B.E. ELECTRONICS ENGINEERING
FOURTH YEAR semester VIII

SUBJECT: Elective - II, Advanced Digital Signal Processing

Lectures: 4 Hrs per week	**Theory: 100 Marks**
Practical: 2 Hrs per week	**Term Work: 25 Marks**
	Oral: 25 Marks

Rationale: *This subject provides a comprehensive treatment of signal processing algorithms for modeling discrete time signals, designing optimum filters and estimating the power spectrum of a random process.*

DETAILED SYLLABUS

- Discrete - Time random processes
- Spectral Factorization Minimum phase signals & systems Partial energy & Minimum delay Minimum phase & Minimum delay property Spectral factorization theorem
- Spectral Estimation by Classical Methods The periodogram The modified periodogram Barlett, Welch & Blackman -Tuckey approach
- Signal Modeling The Least-Squares method The Pade Approximation
- Linear prediction Levinson Recursion Schur Algorithm Lattice realization
- Spectral Estimation by Parametric Techniques
- Wiener filtering FIR wiener filters

BOOKS

Text Books:

1. Hayes, Statistical Digital Signal processing and modeling, John Wiley, 2002
2. Proakis, Rader, Ling & Nikias, Advanced Digital Signal Processing, Maxwell Macmillan International, 1992

Additional Reading:

3. S. M. Kay, Modem Spectral Estimation, Prentice Hall, 1988
4. S. J. Orfanidis, Optimum Signal Processing: An Introduction, second edition, McGraw-Hill, International, 1990

TERM WORK

5. Term work shall consist of at least 10 practicals / assignments covering the topics of the syllabus.
6. A term work test shall be conducted with a weightage of 10 marks.

ORAL EXAMINATION

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

B.E. ELECTRONICS ENGINEERING

FOURTH YEAR semester VIII

SUBJECT: Elective - II, Biomedical Instrumentation

Lectures: 4 Hrs per week	**Theory: 100 Marks**
Practical: 2 Hrs per week	**Term Work: 25 Marks**
	Oral: 25 Marks

Rationale: This subject introduces an interdisciplinary field and shall provide knowledge of the combination of Biomedical Engineering as well as the technology of instrumentation. This subject teaches application of Electronics Engineering to Medicine.

DETAILED SYLLABUS

Study of Human Body

Anatomy and Physiology of the human body, Body System - Skeletal, Muscular, Circulatory, Respiratory, Digestive, Excretory, Nervous, Endocrine, Reproductive.

Study of the Human Cell

Average Human Cell, Transport across the cell membrane and membrane potential - Na+ & K+ transport, Action Potential, Electrical Equivalent Circuit of a cell.

Bio Electrodes, transducers and amplifiers

Electrode - Electrolyte Interface, different electrode types, Stimulating electrodes, Biomedical Amplifiers. Transducers for measurement of physiological events.

Electrocardiogram

Origin of the heart beat and the electrical activity of the heart, the ECG and its analysis, the Einthoven Triangle, Bipolar leads, Unipolar leads, Vector cardiography, Measurement of cardiac output, ECG electrodes, ECG Amplifiers, Cardiac Arrhythmias.

Bioelectric Signals

Study of Characteristics of various Bioelectric Signals such as EEG, EMG, ERG, EOG and their recording,

Signal Measurement

- Measurement of blood pressure, blood flow and cardiac output
- Impedance Plethysmography.
- Measurements in the respiratory system

Biomedical Instruments

Stimulators, Defibrillators, Pacemakers, Respirators, Bedside Monitor, Audiometer and hearing aids. Oximetry, Ear Oximeter, Pulse Oximeter, Blood Gas Analyzer, Spirometry, Pulmonary Function Analyzers.

Prosthesis

Introduction to Prosthesis.

Electrical safety

Electrical safety of patient and medical equipment.

BOOKS

Text Books:

7. Cromwell L. Weibell & Pfeiffer, Biomedical Instrumentation and measurements, Prentice Hall of India, 1993
8. Khandpur R. S., Handbook of Biomedical Instrumentation, Tata McGraw Hill, second edition, 2003

Additional Reading:

9. Ganong W.F., Review of Medical Physiology, Prentice Hall Inc, USA, 1995
10. Webster J. G. -Medical Instrumentation - Application and Design, Wiley and Sons Inc, third edition, 1999
11. Carr and Brown, Introduction to biomedical equipment technology, fourth edition, Pearson press, 2003

TERM WORK

12. Term work shall consist of at least eight practicals and assignments covering the topics of the syllabus, a visit to a hospital for detailed study and functioning of available Biomedical Instruments. 2. A term work test shall be conducted with a weightage of 10 marks.

ORAL EXAMINATION

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

B.E. ELECTRONICS ENGINEERING
FOURTH YEAR semester VIII

SUBJECT: Elective - II, Embedded Systems and Real Time Programming

Lectures: 4 Hrs per week	**Theory: 100 Marks**
Practical: 2 Hrs per week	**Term Work: 25 Marks**
	Oral: 25 Marks

Rationale: *Embedded systems have permeated all industries and even our homes. They are a combination of hardware and software and run critical areas like communications, transportation and energy systems. This subject shall provide crucial knowledge required to understand, analyze and design embedded systems and real-time programming.*

DETAILED SYLLABUS

Introduction to Embedded systems

Software Embedded into a System.

Processor and Memory Organization

Structural Units in a Processor, Processor Selection for an Embedded System, Memory Devices, Memory Selection for an embedded System, Allocation of Memory to program Segments and Blocks and Memory Map of a System, Direct Memory Access, Interfacing Processor, Memories and I/O Devices.

Devices and Buses for Device Networks

I/O Devices, Timer and Counting Devices, Serial Communication using the 'I2C', 'CAN' and Advanced I/O Buses between the Networked Multiple Devices, Host system or Computer parallel Communication between the Networked I/O Multiple Devices Using the PCI, PCI-X and Advanced Buses.

Device Drivers and Interrupts Servicing Mechanism

Device Drivers, Parallel Port Device Drivers in a System, Serial Port Device Drivers in a System, Device Drivers for Internal Programmable Timing Devices, Interrupt Servicing (Handling) Mechanism, Context and the periods of Context-Switching, Deadline and Interrupt Latency.

Programming Concepts and Embedded Programming in C and C++

Software Programming in Assembly Language (ALP) and in High Level Language 'C', 'C' Program Elements: Header and Source Files and Preprocessor Directives, Program Elements: Macros and Functions, Program Elements: Data Types, Data Structures, Modifiers, Statements, Loops and Pointers, Queues, Stacks, Lists and Ordered Lists, Embedded Programming in C++, 'C' Program Compiler and Cross-Compiler, Source Code Engineering Tools for Embedded C/C++, Optimization of Memory Needs.

Program Modeling Concepts for Software-Development Process

Modeling Processes for Software Analysis Before Software Implementation, Programming Models for Event Controlled or Response Time Constrained Real Time Programs.

Software Engineering Practices in the Embedded Software Development Process

Software Algorithm Complexity, Software Development Process Life Cycle and its

Models, Software Analysis, Software Design, Software Implementation, Software Testing, Validating and Debugging , Real Time Programming Issues During the Software Development Process, Software Project Management, Software Maintenance, Unified Modeling Language(UML).

Inter-Process Communication and Synchronization of Processes, Tasks and Threads

Multiple Processes in an Application, Problem of Sharing Data by Multiple Tasks and Routines, Inter process Communication.

Real Time Operating Systems

Operating System Services, I/O Subsystems, Network Operating Systems, Real-Time and Embedded System Operating Systems, Interrupt Routines in RTOS Environment: Handling of Interrupt Source Call by the RTOSs, RTOS Task Scheduling Models, Interrupt Latency and Response Times of The Tasks as Performance Metrics, Performance Metric in Scheduling Models for Periodic, Sporadic and Aperiodic Tasks, IEEE Standard POSIX 1003.1b Functions for Standardization of RTOS and Inter-Task Communication Functions, List of Basic Actions in a Preemptive Scheduler and Expected Times Taken at a Processor, Fifteen-Point Strategy for Synchronization between the processes, ISRs, OS Functions and Tasks and for Resource Management.

Hardware-Software Co-design in an Embedded System Embedded System Project

Management, Embedded System Design and Co-design Issues in System Development Process, Design Cycle in the Development Phase for an Embedded System, Uses of Target System or its Emulator and In-Circuit Emulator (ICE), Uses of Software Tools for Development of an Embedded System, Use of Software Tools for Development of an Embedded System, The software build process for embedded systems - Preprocessing, compiling / cross compiling, linking, locating, loading on the target, Uses of Oscilloscopes and Logic Analyzers for System Hardware Tests, Issues in Embedded System Design.

BOOKS

Text Books:

13. Rajkamal, Embedded Systems - Architecture, Programming and Design, Tata McGraw Hill, first edition, 2003
14. Sriram Iyer and Pankaj Gupta, Embedded Realtime Systems Programming, Tata McGraw Hill, first edition, 2003

Additional Reading:

15. Qing Li and Caroline Yao, Real-time Concepts for Embedded Systems, Cmpbooks Press, first edition, 2003

TERM WORK

16. Term work should consist of at least eight practicals and assignments covering the topics of the syllabus.
17. A term work test must be conducted with a weightage of 10 marks.

ORAL EXAMINATION

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

B.E. ELECTRONICS ENGINEERING

FOURTH YEAR semester VIII

SUBJECT: Elective - II, Robotics

Lectures: 4 Hrs per week	**Theory: 100 Marks**
Practical: 2 Hrs per week	**Term Work: 25 Marks**
	Oral: 25 Marks

Rationale: This course familiarizes students with the concepts and techniques in robot manipulator control, enough to evaluate, choose, and incorporate robots in engineering systems.

DETAILED SYLLABUS

Robotic Manipulation

Automation and Robots, Classification, Application, Specification, Notations.

Direct Kinematics

Dot and cross products, Co-ordinate frames, Rotations, Homogeneous, Co-ordinates, Link co-ordination arm equation, (Five-axis robot, Four axis robot, Six axis robot).

Inverse Kinematics

General properties of solutions tool configuration Five axis robots, Three-Four axis, Six axis robot (Inverse kinematics). Workspace analysis and trajectory planning work envelop and examples, workspace fixtures, Pick and place operations, Continuous path motion, Interpolated motion, Straight-line motion.

Robot Vision

Image representation, Template matching, Polyhedral objects, Shane analysis, Segmentation (Thresholding, region labeling, Shrink operators, Swell operators, Euler numbers, Perspective transformation, Structured Illumination, Camera calibration).

Task Planning

Task level programming, Uncertainty, Configuration, Space, Gross motion, Planning, Grasp planning, Fine-motion Planning, Simulation of Planer motion, Source and goal scenes, Task planner simulation.

Moments of Inertia.

Principles of NC and CNC Machines.

BOOKS

Text Books:

18. Robert Shilling, Fundamentals of Robotics-Analysis and control, Prentice Hall of India
19. Fu, Gonzales and Lee, Robotics, McGraw Hill 3. J.J, Craig, Introduction to Robotics, Pearson Education

Additional Reading:

20. Staughard, Robotics and AI, Prentice Hall of India
21. Grover, Wiess, Nagel, Oderey, “Industrial Robotics”, McGraw Hill
22. Walfram Stdder, Robotics and Mechatronics,

23. Niku, Introduction to Robotics, Pearson Education 5. Klafter, Chmielewski, Negin, Robot Engineering, Prentice Hall of India 6. Mittal, Nagrath, Robotics and Control, Tata McGraw Hill publications

TERM WORK

1. Term work should consist of at least 10 practicals and assignments covering the topics of the syllabus. 2. A term work test shall be conducted with a weightage of 10 marks.

ORAL EXAMINATION

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

B.E. ELECTRONICS ENGINEERING

FOURTH YEAR semester VII

SUBJECT: Elective - II, Telecommunication Network Management

Lectures: 4 Hrs per week	**Theory: 100 Marks**
Practical: 2 Hrs per week	**Term Work: 25 Marks**
	Oral: 25 Marks

Rationale: *Telecommunication systems have grown extremely large in size and complexity. Effective management solutions have been in use to run these complex networks efficiently. This subject introduces principles and practice for effective management of telecommunications networks*

DETAILED SYLLABUS

Foundations

Network management standards, network management model, organization model, information model, abstract syntax notation I (ASN.1), encoding structure, macros, functional model.

Network management application functional requirements

Configuration management, fault management, performance management, Error correlation technology, security management, accounting management, common management, report management, polity based management, service level management, management service, community definitions, capturing the requirements, simple and formal approaches, semi formal and formal notations.

Telecommunication management network (TMN) architecture

Terminology, functional architecture, information architecture, physical architecture, TNN cube, TMN and OSI.

Common management information service element (CMISE)

CMISE model, service definitions, errors, scooping and filtering features, synchronization, functional units, association services, common management information protocol (CMIP) specification.

Information Modeling for TMN

Rationale for Information Modeling, management information model, object oriented modeling paradigm, structure of management information, managed object class definition, management information base (MIB)

Simple network management protocol (SNMP):

SNMPv1: managed networks, SNMP models, organization model, information model, SNMPv2: communication model, functional model, major changes in SNMPv2, structure of management information (SMI), MIB, SNMPv2 protocol, compatibility with SNMPv1, SNMPv3: architecture, applications, MIB security, remote monitoring (RMON) SMI and MIB, RMON1 and RMON2.

Network management examples:

ATM integrated local management interface, ATM MIB, M1, M2, M3, M4, interfaces, ATM digital exchange interface management, digital subscriber loop (DSL) and

Asymmetric DSL (ADSL) technologies, ADSL configuration management, performance management.

Network management tools:

Network statistics management, network management system, management platform case studies: OPENVIEW, ALMAP.

BOOKS

Text Books:

24. Mani Subramanian, Network Management: Principles and Practice, Addison Wesley, Pearson Education Asia publication

25. Lakshmi Raman, Fundamentals of Telecommunication Network Management, IEEE Communication Society, Prentice Hall of India Edition, 1999

26. Airdarous Salah, Plevyak Thomas, Telecommunication Network Management: Technologies and Implementations, Prentice Hall of India

27. Haojin Wang, Henry Haojin Wang, Haijiang Haojin Wang, Telecommunication Network Management.

Additional Reading:

TERM WORK

28. Term work shall consist of at least 10 practicals and two assignments covering the topics of the syllabus.
29. A term work test shall be conducted with a weightage of 10 marks.

ORAL EXAMINATION

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

B.E. ELECTRONICS ENGINEERING

FOURTH YEAR semester VIII

SUBJECT: Elective - II, VLSI Design

Lectures: 4 Hrs per week	**Theory: 100 Marks**
Practical: 2 Hrs per week	**Term Work: 25 Marks**
	Oral: 25 Marks

Rationale: *This subject lays a strong foundation for understanding VLSI circuits and their performance. Design of different CMOS integrated devices is covered in great detail along with testing.*

DETAILED SYLLABUS

Circuit Characterization and Performance Estimation

Resistance and capacitance estimation, switching characteristics, CMOS gate transistor sizing, power dissipation, Sizing Routing conductors, Charge sharing designing margining yield and reliability.

System Specification Using Verilog HDL

Basic concepts, structural gate level modeling, switch level modeling, design hierarchies, behavioral and RTL modeling

Arithmetic Circuit in CMOS VLSI

Bit adder circuits, Ripple carry adders, Carry look ahead adders, High speed adders, Multipliers.

Design of Memories and Programmable Logic

The static RAM, SRAM, Dynamic RAM, ROM ARRAYS, Logic ARRAYS.

System Level Physical Design

Large scale physical design, Interconnected Delay Modeling, Crosstalk, Interconnected Scaling, Floor planning & Routing, I/P & O/P Circuit, Power dissipation and consumption, Low power Design considerations.

VLSI clocking and system design

Clocked flipflop, CMOS clock styles, Pipelined systems, Clock generation and distribution, System design considerations.

CMOS Testing

The need for testing, manufacturing test principles, design strategies for test, Chip level test techniques, System level test techniques, Layout design for improved testability.

BOOKS

Text Books:

30. Neil H.E. Weste Kamran E Shraghian, Principles of CMOS VLSI Design: A system perspective, Addison Wesley publication
31. John P Vyemura, Introduction to VLSI Circuits and systems, John Wiley & sons
32. Samir Palnitkar, Verilog HDL, A Guide to Digital Design and Synthesis, Pearson

Education
Additional Reading:
TERM WORK
33. Term work shall consist of at least 10 practicals and two assignments covering the topics of the syllabus. 34. A term work test shall be conducted with a weightage of 10 marks.
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus.