII

SUBJECT: IMAGE PROCESSING (ELECTIVE – I)

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term work: 25 Marks** **Oral Exam.: 25 Marks**

Objective: Digital Image Processing is a rapidly evolving field with growing applications in science and engineering. Image processing holds the possibility of developing the ultimate machine that could perform the visual functions of all living beings. There is an abundance of image processing applications that can serve mankind with the available and anticipated technology in the near future

Pre – requisites: Digital Signal processing and Computer Graphics

DETAILED SYLLABUS

1. **Digital Image Processing Systems**
   Introduction, structure of human eye, image formation in the human eye, brightness adaption and discrimination, image sensing and acquisition, storage, processing, communication, display, image sampling and quantization, baswic relationships between pixels.

2. **Image Transforms (Implementation)**
   Introduction to Fourier transform, DFT and 2- D DFT , Properties of 2- D DT, FFT, IFFT,Walsh transform, Hadamard transform, discrete cosine transform, slant transform, optimum transform, karhunen Loeve Transform

3. **Image Enhancement in the Spatial Domain**
   Gary level transformations, Histogram processing, Arithmetic and logical operations, Spatial filtering : introduction, smoothing and sharpening filters

4. **Image Enhancement in the frequency Domain**
   Frequency Domain Filters, Smoothing and sharpening filters, homomorphic filtering

5. **Wavelets and Multi resolution Processing**
   Image pyramids, sub band coding, Haar transform, Series Expansion, Scaling Functions, Wavelet Functions, Discrete Wavelet transforms in one dimensions, Fast Wavelet transform, Wavelet Transforms in two dimensions

6. **Image Data Compression**
   Fundamentals, Redundancies, coding, interpixel., psycho visual, fidelity mcriteria, image compression models, error free compression, loss compression standards, binary image and continuous tone still image compression standards, video compression standards

7. **Morphological Image processing**
   Introduction, dilation, erosion, opening, closing, hit- or – miss transformation, Morphological algorithm operations on binary images, morphological algorithm operations on gray- scale images

8. **Image Segmentation**
   Detection of discontinuities, Edge linking and boundary detection. Thresholding, Region based segmentation

9. **Image Representation and Description**
   Representation schemes, boundary descriptors, regional descriptors

BOOKS

Text Books:

1. R.C. Gonsales, R. E. Woods, “Digital Image Processing” , Second Edition, Pearson Education
2. Anil K. Jain, “Software Engineering, An engineering approach”
3. Ian Sommerville, “Fundamentals of Image Processing”, PHI

References:

1. William Pratt, “Digital Image Processing”, John Wiley

2. Milan Sonka, Vaclav Halvac, Roger Boyle, “Image Processing, Analysis and Machine Vision”, Thompson Learning
3. N Ahmed and K.R. Rao , “Orthogonal Transform for Digital Image Processing ”, Springer
4. B. Chanda, D. Dutta Majumdar , “Digital Image Processing and analysis ”, PHI

TERM WORK

1. Term work shall consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMESTER VII

SUBJECT: INTELLIGENT SYSTEMS

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term work: 25 Marks** **Oral Exam.: 25 Marks**

Objective: To understand and apply principles, methodologies and techniques in design and implementation of intelligent system

Pre- requisite: Data structures, Programming Languages and Algorithms

DETAILED SYLLABUS

1. **Artificial Intelligence**
   An Overview, Intelligent Systems, Evolution of the concept

2. **Intelligent Agents**
   How Agent should act, structure of intelligent agents, environments

3. **Problem Solving**
   Solving problems by searching, informed search methods, game playing

4. **Knowledge and Reasoning**
   A knowledge based agent. The wumpus world environment, representation , reasoning, logic proportional logic, first order logic, syntax and semantics, extensions and notaion variation, using first order logic

5. **Building and knowledge base**
   Properties of good and bad knowledge base, knowledge engineering, general ontology

6. **Interfacing First Order logic**
   Interface rules involving quantifiers, an example proof, forward and backward chaning, completeness

7. **Acting Logically**
   Planning, Practical Planning, Practical planners, hierarchical decomposition, conditional planning

8. **Uncertain Knowledge and reasoning**
   Representing knowledge in an uncertain domain , the semantics of belief networks, Interference in belief networks

9. **Learning**
   Learning from observations, general model of learning agents, inductive learning, learning decision trees, learning in neural and belief networks, introduction to neural networks, percepttrons, multilayer feed forward network. Application of ANN, reinforcement learning, passive learning in a know environment, generalization in reinforcement learning, genetic algorithms

10. **Agents that Communicate**
    Communication as a action, types of communicating agents. A formal grammar for a subset of English

11. **Expert System**
    Introduction to expert system, representing and using domain knowledge, expert system shells, explanation acquisition

12. **Applications**
    Natural Language processing perception, Robotics

BOOKS

Text Books:

1. Struart Russell and Peter Norvig, “rtifical Intelligence, a modern approach ”

2. George F. Luger , “Artifical Intelligence: structures and strategies for complex problem solving”, Pearson education

References:

1. Nils J. Nillson, “Artifical Intelligence: A new Synthesis”, Harcourt Asia
2. Elaine Rich and Kevin Knight, “Artificial Intelligence ”, TMH
3. Patrick Winston, “Artifical intelligence”, Pearson Education
4. Ivan Brakto, “Prolog Programming for artificial intelligence”, Pearson Education
5. Efraim Turban. “ Decision Support Systems and Intelligent Systems”
6. Ed. M Saikumar and others, “Artificial intelligence: Theory and practice”, proceedings of the International conference KBCS -2002”, Vikas Publishing House

TERM WORK

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ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMESTER VII

SUBJECT: ADVANCED MICROPROCESSORS

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term work: 25 Marks** **Oral Exam.: 25 Marks**

Objective: To study microprocessor basics and the fundamental principles of architecture related to advanced microprocessors

Pre- requisite: MIcroprocessors

DETAILED SYLLABUS

1. **Overview of new generation of modern microprocessors**
2. **Advanced Intel Microprocessors**
   Protected Mode operation of x 86 Intel family, study of Pentium, super scalar architecture and pipelining, register set & special instructions, memory management, cache organization, bus operation, branch prediction logic.
3. **Study of Pentium Family of Processors**
   Pentium I, Pentium II, Pentium III, Pentium IV, architectural features, comparative study.
4. **Advanced RISC Microprocessors**
   Overview of RISC Development and current systems , Alpha AXP architecture , Alpha AXP Implementation and applications
5. **Study of Sun SPARC Family**
   SPARC Architecture, the Super SPARC, SPARC implementation and application
6. **Standard for Bus Architecture and Ports**
   EISA, VESA, PCI, SCSI, PCMCIA Cards and slots, ATA, ATAPI, LPT, USB, AGP, RAID
7. **System Architecture for desktop and server based systems**
   Study of memory subsystems and I/O subsystems, Integration Issues.

BOOKS

Text Books:

1. Daniel Tabak, “Advanced Microprocessors” , Tata McGraw Hill
2. Barry Brey , “The Intel Microprocessors, Architecture, Programming and Interfacing”,
3. Tom Shanley, “Pentium Processor System Architecture”, Addison Wesley Press

References:

1. Ray Bhurchandi, “Advanced Microprocessors and peripherals”, TMH
2. James Abtonakos, “The Pentium Microprocessor”, Pearson Education
3. Badri Ram, “Advanced Microprocessors and Interfacing”, TMH
4. Intel Manuals

TERM WORK

1. Term work shall consist of at least 10 practical expermiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMESTER VII

SUBJECT: MOBILE COMPUTING (ELECTIVE – I)

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term work: 25 Marks** **Oral Exam.: 25 Marks**

Objective: Recent developments in portable devices and high- bandwidth, ubiquitous wireless networks has made mobile computing a reality. Indeed, it is widely predicted that within the next few years access to the Internet services will be primarily from wireless devices , with desktop browsing the exception. Such predictions are based on the huge groeth in the wireless phone market and the success of wireless data services. This course will help in understanding fundamental concepts, current developments in mobile communication systems and wirelesss computer networks

Pre – requisites: Computer Networks

DETAILED SYLLABUS

1. **Introduction**
   Applications, a short history of wireless communication

2. **Wireless Transmission**
   Frequency for radio transmission, signals , antennas, signal propagation, multiplexing, modulation, spread spectrum, cellular system

3. **Medium access control**
   Motivation for a specialized MAC, Hidden and Exposed terminals. Near and far terminals, SDMA FDMA, TDMA, fixed TDM, classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access ,PRMA Packet reservation multiple access, reservations TDMA, Multiple access with collision avoidance, Polling, Inhibit Sense multiple access, CDMA, Spread Aloha Multiple Access

4. **Telecommunication Systems**
   GSm, Mobile services, system architecture, radio interference, protocols, localization and Calling, handover, Security, new data services, DECT : system architecture, Protocol architecture, TETRA, UTMS and IMT-2000, UMTS Basic Architecture, UTRA FDD mode, UTRA TDD mode

5. **Satellite Systems**
   History, applications, Basics: GEO, LEO, MEO , Routing, Localization, handover, Examples

6. **Broadcast Systems**
   Overview, Cyclic repetition of data, digital audio broadcasting, Multimedia object transfer protocol, digital video broadcasting

7. **Wireless LAN**
   Infrared vs Radio transmission. Infrastructure and ad-hoc networks, IEEE 802.11, system architectur, protocol Architecture, Physical layer, medium access control layer, MAC management, Future development. HYPERLAN: Protocol architecture, physical layer, channel access control. Sub layer, medium access control sublayer, Information base and networking, Bluetooth: user scenarios, physical layer, MAC layer, Networking, Security, Link Management

8. **Wireless ATM**
   Motivation for W ATM, Wireless ATM group working, W ATM services, reference model: Example configurations, Generic reference model. Functions, wireless mobile terminal side , mobility supporting network side, radio access layer, requirements, BRAN, handover, handover reference model, handover requirements , types of handovers, handover scenarios, backword handover, forward handover, Location Management, Requirements, Requirements for location management, procedures and entities , addressing, mobile quality of service, access point control protocol

9. **Mobile network Layer**

Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent Advertisement and discovery, IP packet delivery, Agent advertisement and discovery, Registration n tunneling and Encapsulation, Optimization, reverse tunneling, IP V6, dynamic host configuration protocol AD Hocnetworks, routing, destination sequence distance vector, Dynamic source routing, Hierarchical Algorithms, Alternative Metrics

10. Mobile Transport Layer

Traditional TCP, Congestion control, slow start, fast retransmit/fast recovery, implications on mobility, indirect TCP, Snopping TCp, Mobile TCP , fast retransmit / fast recovery, transmission/ time-out freezing, selective retransmission, transaction oriented TCP

11.Support for Mobility

File Systems: Consistency, examples, world wide web, hypertext markup language, some approaches that might help wireless access, system architecture: wireless application protocol, architecture, wireless datagram protocol, wireless transport layer security, wireless transaction protocol, wireless session protocol, wireless application environment , wireless markup language, WML script, wireless telephony application, Examples : Stacks with wap, Mobile databases, Mobile Agents

BOOKS

Text Books:

1. Jochen Schiller, “Mobile Communication” , Pearson Education
2. William Stallings, “Wireless Communications and Networks”, Pearson Education

References:

1. Rappaort, “Wireless Communications Principles and Practices”,
2. Y B Lin, “Wireless and Mobile Network Architectures”, John Wiley and Sons
3. R NIcopolitidis , “Wireless networks”, John Wiley and Sons
4. K. Pahlavan, P. Krishnamurthy , “Principle pf wireless networks”,
5. M. Richharia. “Mobile Satellite Communication ”, Pearson Education

TERM WORK

1. Term work shall consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMESTER VII

SUBJECT: PATTERN RECONGNITION (ELECTIVE – I)

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term work: 25 Marks** **Oral Exam.: 25 Marks**

Objective: This course teaches the fundamentals of techniques for classifying multi- dimensional data, to be utilized for problem solving in a wide variety of applications, such as engineering system design, manufacturing, technical and medical diagnostics, image processing, economics, psycholgy

Pre- requites: Linear algebra, probability and statistics

DETAILED SYLLABUS

1. **Introduction**
   Machine perception, Pattern recognition systems, design cycle, learning and adaptation

2. **Bayesian Decision Theory**
   Bayesian decision theory, continuous features, minimum- error rate classification, classifiers, discriminant functions and desion surfaces, normal density, discriminant functions and decision surfaces, normal density, disriminant functions for normal density, bayes Decision theory, discrete features

3. **Maximum Likelihood and Bayesian parameter Estimation**
   Maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation, Gaussian case and general theory, Problems of dimensionality, Hidden Markov Model

4. **Nonparametric Techniques**
   Density estimation , parzen windows, K_n Nearest neighbor estimation, nearest neighbor rule, metrics and nearest neighbor classification

5. **Linear Discriminate Functions**
   Linear discriminate functions and decision surfaces, Generalized linear discriminate functions, 2- category linearly separable case, Minimizing the perception criterion function, Relexation procedure, Non- separable behavior, Minimum Squared error procedure, Ho Kashyap procedures, multi category generalisation

6. **Nonmetric methods**
   Decision Tree, CART, ID3, C4.5, Grammatical Methods, Gramatical interfaces

7. **Algorithm Independent machine Learning**
   Lack of inherent superiority of any classifier, Bias and Variance, Resampling for estimating statistic, resampling for classifier design, estimationg and comparing classifiers, combining classifiers

8. **Unsupervised Learning and Clustering**
   Mixture densities and Identifiably, Maximum – Likelihood estimates, Application to normal mixtures, unsupervised Bayesian learning, Data description and clustering criterion function for clustering , hierarchical clustering

9. **Applications of Pattern Recognition**

BOOKS

Text Books:

1. Duda, Hart and Stock “Pattern Classification ” , John Wiley and Sons
2. Gose, Johnsonbaugh and Jost, “Pattern Recognition and Image Analysis”, PHI

TERM WORK

1. Term work shall consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMESTER VII

SUBJECT: SOFTWARE ENGINEERING

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term work: 25 Marks** **Oral Exam.: 25 Marks**

Objective: Apply various software engineering principles and methodologies while dealing with the various phase of software development

Pre – requisites: Programming concepts

DETAILED SYLLABUS

1. Product

Evolving role of software, software characteristics, software application, software myths

2. Process

Software Process, Process Models, Linear sequential model , prototyping model, RAD model, evolutionary software models, component based development, format methods model, fourth generation technique, process technology, product process

3. Project Management

Management spectrum, people, product, process, W^5HH principle

4. Software Process and Project Metrics

Measures Metrics Indicators , Metrics in the process and project domainds, software measurement, metrics for software quality, integrating metrics within the software engineering process, statistical quality control, metrics for small organization, establishing a software metrics program

5. Software Project Planning

Objectives, Software Scope, Resources, Software project estimation, decomposition techniques, empirical estimation models, Make/ Buydecision, automated estimation tools

6. Risk Analysis and management

Reactive versus proactive risk strategies, software risks, risk identification, risk projection, risk refinement, risk mitigation monitoring management, safety risks and hazards, RMMM plan.

7. Project scheduling and Tracking

Basic concepts, relationship between people and effort, defining a task set for the software project, selecting software engineering tasks , refinement of major tasks, defining a task network, scheduling, earned value network, error tracking, project plan

8. Software Quality Assurance

Quality concepts, quality movement, software quality assurance, software reviews, formal technical reviews, formal approaches to SQA, statistical quality assurance, software reliability, mistake proofing for software, ISO 9000 quality standards, SQA plan.

9. Software Configuration Management

Introduction, SCM process, Identification of objects in the software configuration, version control, change control, configuration audit, status reporting, SCM standards

10. System Engineering

Computer based systems, system engineering hierarchy, business process engineering, product engineering, requirements engineering, systems modeling

11.Analysis Concepts and principles

Requirement analysis , requirement elicitation for software, analysis principles, software prototyping, specification

12. Analysis Modeling

Introduction, Elements of analysis model, data modeling, functional modeling and information flow, behavioral modeling, mechanics of structured analysis , data dictionary, other

classical analysis methods

13. Design Concepts and Principles

Software design and software engineering , design process, design principles, design concepts, effective modular design, design heuristics for effective modularity, design model, design documentation

14. Architectural Design

Software architecture, data design, architectural styles, analyzing alternative architectural designs, mapping requirements into a software architectural design

15. User Interface design

The golden rules, user interface design , task analysis and modeling, interface design activities, implementation tools, design evaluation

16. Component Level Design

Structured Programming, Comparison of design notation

17. Software Testing Techniques

Software testing fundamentals, test case design, white box testing, basis path testing, control structure testing, black box testing, testing for specialized environments, architectures and applications

18. Software Testing Strategies

Strategic approach to software testing, strategic issues, unit testing, integration testing, validation testing, system testing, art of debugging

19. Technical Metrics for Software

Software quality, framework for technical metrics. Metrics for analysis model. Metrics for the design model, Metrics for source code, Metrics for testing, metrics for maintanence

BOOKS

Text Books:

1. Roger Pressman, “Software Engineering” , McGraw Hill, Fifth Edition
2. James Peter, “Software Engineering, An engineering approach”
3. Ian Sommerville, “Software Engineering”, Pearson Education

References:

1. W.S Jawadekar, “Software Engineering”, TMH
2. Pankaj Jalote, “An Integrated approach to Software Engineering”, Narosa
3. R Mall , “Fundamentals of Software Engineering”, Prentice hall of India
4. A. Behferooz and F.J. Hudson , “Software Engineering Fundamentals”, Oxford university press
5. S. L Pfleeger. “Software Engineering”, Pearson Education

TERM WORK

1. Term work shall consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMESTER VII

SUBJECT: ADVANCED COMPUTER NETWORKS (ELECTIVE –I)

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term work: 25 Marks** **Oral Exam.: 25 Marks**

Objective: In first part, advanced technologies like high speed devices are to be considered. Second part, network Programming is to be studied. Not just SOCKETS but also protocols, Drivers, Simulation programming. In third part, we should study network design, Protocols designs and analysis considering deterministic and non-deterministic approach. We expect natural thinking from students. For example, he should be able to consider different constraints and assume suitable data and solve the problems

Pre – requisites: Basic Course in Computer networks

DETAILED SYLLABUS

1. **Data communication**
   Business Drivers and networking Directions, Data Communication : Past and Future

2. **Understanding the standards of the Marker**
   Creating standards, players and process, current forums, standard protocols, Layered reference models, The OSIRM, Standard Computer Architectures

3. **Introduction to Transmission Technologies**
   Hardware selection in the design process

4. **Optical networking**
   SONET/ SDH standards, Dense wavelength division multiplexing(DWDM), performance and design considerations

5. **Physical Layer Protocols and Access Technologies**
   Physical layer protocols and interfaces, Accessing the network copper access technologies, cable access technologies, fiber access technologies, air access technologies

6. **Common protocols and interfaces in the LAN environment**
   Data link layers protocols, LLC and MAC sub layer protocol, Ethernet, Token Ring, Token bus and FDDI, bridge Protocols, Switching in the LAN Environment

7. **Frame Relay**
   FR specification and design, VoFR performance and design consideration, advantages and disadvantages of FR

8. **Common WAN Protocol**
   ATM: Many faces of ATM, ATM Protocol operation(ATM cell and transmission), ATM networking basics. Theory of operation,, B-ISDM, protocol reference model, PHY layer, ATM layer(Protocol Model) , ATM layer and cell(definition) , Traffic descriptors and parameters, Traffic and Congestion control defined, AAL protocol model, Traffic Contract and oS, User Plane Overview, Control plane AAL, Management plane, sub-DS# ATM, ATM public services

9. **Common Protocol and Interfaces in the upper layers(TCP/IP)**
   Background(Routing Protocols), TCP/IP suite, Network Layer (Internetwork Layer), transport layer, Application Layer, Addressing and routing design

10. **Mature Packet Switch Protocol**
    ITU Recommendation X.25, User connectivity, Theory of operation, Network layer functions, X.75 Internetworking protocol, switched multimagabit data service(SMDS), SMDS and IEEE 802.6, Subscriber Interface and Access protocol, Addressing and traffic control

11. **Requirements Definition**
    User requirements, traffic sizing, traffic characteristics, Protocols, Time and Delay considerations, connectivity, Availability, Reliability and Maintainability, Service aspects, budget constraints

12. Traffic Engineering and Capacity Planning

Background (Throughput calculations), Traffic Engineering basics (Traffic characteristics), Traditional Traffic Engineering, Queued data and packet switched traffic modeling, Designing for peaks. Delay or latency, Availability and reliability, network performance modeling, Creating the traffic matrix, Capacity Planning and Network vision, Design tool, categories of tools, classes of design tool, components of design projects, Types of design projects

13. Technology Comparisons

Circuits message packet and cells switching models , Packet switching service aspects, Generic packet switching network characteristics, Private versus public networking, Public network service selection, Business aspects of Packet-frame and cell switching services, High speed LAN protocols comparisons, Application Performance Needs.

14. Access Network Design

Network design layers, access layer design, Access network capacity, network topology and hardware, completing the access network design

15. Backbone Network Design

Backbone requirements, network capacities, Topologies strategies. Tuning the network

BOOKS

Text Books:

1. Darren L. Spohn “Data network Design” , TMH
2. D. Bertsekas , R. Gallager, “Data networks ”, PHI

References:

1. W.R Stevens, “Unix network programming”, Volume I, Pearson Education
2. J. Walrand, P.Varaiya, “High Performance Communication network “, Morgan- Kaufmann
3. Y. Zheng, S.akhtar , “Network for Computer Scientists and Engineers”, Oxford
4. A.S. TAnenbaum , “Computer networks”,
5. Peterson and Davie. “Computer networks”, Harcourt Asia
6. James D. McCable, “practical Computer Analysis and design”, Harcourt Asia

TERM WORK

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ORAL EXAMINATION

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B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMESTER VII

SUBJECT: COMPUTER SIMULATION AND MODELLING (ELECTIVE –I)

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term work: 25 Marks** **Oral Exam.: 25 Marks**

Objective: In the last five decades digital computer simulation has developed from infancy to a full fledged discipline. The field of modeling and simulation is as diverse as of man. The application of simulations continues to expand both in terms of extent to which simulation is used and the range of applications. This course gives a comprehensive and state of art treatment of all the important aspects of simulation study, including modeling, simulation software, model verification and validation, input modeling

Pre – requisites: Probability and Statistics

DETAILED SYLLABUS

1. Introduction to Simulation

Systems and system environment , components of system, type of systems, type of models, steps in simulation study, advantages and disadvantages of simulation

2. Simulation Examples

Simulation of Queuing System, Other Examples of simulation

3. General Principles

Concepts of discrete event simulation, list processing

4. Simulation software

History of simulation software, desirable software features, General purpose Simulation packages, Object Oriented Simulation, Trends in Simulation software

5. Statistical Model in Simulation

Useful statistical model, discrete distribution, continuous distribution, Poisson process, Empirical Distribution

6. Queuing Models

Characteristics of Queuing systems, queuing notations, long run measures of performance of queuing systems, steady state behavior of infinite population , Markovian models, steady state behavior finite population model, network of queues

7. Random Number Generation

Properties of Random numbers, generation of pseudorandom numbers. Techniques for generating random numbers, tests for random numbers

8. Random Variate Generation

Inverse Transform technique, convolution method, acceptance rejection techniques

9. Input Modeling

Data Collection Identifying the distribution of data, parameter estimation, Goodness of fit tests, Selection input model without data, Multivariate ant time series input models

10. Verification and Validation of Simulation Model

Model Building, verification and validation, verification of simulation models, calibration and validation of models

11.Output Analysis for a single model

Types of simulations with respect to output analysis, stochastic nature of output data, measure of performance and their estimation. Output Analysis for terminating simulators, Output analysis for steady state simulation

12. Comparison and Evaluation of Alternative System Design

Comparision of two system design, comparision of several system design, meta modeling, optimization via simulation

13. Case Studies

Simulation of manufacturing systems, simulation of computer systems, simpulation of super market, simulation of pert network

BOOKS

Text Books:

1. Jerry Banks, John Carson, Barry Nelson, David Nicol, “Discrete Event System Simulation”
2. Averill Law, W. David Kelton, “Simulation Modeling and Analysis”, McGraw Hill

References:

1. Geoffrey Gordon, “System Simulation”, PHI
2. Berned Zeigler, Herbert Praehofer, Tag Gon Kim, “Theory of Modeling and Simulation “, Academic Press
3. Narsing Deo , “System Simulation with digital computer”, Prentice hall of India
4. Donald W. Boyd , “System analysis and modeling”, Academic press
5. 5. W. David Kelton, Randall Sadowski, Deborah Dasowski. “Simulation with arena”, McGraw Hill

TERM WORK

1. Term work shall consist of at least 10 practical experiments and two assignments covering the topics of the syllabus

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus