## SCHEME OF INSTRUCTION AND EVALUATION
### I SEMESTER OF II YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME
#### ELECTRONICS AND INSTRUMENTATION ENGINEERING

<table>
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<tr>
<th>Course No.</th>
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<th>Lectures</th>
<th>Tutorials</th>
<th>Practicals</th>
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MH 211 MATHEMATICS – II

Class: B.Tech. II/IV, I-Semester
Branch: CSE, IT, Mech, Civil, ECE, EEE, E&I
Duration of Univ. Examination: 3 Hrs.
Lectures: 3 Hrs, Tutorials: 1
Univ. Examination: 100 marks
Sessionals: 50 marks

UNIT – I

UNIT – II

UNIT – III

UNIT – IV
PARTIAL DIFFERENTIAL EQUATIONS: solution of wave equation, Heat equation and Laplace equation by the method of separation of variables and their application in problems of vibrating string, one dimensional unsteady heat flow and two dimensional steady heat flow (Problem based on Fourier – Trigonometric series only).

TEXT BOOKS:

REFERENCE BOOKS:
EI 212 ELECTRICAL & ELECTRONIC MEASUREMENTS

Class: II/IV B.Tech. I-Semester
Branch: E&I
Duration of Uni. Exams: 3 Hours

Lecturers: 3 Tutorials: 1
Uni. Examinations: 100 marks
Sessions: 50 Marks

UNIT-I


UNIT-II

POTENTIOMETERS: Basic Potentiometer Circuit, Cromptons DC Potentiometer, Volt-Ratio Box, Applications of DC potentiometers: Calibration of Ammeter, Voltmeter and Wattmeter, AC polar type and co-ordinate type potentiometers.
BRIDGES: Measurement of Resistance, Inductance and capacitance using Bridges – Wheatstone Bridge, Kelvins Double Bridge, Maxwells Bridge, Hay’s Bridge, Owen’s Bridge, Wiens Bridge, Desauty’s and Schering Bridges. (8+3)

UNIT-III

DIGITAL MULTIMETER: Block diagram Approach for measurement of Voltage, Current and Resistance.
OSSILLOSCOPES: Cathode Ray Tube (CRT), Electrostatic deflection, post deflection and Acceleration of Electron Beam, screens for CRTS, Block diagram of CRO, Time – Base Generator, Free running and Triggered sweeps, Attenuators, probes, Dual Beam Oscilloscope, Dual Trace Oscilloscope, Sampling Oscilloscope, Digital Storage Oscilloscope, Applications of CRO, Measurement of Phase and frequency using Lisajjous Patterns. (9+3)

UNIT-IV

INSTRUMENT TRANSFORMERS: instrument Transformers versus shunts and multipliers, Phasor diagram of current and potential transformers, Expression for ratio and phase angle errors, Effect of variation of Load Power Factor and Frequency. (9+3)

Text Books:


Reference Books:

EC 214 SWITCHING THEORY AND LOGIC DESIGN

Class: II/IV B.Tech. I-Semester
Branch: (Common to ECE and EIE)
Duration of Uni. Exams: 3 Hours

Lecturers: 3  Tutorials: 1
Uni. Examinations: 100 marks
Sessions: 50 Marks

UNIT – I


UNIT – II

Design of Combinational Circuits:

UNIT – III


UNIT – IV


TEXT BOOKS:

REFERENCE BOOKS:
3. R.P. Jain, Modern Digital Electronics, Prentice Hall of India
UNIT – I

UNIT – II

UNIT – III

UNIT – IV
Transistor biasing Thermal runway and thermal stabilization. The operating point stability Collector –to-base, self Bias. Stabilization against variations in V_{BE} and Beta for self bias circuits, FET biasing, Source self bias. Zero current drift biasing. Biasing against device variation. Biasing of enhancement type MOSFET.

TEXT BOOKS:

Class: II/IV B.Tech. I-Semester
Branch: ECE / EIE
Duration of Univ. Examination: 3 Hours

Lectures: 3, Tutorial: 1
Univ. Examination: 100 marks
Sessionals: 50 Marks

UNIT – I
Ohm’s Law, Network Elements, Kirchhoff’s Laws, Source Transformation, Mesh and Nodal Analysis, Power in Electric Circuits, Series, Parallel and Series Parallel and Combination of Resistances, network reduction by Star – Delta Transformation, Superposition, Thevenin’s Norton’s, and Maximum Power transfer theorems. (9+3)

UNIT – II
1 – Phase A.C. Circuits: Phasor representation of sinusoidal quantities, Average, R.M.S. values and Form factor, A.C. through Resistor, Inductor and Capacitor, Analysis of R-L-C series and parallel circuits, Power factor, power triangle, Series Resonance.
3-ϕ A.C. Circuits: Production of 3-ϕ Voltages, Voltage & Current relationships of Line and Phase values for Star and Delta Connections, 3-ϕ Power Measurement by two-wattmeter method for balanced loads. (9+3)

UNIT – III
Magnetic circuits: Self and Mutual Inductance, Dot Convention, Coefficient of Coupling. B-4 loop curve.

UNIT – IV
1-ϕ Induction Motors: Production of Rotating Field in various type of 1-phase motors split phase, capacitor start, capacitor run, shaded pole motors and applications.
Synchronous Generators and Motors: Principal of Operation and its Applications. (9+3)

TEXT BOOKS:
1. Vincent Del Toro “PRINCIPLES OF ELECTRICAL ENGINEERING” PHI.
2. Edward Hughes, “ELECTRICAL TECHNOLOGY”, Pearson Publisher.

REFERENCE BOOKS:
1. M.S. Naidu & S.Kamakshaiah, “INTRODUCTION TO ELECTRICAL ENGINEERING.
2. B.L. Thereja, “ELECTRICAL TECHNOLOGY” S.Chand & Company Ltd.
3. Sudhakar and Shyam Mohan “ NETWORK ANALYSIS AND SYNTHESIS” TMH.
4. Nagrath and Kothari “ BASIC ELECTRICAL ENGINEERING” TMH.
UNIT – I
P-SPICE: Introduction to P-SPICE representation of circuit elements – Analysis of Circuits using P-SPICE – Simple problems.

UNIT – II

UNIT – III
Network Functions: Network function for 1-port and 2-port networks and their relationships – Ladder Networks – General Networks – Poles and zeros of Network functions – Restrictions of pole zero locations for driving point functions.

UNIT-IV
Image and iterative impedance, transfer constants, inserion loss, attenuaters, Passive Filters: LPF,HPF,BPF and BRF constant K-and m derived filters, composite filters.

TEXT BOOKS:
1. M.E.Van Valkenberg “ Network Analysis” PHI.

REFERENCES:
1. J.Edminister & M.Nahvi. “ Electric Circuits” Schaum’s outlines, TMH.
2. D.Roy Choudhary “Networks analysis and Synthesis” New Age Publishers
Class: II/IV B.Tech. II Semester
Branch: E&I
Duration of University Examination: 2 hours
Practicals: 2
University Examination: 50 marks
Sessionals: 25 marks

LIST OF EXPERIMENTS

1. Range Extension of Ammeter.
2. Conversion of Ammeter to Voltmeter.
12. Calibration of Wattmeter
13. Single phase Energy meter
14. Testing of Instrument Transformer (CT/PT)
15. Q-factor measurement.
LIST OF EXPERIMENTS

1. Verification of Kirchhoff's Laws
2. Verification of Superposition Theorem.
3. Verification of Thevenin’s Theorem.
4. Voltage and Current relationships of line and phase values in star, delta connections and 3-phase power measurement by two-wattmeter method.
5. Frequency response of R-L-C series circuit
6. Determination of Parameters of choke coil.
7. S.C. Tests on 1-phase transformer to determine the equivalent circuit parameters and predetermination of efficiency.
8. Efficiency and voltage Regulation of a 1-phase transformer by direct load test.
9. Speed control and Swinburne’s test on D.C. shunt motor to predetermine efficiency as Motor and Generator
11. Load test on D.C. shunt Generator
12. Demonstration Experiments
   a) D.C. Motor
   b) D.C. Generator (O.C.C.)
   c) 1-phase Induction Motors
   d) Alternators.
### SCHEME OF INSTRUCTION AND EVALUATION
#### II SEMESTER OF II YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

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MH 221  MATHEMATICS – III

Class: B.Tech. II/IV, II-Semester
Branch: CSE, IT, Mech, Civil, ECE, EEE, E&I
Duration of Univ. Examination: 3 Hrs.

lectures: 3 Hrs, Tutorials:
Univ. Examination : 100 Marks
Sessionals: 50 marks

UNIT – I
MATRICES: Rank of a matrix – Solution of System of Linear equations – Linear dependence and independence of vector – Characteristics roots and Characteristics vectors of a matrix–Cayley Hamilton Theorem (without proof) – Reduction to diagonal form and normal form. Reduction of a quadratic form to canonical form. (8+3)

UNIT – III

UNIT – III
NUMERACAL DIFFERENTIATION AND INTEGRATION: First and second derivatives using forward and backward interpolation. Numerical Integration-Trapezoidal and Simpson’s rule. (8+3)

UNIT – IV
NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS: Taylor’s methods, Euler’s method, Runge – Kutta methods of second and fourth orders. (8+3)

TEXT BOOK:


REFERENCE BOOKS:

1. S.S.Sastry, “Introductory Numerical Analysis”.
EI 222 INSTRUMENT TRANSDUCERS

Class: II/IV B.Tech. II Semester  Lectures: 3, Tutorials: 1
Branch : E&I  University Exam. : 100 marks
Duration of University Examination: 3 hours  Sessionals: 50 marks

UNIT I

**Transducers:** Functional block diagram of a Instrumentation system & examples, classification of transducers, Requirements of an ideal transducer.

**Static Characteristics:** Accuracy, Precision, Resolution, Threshold, Sensitivity, Non-linearity, Hysteresis & Dead-Band, Drift, Span & Range.

**Errors in Measurement:** Types of uncertainties, propagation of uncertainties in compound quantities.

**Dynamic Characteristics:** Order of measuring system, Step, Ramp, Impulse and frequency responses of Zero, first and second order systems, Dynamic compensation of first and second order systems, Fidelity, Bandwidth, Speed of response, Settling time, Measurement lag. 9+3

UNIT II

**Resistive Transducers:**

**Potentiometers:** Principle of operation, Expression for error due to loading effect, sensitivity and linearity requirements, resolution.

**Strain Gauges:** Piezo-Resistive effect, Gauge factor, SG materials, Un Bonded & Bonded SGs, Semiconductor SGs, Quarter, half and full bridge configurations, Arrangement of SGs for maximum sensitivity, Temperature compensation schemes, Balancing arrangement and Calibration of SGs using Shunt Resistor method, Rosettes.

**Force and Torque Measurement:** Cantilever, column and proving ring type load cells, Hydraulic Load cell, Torsion bar, SG force transducer & SG Torque transducer. 9+3

UNIT III

**Capacitive Transducers:** Variable gap, area and dielectric types and associated signal conditioning circuits.

**Inductive Transducers:** LVDT, RVDT, Variable reluctance type transducers and associated signal conditioning circuits.

**Magnetostrictive Transducers:** Magnetostriction Phenomenon, magnetostrictive materials & their application to measurement of force.

**Piezoelectric Transducers:** Piezoelectric effect, Piezo-electric materials, sensitive coefficients Frequency response of Piezo-electric transducers, Piezo electric semi conductors, Bimorphs, piezoelectric strain and Torque transducers.

**Photoelectric Transducers:** Photoelectric phenomenon, Photo conductive, Photo voltaic and photoemissive transducers - Half effect Transducer and its applications. 10+3

UNIT IV

**TEMPERATURE MEASUREMENT :**

**Fluid Expansion Thermometers**
Metallic resistance thermometers: Materials, R-T characteristics, Construction, Lead wire compensation schemes (Siemen’s & Callender’s circuits), Bimetallic thermometers.

Thermistors: Materials, R-T characteristics, and applications.

Thermocouples: Thermoelectric effects, Thermo electric laws, Materials and construction, Cold junction compensation, Thermopile.

Pyrometers: Stefan-Boltzman’s Law, Planck’s Law, Total Radiation Pyrometer, Selective Radiation Pyrometer.

8+3
TEXT BOOKS:


REFERENCE BOOKS:

UNIT-I

Logic Families: Detailed study of RTL, I^2L, DCTL, DTL, HTL, TTL, ECL, MOS & COMOS families and their properties and comparison.

UNIT-II

Programmable Logic Devices: PLAs, PALs, FPGAs, CPLDs.
Algorithmic State machines: ASM charts, ASM blocks, timing considerations, data path design, control logic design, design with MUXs and Flip flops, typical examples.

UNIT-III

EDA Tools: Introduction of HDL Simulation & Synthesis, VHDL – Basic Language elements and various modellings.


UNIT-IV

DATA FLOW Modeling: Cuncurrent Vs sequential Signal assignment, multiple drivers, signal assignment statements, block statement simple programming.

Structural modeling: Component declaration, component instantiation, simple programming.
Generics and Configurations.

Text Books:
1. Digital Integrated Electronics: Tanb & Schiling –
2. Digital Design – M.Moris Mano – PHI.
3. VHDL Primer – J. Bhaskar – PHI.

References Books:
EI 224 ELECTRONIC DEVICES & CIRCUITS – II

Class: II/IV B.Tech. II Semester. Lectures: 3
Branch: ECE, EIE, EEE Tutorials: 1
Duration of University Examination: 3 hours

University Examination: 100 marks
Sessionals: 50 marks

UNIT-I
SMALL SIGNAL LOW FREQUENCY TRANSISTOR AMPLIFIER CIRCUITS:
Analysis of Single Stage transistor amplifier circuits using h-parameters, RC coupled amplifier – Frequency response analysis, cascaded amplifiers.

HIGH FREQUENCY TRANSISTOR AMPLIFIER CIRCUITS:
High frequency model of a transistor α and β cut-off frequencies, single Stage and Multistage amplifiers at High frequencies Calculation of Band Width of single and multistage amplifiers.

UNIT-II
DC AMPLIFIERS:
DC amplifiers, drift compensation techniques, differential amplifiers.
FET AMPLIFIERS:
FET Low frequency and High Frequency models; Low and High frequency response of amplifier circuits, Analysis of Single and Multistage amplifier circuits.

UNIT-III
FEED BACK AMPLIFIERS:
Concept of feedback, Classification of feedback amplifiers, general characteristics of negative feedback amplifiers, effect of feedback on amplifier characteristics.
OSCILLATORS:
Condition for Oscillations, RC and LC type oscillators, crystal oscillators, frequency and amplitude stability of Oscillations.

UNIT-IV
POWER AMPLIFIERS:
Class A,B and AB power amplifiers: Push-Pull and Complementary push-pull amplifiers, design of heat sinks, power o/p efficiency, cross – over and Harmonic Distortion.
TUNED AMPLIFIERS:
Single tuned and Double tuned voltage amplifiers, Inter stage design, stability considerations, class B and Class C tuned Power amplifiers.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT-I

Signals – Signals and their representation, classification of signals, singularity functions – Impulse, step, ramp functions, representation of signals with singularity functions, exponential functions.

Systems: Definition, Classification of Systems, Convolution integral, graphical convolution.

Signal Approximation – Approximation of a function by a set of mutually orthogonal functions, mean square error, complete set of orthogonal functions orthogonality in complex functions, Trigonometric and exponential Fourier series, representation of periodic functions by Fourier series, complex Fourier spectrum.

UNIT-II

Fourier Transforms and their applications to systems – Fourier transform definition, properties of F.Ts, energy spectral density, parsevals theorem, power spectral density, Hilbert transforms and properties.

Linear Systems – impulse response, response of a linear system, linear time invariant system, linear time variant system, transfer function of LTI system.

UNIT-III

Random Variables & Processes – Probability, Joint Probability, Statistical independence, Random Variables, cumulative distribution function, probability density function, relation between probability & probability density, joint commutative distribution, average value of random variables, variance of a random variable, tchebycheff's inequality, the Gaussian probability density, the error function. Rayleigh probability density, mean & variance of the sum of random variables, correlation between random variables, central limit theorem.

UNIT-IV

Discrete Time Signals & Systems: Discrete time signals, representation, operations on sequences, Discrete time systems and classification, LTI systems, Linear Convolution, Difference equations.

Z-Transforms: ROC, properties of Z-Transforms Inverse Z-Transforms, Causality and stability.


TEXT BOOKS:
2. Zeimer, Signals & Systems, PHI.

REFERENCE BOOKS:
1. Oppenheim, Willsky & Young; Signals and Systems PHI, EEE, New Delhi.
3. B.P. Lathi, Signals & Systems and Communication – BSP.
UNIT - I

INTRODUCTION: Circuit and Field concepts, Review of vector analysis, Physical interpretation of Gradient, Divergence & curl.

ELECTRO STATICS: Coulomb's law, Electric field intensity, Field due to line charge and sheet of charge, Flux density Gauss's law and its applications, Divergence Theorem, work done in moving a point charge in an electric field, potential difference and potential at a point, potential gradient, equipotential surfaces, Relation between E & V, Derivations of Poisson's and Laplace's equation. Energy stored in electric field, Energy density, Boundary conditions between two dielectrics, capacitance, parallel plate capacitor, co-axial cable. [9 + 3]

UNIT - II


TIME-VARYING FIELDS : MAXWELLS EQUATIONS: Faraday's laws of Electro Magnetic Induction, continuity equation for time varying fields, Inconsistance of Ampere's law, Maxwells equations in differential & Integral forms, Boundary conditions for time varying fields. [9 + 3]

UNIT – III

ELECTROMAGNETIC WAVES: Wave equations for free space and conducting medium, Uniform plane waves, Sinusoidal time varying fields, conductors and dilutries, wave propagation through good conductors and good dielectrics, Polarisation, Direction cosines, Reflection of EM waves by a perfect conductor, a perfect dielectric, surface impedance, skin effect.

POYNTING VECTOR: Poynting theorem, Instantaneous, Average and complex poynting vectors, power loss in a plane conductor. [9 + 3]

UNIT IV

GUIDED WAVES: Waves between parallel planes, TE, TM, TEM Waves characteristics of TE, TM & TEM Waves.

WAVE GUIDES: Rectangular wave guides, TE & TM waves in wave guides, Characteristics of TE & TM waves, Impossibility of TEM waves in wave guides. [9+3]
TEXT BOOKS:


REFERENCE BOOKS:

1. “ELECTROMAGNETICS.” - Schaum Out line series - II Edition
2. “ELEMENTS OF ELECTRO MAGNETICS.” - Sadiku, Oxford Publishers
3. “INTRODUCTORY COURSE IN ELECTRO MAGNETIC FIELDS.” - P.V. Gupta Dhanpathi Rai Publishers
EI 228  INSTRUMENT TRANSDUCERS LAB

Class: II/IV B.Tech. II Semester
Branch: E&I
Duration of University Examination: 3 hours

Practicals: 3 Hrs.
Sessionals: 25 Marks
University Examination: 50 Marks

LIST OF EXPERIMENTS

3. Measurement of Torque using strain gauge Torque Transducer
6. Measurement of Load using proving ring type Load cell
8. Measurement of temperature using Thermistor, Thermocouple, etc.,
10. Determination of Time Constant of I order system.

TEXT BOOKS:

EI 2210  ELECTRONICS CIRCUITS LABORATORY

Class: II/IV B.tech .II - Semester  
Branch: E&I, EEE 
Marks 
Practicals: 2Hrs 
University Examination: 50 
Duration of university Examination: 2Hrs  
Sessionals: 25 Marks 

LIST OF EXPERIMENTS 

1. Characteristics of: PN Diode 
   Zener diode  
   SCR  
   UJT 

2. Static characteristics of: BJT (CE). 
   FET (CS). 


4. Zener diode voltage regulator. 

5. BJT biasing circuits: Fixed bias 
   Collector to base bias  
   Self-bias 

6. BJT switch, Amplifier. 

7. Emitter Follower. 

8. Cascade Amplifier (Two stage). 

9. FET Amplifier. 


13. Class-B Power Amplifier. 

# SCHEME OF INSTRUCTION AND EVALUATION
## I SEMESTER OF III YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME
### ELECTRONICS AND INSTRUMENTATION ENGINEERING

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<th>Course</th>
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### Open Electives:
- OE 311 A. Operations Research
- OE 311 C. Entrepreneurship Development
- OE 311 B. Management Information Systems
- OE 311 D. Forex & Foreign Trade
Course: B.Tech. III/IV  I Semester  
Branch: Common to all branches  
Theory: 3 periods/week  
External Examination: 3 Hours  
Internal Examination: 2 Hours  
External Evaluation: 100  
Internal Evaluation: 50

UNIT-I  
**Linear Programming:** Mathematical Model, assumptions of linear programming, principles of simplex method. Applications. Duality, Dual simplex method, revised simplex method.

UNIT-II  
**Non-linear Programming:** Unconstrained Optimization techniques, Random search methods, Decent methods, Steepest Decent method, variable metric method. Constrained optimization techniques. Cutting plane method.

UNIT-III  
**Dynamic programming:** Introduction, Multistage decision process, linear programming as a case of dynamic programming. Computational procedures in dynamic programming.  
**Special type of linear programming:** Special type of linear programming problems - Transportation problems - balanced and unbalanced transportation, time transportation problem. Assignment problem - special case of transportation.

UNIT-IV  
**Queuing Theory:** Description of Queuing Models and applicability. Birth and Death Processes, Single server models with Poisson input and exponential service. Multiple service queuing models.

**SUGGESTED TEXT / REFERENCE BOOKS:**
2. Kanthiswaroop, etal, Opertions Research, S.Chand & Sons, New Delhi.  
OE 311 (B) MANAGEMENT INFORMATION SYSTEMS

Course: III/IV B.Tech I Semester  
Branch: Common to all branches  
External Examination: 3 Hours  
Internal Examination: 2 Hours

**UNIT–I**  
Management Information Systems (MIS): MIS Concept, Definition, Role and Impact of MIS, MIS and Computer, MIS and Academics, MIS and the User.

Role and Importance of Management: Introduction and Approaches to Management, Functions of Manager, Managers and the Environment, Management as a Control System, Management by Exception, MIS – A Support to the Management.


**UNIT-II**  


**UNIT-III**  


UNIT-IV


SUGGESTED TEXT / REFERENCE BOOKS:


OE 311(C) ENTREPRENEURSHIP DEVELOPMENT

Course: III/IV B.Tech I Semester  
Theory: 3 Periods/week
Branch: Common to all branches
External Examination: 3 Hours  
External Evaluation: 100
Internal Examination: 2 Hours  
Internal Evaluation: 50

UNIT-I  
Entrepreneurship definition, Significance of Entrepreneurship. Role of Entrepreneurship in development advantages and limitations characteristics of a person to become an entrepreneur, human factor in Entrepreneurship, Motivation, Leadership qualities and the essential skills of communication etc., Role of women entrepreneurship. Agencies dealing with entrepreneurship and small scale Industries. Case studies of successful entrepreneurs. Identification of a variable business opportunity, Various methods.  
Activity: Inputs from DIC, SFC, IIC & Nationalized Banks.

UNIT-II  
Activity: Visit to a small scale industry.

UNIT-III  
Project planning: Product planning and development process, Definition of a project, Sequential steps in executing the project, principles of layouts, Types of layouts, Factors influencing layouts. choosing an optimum layout suitable to the venture. Tenders, Call for quotations, Purchase orders, Procurement and installation of machinery and equipment, Utilities etc. Fundamentals of Production Management, PPC-Concepts, Functions, Long & short run problems. Marketing Management: Definition, Functions and Segments. Financial Management: Objectives & Functions  
Activity: Interaction with Entrepreneurs in the field.

UNIT-IV  
Personal and Human resource management: Introduction, Definitions, Importance, Factors effecting Major functions of enterprise management. Selection, recruitment, training, placement, development, performance appraisal systems. Legal issues in Entrepreneurship, Intellectual property rights, Issues in setting up the organization.  
Activity: Preparation of project report for variable business venture
SUGGESTED TEXT / REFERENCE BOOKS:


2. David H. Holt, Entrepreneurship New venture creation prentice hall of India.


UNIT-I (9)

UNIT-II (9)

UNIT-III (9)

UNIT-IV (9)

SUGGESTED TEXT / REFERENCE BOOKS:


EC 311 COMPUTER ARCHITECTURE

Class: III/IV B.Tech. II Semester
Lectures: 3
Branch: ECE, EIE
University Exam.: 100 marks
Duration of University Examination: 3 hours.
Sessionals: 50 marks

UNIT – I
Introduction: Types of Computers: Analog, Digital and Hybrid. Generation of Computers and their comparison. Dissection of Computer into various blocks; Communication among the blocks; Common bus concept, design of bus lines using MUXs and tristate buffers.
The Arithmetic Logic Unit: General register organization, stack organization of CPU, Instruction formats, Instruction types, addressing modes; Introduction to Assembly Language Programming. BASIC, ALU design: Arithmetic Unit, Logic Unit, and Shift Unit, One stage ALU. Computer Arithmetic: Fixed point arithmetic and floating point arithmetic.

UNIT – II
Control Unit: Instruction sequencing, Instruction interpretation. Control Unit design. Methodologies: Hard wired Control Unit – Illustrative example; Micro programmed control unit; Control Memory, Address Sequencing, Micro Instruction format, Micro program sequencer design, concepts of RISC and CISC.
Memory Unit: Memory hierarchy, Main Memory, RAM, ROM, Memory address mapping; Auxiliary Memory: Magnetic tapes & Discs. Associative Memories: Match logic, Read and Write logics, Cache Memory: Mapping techniques, R/W operations; Virtual Memory: Paging, Segmentation; Interleaved Memories.

UNIT – III
Data Transfer Modes: Synchronous data transfer, Asynchronous data transfer, Strobe Control, Hand Shaking.
I/O Unit: Introduction to peripheral devices. I/O interface, I/O data transfer modes: Programmed I/O; Interrupt Driver I/O; Priority Interrupts; Hardware and Software; DMA controller and Data transfer, I/O Processor – CPU and IOP Communication.

UNIT – IV
8085 CPU: 8085 Architecture, Instruction set addressing modes, Basic assembly language programming, pin configuration, timing diagrams, Interrupts. Basic Assembly Language Programmes – stacks, subroutine, strings.

TEXT BOOK:

REFERENCE BOOKS:
UNIT – I

**Pressure Measurement:** Manometers: U-tube, Well-type with vertical & inclined tubes, Ring balance manometer – Elastic elements for pressure measurement: Bourdon tube, Bellows, Capsule, flat and corrugated Diaphragms – Electrical types of pressure Measurement: Potentiometric, strain gauge, strain tube, variable reluctance types, LVDT types, piezoelectric type pressure transducers – Vacuum measurement: McLeod gauge, thermal conductivity gauges, Ionization gauges – Bridgemann gauge for high pressure measurement – Force balance transducer. 10+3

UNIT – II


UNIT – III

**Level Measurement:** Sight glass method, Float gauges, hydrostatic pressure tube, Bubbler or purge type – Electrical Methods: Rheostatic liquid level gauge, capacitive level gauge, capacitive voltage divider level gauge, ultrasonic level gauge, Gamma ray liquid level gauge.

**Density Measurement:** Hydrometer system, Hydrometer with phototransducer, LVDT type, Air bubbler system, weighing methods.

**Viscosity Measurement:** Dynamic Viscosity, Kinematic viscosity, Falling body viscometer, Capillary tube viscometer (viscosity – to – pressure converter), Rotational viscometers, Variable Area type viscometer (viscosity – to displacement converter), Saybolt viscometer.

**Humidity Measurement:** Absolute and Relative Humidities, Hair Hygrometer, Humistor Hygrometer, Automatic Measurement of Dew point. 9+3

UNIT – IV

**Sound Measurement:** Characteristics of sound, sound pressure and power levels, variation of Intensity of sound with distance, sound measurement conditions, Loudness, sound level meter, Microphones – Capacitive, Carbon, Piezoelectric and Electrodynamic types of Microphones.

**Vibration Measurement:** Characterisation of vibration, seismic system, measurement of absolute displacement, absolute velocity, absolute acceleration, amplitudes & phase characteristics, Electrodynamic vibration transducer, Types of Accelerometers: Potentiometric, LVDT, Bonded strain gauge and Piezoelectric type. Basic principle of operation of Gyroscopic device.
**Speed Measurement**: Tachometer (Contact & Non contact type), Stroboscope and its applications.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
EC 314 LINEAR INTEGRATED CIRCUITS

Class: III/IV B.Tech. I – Semester  
Lectures: 3

Branch: ECE, E&I, EEE  
University Examination: 100 marks

Duration of University Examination: 3 Hours  
Sessionals: 50 marks

UNIT-I

UNIT-II
Applications of Operational Amplifiers: Summing and difference amplifiers, Integrator and differentiator, current to voltage and voltage to current converters, Instrumentation amplifier, sample and Hold circuit.  
Non-Linear Applications: Precision Rectifiers – Half wave and full wave, log and antilog amplifiers.  
Comparators and wave form generators: OPAMP comparators, Regenerative (Schmitt Trigger), R.C. phase shift and wiens bridge oscillators, Astable Multivibrator (Square wave generator) and Monostable Multivibrator.

UNIT-III

UNIT-IV
Phase Locked Loops: Voltage controlled oscillator, Basic PLL operation, definitions related to PLL, Monolithic PLL and design considerations, transient response of PLL, typical PLL applications (FSK, AM detectors)  
Analog multiplexers, DAC types (R-2R ladder weighted ladder and Inverted ladder), ADCs types (Successive Approximation, Dual-Slop, Flash types).
TEXT BOOKS:

2. Ramakant Gayakwad, Opamp and Linear Integrated Circuits, Pearson Education.

REFERENCE BOOKS:

UNIT – I

INTRODUCTION: Types of systems, Properties of systems, Linearity, Time-invariance, Stability, Causality. Open loop control system, Closed loop control system, Effect of Feedback on overall gain, Stability and Sensitivity. (9+3)

MATHEMATICAL MODES OF PHYSICAL SYSTEMS: Electrical, Mechanical and Electromechanical systems, Transfer function of physical systems by Block diagram reduction techniques and signal flow graphs, Drawing a signal flow graph from a block diagram.

UNIT – II

CONTROL SYSTEM COMPONENTS: AC and DC servomotors, Synchros, Tachogenerator and Potentiometer. (9+3)

TIME DOMAIN ANALYSIS: Design specifications, Typical test signals, Time response of first order and of 2nd order systems, Time domain specifications, Basic control actions like P, PI, PD, PID and derivative feedback, Steady State error and error constants, Routh Hurwitz Criterion, Concept of root locus and construction of root loci, Effects of adding poles and zeros.

UNIT – III

FREQUENCY DOMAIN ANALYSIS: Frequency response of closed loop systems, Specifications, Correlation between frequency and time domain specifications, Polar plots, Gain Margin and Phase Margin, Bode plots, Nyquist stability criterion, Relative stability using Nyquist stability criterion. (9+3)

UNIT – IV

STATE VARIABLE ANALYSIS OF CONTINUOUS SYSTEMS: Concepts of state, State variables and state model, Derivation of state model from transfer function, Diagonalization, Derivation of transfer function from state model, Solution of state equations, State transition matrix, Concept of Controllability and Observability.

COMPENSATION: Elementary treatment of Compensation. (9+3)

TEXT BOOKS
REFERENCES

EC 316 LINEAR INTEGRATED CIRCUITS LABORATORY

Class: III/IV B.Tech. I – Semester
Branch: ECE
Duration of University Examination: 3 Hours
Lectures: 3
University Examination: 50 marks
Sessionals: 25 marks

LIST OF EXPERIMENTS

   (i) Open Loop gain
   (ii) I/P bias and offset currents.
   (iii) I/P offset voltage.
   (iv) Slow Rate and
   (v) CMRR

2. Design of square wave generator for a specified frequency and duty cycle, using Op-Amp IC 741.

3. Design of a sinusoidal oscillator for specified frequency based on wiens bridge using IC 741.

4. Design and testing of precision rectifier.


6. Design and testing of Active
   (i) L.P.F.
   (ii) H.P.F.
   (iii) B.P.F. for specified frequency.

7. Design a Astable multivibrator using IC 555 timer for a given frequency.

8. Design a Monostable Multivibrator using IC 555 timer for a specified width period.

9. Design a voltage regulator using IC 723 for a given O/P voltage and Load current.

10. Design and testing of PLL parameters using IC 565.

TEXT BOOKS:

1. Roy Choudary, Shail Jain, Linear Integrated Circuits, New Age International.
2. Ramakanth Gayakwad, Opamp and Linear Integrated Circuits, Prentic Hall of India, New Delhi.
EI 317 PROCESS INSTRUMENTATION LAB

Class: III/IV B.Tech. I Semester
Branch: E&I

Practicals: 3 Hrs.
Sessionals: 25 marks

Duration of University Examination: 3 hours
University Examination: 50 marks

LIST OF EXPERIMENTS

1. Measurement of pressure using strain gauge pressure transducer
4. Measurement of Sound using sound level meter
7. Study & use of I-P and P-I demonstration set up.
13. Study and use of Instrumentation Amplifier.

TEXT BOOKS:

# SCHEME OF INSTRUCTION AND EVALUATION

II SEMESTER OF III YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS AND INSTRUMENTATION ENGINEERING

<table>
<thead>
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<th>Scheme of Evaluation</th>
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MH 321 ECONOMICS MANAGEMENT AND ACCOUNTANCY
For B.Tech., III/IV, I-Semester
(Compulsory for All Branches)

Weekly No. of Hours: 04
Max.Marks: 150
Internal Exam: 50
Univ. Exam: 100 marks

ECONOMICS
UNIT – I

Factors of Production: Meaning and Definition, Characteristics of Land Labour, capital and Entrepreneurship. Division of Labour, Advantages and disadvantages. Formation of Capital. Forms of Business organization; Sole proprietorship, partnership concern, cooperative societies joint stock company. Types of partners, Types of joint Stock companies. Merits and Demerits. (6 periods)

MANAGEMENT
UNIT – II


UNIT – III

Staffing: Meaning and Functions of Personnel Management. Coordination Definition, how to Achieve effective coordination. Controlling; Definition and Process (4 periods)

ACCOUNTANCY
UNIT - IV

Preparation of Final Accounts: Trading Account, Profit and loss Account and Balance Sheet (with simple Adjustments) (7 periods)

REFERENCE BOOKS:
EI 322 BIOMEDICAL INSTRUMENTATION

Class: III/IV B.Tech. II Semester

Lectures: 3
University Exam.: 100 marks

Branch: E&I

Sessionals: 50 marks

Duration of University Examination: 3 hours

UNIT – I

Physiology: Basic charge on cell, transmission of action potentials, sources and theories of bioelectric potentials, physiology of cardiac, nervous and respiratory systems. Generalized Medical Instrumentation system, problems encountered with measurements from human beings.

Transducers: Different types of transducers and their selection for biomedical applications, Electrode theory, various types of electrodes, their construction, errors caused by electrodes in measurement of body potential.

UNIT – II

Electro Cardiography: Block diagram of ECG machine, origin of ECG, different types of lead systems electrode positions, Noise problems and their elimination.

Electro-Encephelography: Block diagram of EEG recording system, Electrode locations, 10-20 electrode system, characteristics of abnormal EEG, Resting Rhythms and Sleep stages.

Electromyography: Block diagram of EMG machine, stimulation, strength duration curves, Electromyography with voluntary muscle action and electrical stimulation.

UNIT – III

Blood Pressure: Direct and Indirect measuring techniques of BP.


Medical Imaging: Ultrasound imaging, Radiography, MRI, electrical tomography and applications

UNIT – IV

Biotelemetry: Transmission and reception aspect of Biomedical signals via long distances.


Electrical factors in Hospital Design: Electrical Power Supply systems in a hospital building, proper installation and grounding for providing safe patient – electrical environment.
**TEXT BOOKS:**


**REFERENCE BOOKS:**


EC / EI 323 MICROPROCESSORS & MICRCONTROLLERS

Class: III/IV B.Tech. II – Semester  Lectures: 3
Branch: ECE, E&I, EEE  University Examination: 100 marks
Duration of University Examination: 3 Hours  Sessionals: 50 marks

UNIT – I
Evolution of Microprocessors, 8085 MPU Architecture,
8086 Family Architecture: Organization of 8086 CPU, Concept of Memory Segmentation, Segment registers, physical and logical addressing, Instruction set, Addressing Modes.

9+3

UNIT – II
Assembly Language Programming: Assembler directives, simple Programming of 8086 Implementation of structures, time delays, strings, procedures, macros, pin configuration, Min/Max modes, timing diagrams.

8+3

UNIT – III
Interfacing with 8086: ADC, DAC interfacing, Interfacing of switches, Keyboards, LEDs, Stepper motor; CRT interface, interfacing through devices like 8255, 8257 and 8253. Interrupts & Priority interrupt controller 8259.

9+3

UNIT – IV

10+3

TEXTBOOKS:
2. Yuchangliu, Glen A.Gibson, Microcomputer Systems. The 8086/8088 family, architecture, programming and design, Prentice Hall of India, New Delhi.

REFERENCE BOOKS:
EI 324 PROCESS CONTROL

Class: III/IV B.Tech. II Semester
Branch: E&I
Lectures: 3
University Exam.: 100 marks
Duration of University Examination: 3 hours
Sessionals: 50 marks

UNIT-I
PROCESS DYNAMICS:

UNIT – II
CONTROL ACTIONS AND CONTROLLERS:
Basic Control actions; discontinuous controller modes – two position, multiposition, and floating control modes; continuous controller modes: Proportional, Integral, Derivative and Composite controller modes; Dynamic behaviour of CSTR process; Block diagram & closed loop response, effect of P, I, PI and PID controllers on the response of controlled process. (9+3)

UNIT-III
DESIGN OF FEED-BACK CONTROLLERS: Design considerations, Evaluation criteria; 1/4th decay ratio, ISE, IAE, ITAE, Determination of optimum controller settings using process-reaction curve method, gain and phase margins, zeigler-Nichols tuning technique.
Multiloop Control Systems: Cascade Control, Selective Control, Split-range control, Feed-forward control, feed-forward - feedback control, ratio control, Adaptive control and Inferential Control.
(9+3)

UNIT-IV
FINAL CONTROL ELEMENTS: I/P Converter – pneumatic, Electric and hydraulic actuators; – Control Valve: – Characteristics of Control Valve, Control Valve sizing, control Valve Positioner, different control valves: butterfly, Diaphram, Globe & Ball valves.
ANALOG CONTROLLERS:
Pneumatic, Hydraulic and Electronic Controllers.
(8+3)

TEXT BOOKS:

REFERENCE BOOKS:
EC 326 DIGITAL SIGNAL PROCESSING

Class:III/IV B.Tech. II–Semester Lectures: 3
Branch: ECE, E&I, EEE University Examination: 100 marks
Duration of University Examination: 3 Hours Sessionals: 50 marks

UNIT-I

UNIT-II
Infinite Impulse Response (IIR) Filters: Realizability of Ideal Filter, Introduction to IIR Filters, Methods of converting analog transfer function H(s) to its digital equivalent, Necessity of Filter Approximation, IIR Digital filter design using Butterworth Approximation, IIR Digital Filter Design using chebyshev approximation, comparison of Butterworth and Chebyshev filters.

UNIT-III

UNIT-IV
DSP Architecture: Introduction to Programmable Digital Signal Processors; MAC, Bus structures and memory access schemes, multiported memory, multiple access memory, VLIW architecture, Pipelining, addressing modes, on-chip peripherals. Architecture of TMS320C5X: Introduction, Bus Structure, Central Arithmetic Logic unit, registers, flags, on-chip memory and peripherals, assembly language instructions.

TEXT BOOKS:

REFERENCE BOOKS:
2. Lyons, Understanding DSP (Pearson Education)
3. Adreas Antanio, Digital filter Analysis and Design (TMH)
EC 329 COMMUNICATION ENGINEERING

Class: III/IV B.Tech. II–Semester  Lectures: 3
Branch: E&I University Examination: 100 marks
Duration of University Examination: 3 Hours  Sessionals: 50 marks

UNIT-I
Amplitude modulation: Time and frequency domain-description of AM, DSB, SSB & VSB signals-Generation and demodulation AM, DSB, SSB and VSB signals-coherent demodulation-envelop detection-carrier recovery, AM Transmitters (9+3)

UNIT-II

UNIT-III
AM & FM Receivers: TRF, Superheterodyne receivers, RF, IF stages, AGC, AFC, Sensitivity, selectivity measurement.
Sampling and Pulse Modulation: Sampling Theorem, Analog Pulse Modulation-PAM, PWM, PPM, TDM, FDM pulse code modulation, Quantization noise, Multiplexing PCM, SNR of PCM, Shift keying techniques – Binary ASK, FSK, PSK.

UNIT-IV
Information Theory: Information Measure and entropy – Coding of discrete source – Shannon – fan and Huffman codes – discrete memory less channels – Channel capacity. (9+3)

TEXT BOOKS:
2. “Principles of Communications” – Taub and Schilling (McGraw Hill)

REFERENCE BOOKS:
2. “Analog Communication Systems” – P.Chakrabarthi (Dhanpatrai & Co.)
LIST OF EXPERIMENTS

Assembly Language Programming on 8086 Microprocessor

1. Study of 8086 kits
2. Finding Sum, Average, Multiplication.
3. Sorting (a) Ascending (b) Descending.
4. Transfer of bytes from DS to ES
5. Code Conversions (i) BCD to Binary (ii) Binary to BCD (iii) Binary to ASCII
6. String Comparison
7. Generation of time Delays – counters
   Interfacing with 8086
8. Wave form Generation using DAC modules (i) Square wave (ii) Sawtooth (iii) Triangular.
9. Stepper Motor interfacing
10. ADC interfacing
11. LED/LCD interfacing.
12. Traffic Controller
   ALP on 8031/51 Micro Controllers.
13. Study of Micro Controller kits, Assembly Language Programming
14. Multiplication, Division
15. Sorting
16. Code Conversion
17. Time delays – Counters

TEXT BOOKS:

SCHEME OF INSTRUCTION AND EVALUATION  
I SEMESTER OF IV YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME  
ELECTRONICS AND INSTRUMENTATION ENGINEERING

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**Total**  
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**Professional Elective – I: EI 415**

- **EI 415A** - Digital Image Processing
- **EI 415B** - Neural Networks and Fuzzy Logic
- **EI 415C** - Computer Networks
- **EI 415D** - Optical Instrumentation
EI 411 TELEMETRY & TELECONTROL

Class: IV/IV B.Tech. II Semester
Lectures: 3
Branch: E&I
University Examination: 100 marks
Duration of University Examination: 3 hours
Sessionals: 50 marks

UNIT – I
Telemetry Principles: Block Schematic of a telemetry system, classification of Telemetry systems – Mechanical, Pneumatic, voltage and current telemetry systems; Synchro Systems, Position and Pulse Systems frequency Tele metering – Block diagram of Radio Telemetry System – Transmitting and Receiving Techniques – (AM, FM, PM).

UNIT – II
Symbols & Codes: Bits and symbols, pulse duration system, Pulse Code system, Line coding, channel coding, Modulation codes.

Multiplexing: Frequency Division, Multiplexing, Transmitting side and Receiving side FDM Systems, Multiplexing with sub carriers – Time division multiplexing: TDM-PAM system, PAM/PM system, TDM-PCM system, Digital Multiplexers

UNIT – III
Fiber Optical Telemetry: Typical fiber optic communication system, The optical fiber cable and constructional features, dispersion, Losses, Sources and detectors, Transmitters and receiver circuits, coherent optical fiber communication system, Wavelength Division Multiplexing.

UNIT – IV
MODEMS: Parallel & Serial Communications, Synchronous & Asynchronous communications, Modem based data linking, Modem Protocol, ATM and ISDN services.

TEXT BOOK:
REFERENCE BOOKS:
UNIT – I
COMPUTERS IN PROCESS CONTROL: Introduction, Function Block diagram of Computer Control System Advantages & Disadvantages of CCS, Data Acquisition System, Computer Data Logging System, Computer Supervisory Control, Direct Digital Control; Structure & Implementation Types of Computer Based Controllers, and Characteristics of Digital Data; Digitized Valve, Sampling gate case study of computer controlled Rolling mill regulating system, SCADA Modern control; Optional control, Artificial Intelligence Based system, Expert system & Block Diagram of Exert Controller.

UNIT - II

STATE VARIABLE REPRESENTATION OF DISCRETE TIME SYSTEMS: Definition of state variables, state space representation of discrete time system, (Phase variable economical form & diagonal canonical form), solution of discrete state equation, Transfer function from discrete state model, controllability and observability state diagrams stability tests of linear digital systems: pole placement design by state feedback (single input).

UNIT – III
DISCRETE TIME SYSTEM ANALYSIS AND CONTROL ALGORITHMS: Mathematical modeling of sampling process (I order, II order, I order with pure delay, II order with pure delay) – Data sampling reconstruction Ideal sampler, Hold devices (ZOH, FOH) Reconstruction of sampling instants and between the samples (Sub multiple sampling method & Modified Z-transform method) – Pulse transfer function of DTS with ZOH device – Open loop & closed loop response of DTS with ZOH device – sample signal flow graph. Control Algorithms; digital PID control Algorithm, Dead Beat Algorithms, Dahlin’s Algorithm, Kalman’s Algorithm.

UNIT – IV

DISTRIBUTED CONTROL SYSTEMS (DCS): Introduction Comparison of Centralized and Decentralized Control systems. Hierarchy and Communication facilities for DCS.

TEXT BOOKS:

REFERENCE BOOKS:
EC 413 VLSI DESIGN

Class: IV/IV B.Tech. I Semester
Branch: EIE
Duration of University Examination: 3 hours.

Lectures: 4
University Exam.: 100 marks
Sessionals: 50 marks

UNIT-I
Review of Microelectronics and introduction to MOS Technology: Introduction to IC technology, MOS Technology and VLSI, Basic MOS transistor, fabrication of NMOS, CMOS and BICOMS Transistors, thermal aspects of processing and production of E-beam marks.

UNIT – II
MOS and BIMOS Circuit Design Processors: MOS layers, stick diagrams, design rules and layout 2μm and 1.2 μm CMOS rules, layout diagrams and symbolic diagrams.
Basic Circuit Concepts: Sheet resistance, area capacities of layers, delay unit and choice of layers.

UNIT-III
Scaling of MOS Circuits: Scaling models and scaling factors, scaling factors for device parameters and limitations of scaling.
Subsystem Design and Layout: Architectural issues, switch logic, gate logic, examples of structured design clocked sequential circuits and system considerations.

UNIT-IV
System Design and Design Methods: Design Strategies, CMOS chip design options, design methods, design capture tools, verification tools and examples.
CMOS Testing: Need for Testing, manufacturing test principles, design strategies for test, chip level test techniques, system level test techniques.

TEXT BOOK:
1. Dourglas A Pucknell & Kamran Eshraghian, Basic VLSI Design.

REFERENCE BOOK:
EI 414 ANALYTICAL INSTRUMENTATION

Class: III/IV B.Tech. I Semester
Branch: E&I
Duration of University Examination: 3 hours

Lectures: 4
University Exam.: 100 marks
Sessionals: 50 marks

UNIT – I

Basic Components of analytical instruments – sources of light, filters, Monochromators.
Absorption Spectrometry – Beer’s Law and its application in qualitative and quantitative analyses; Ultraviolet and visible absorption methods – colorimeters and spectrophotometers,
Infrared Spectrophotometers – Basic Components, Sources, detectors, Fourier transform Infrared Spectroscopy.

UNIT-II


UNIT-III

PH meters – principle of PH measurement, Electrodes, PH meters.

UNIT-IV

Chromatography – General Principles, Classification, column efficiency, HETP, resolution, column processes and band Broadening, quantitative determinations.
Gas and Liquid Chromatography - Column packings, sample injection techniques, detectors.
Environmental pollution monitoring Instruments – Air Pollution monitoring instruments, Carbon monoxide sulphur dioxide, Nitrogen oxides, Hydrocarbons, ozone, water pollution monitoring instruments.
TEXT BOOKS:

1. Instrumentation Methods of Analysis – Willard, Merrit, Dean.E.Settle (CBS)

REFERENCE BOOKS:

UNIT – I

1. **Introduction**: Elements of Digital Image Processing system, Digital Image representation, Image model, Sampling and Quantization, Neighbors of pixel, Connectivity, Distance measures, Arithmetic and Logical operations on images, Basic Transformations such as translation, Scaling, Rotation, Perspective Transformations

2. **Image Transforms**: Two dimensional DFT and its properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling (K-L) Transform

UNIT – II

3. **Image Enhancement**: Brightness and contrast of an image, Simple intensity transformations – Image negatives, Linear mapping, logarithmic mapping, Gray level thresholding; Image histograms, histogram equalization, histogram specification, local enhancement; spatial filtering: smoothing filters – low pass, Rank filters, Median filters, min-max and range filters; sharpening filters – high pass, high boost and Derivative filters; Enhancement in frequency domain, Generation of spatial masks from frequency domain specification.

UNIT – III

4. **Image Compression**: Redundancy – Coding redundancy, interpixel redundancy, Psychovisual redundancy; Root mean square error, Image compression system model, noiseless and noisy coding, error free compression – Huffman coding, Bit–plane coding, constant area coding, lossless predictive coding; Lossy compression – Lossy predictive coding

UNIT – IV

5. **Image Segmentation**: Detection of discontinuities – Point detection, line detection, Edge detection, pixel connectivity; Region – Oriented segmentation – Region similarity, Region growing, Limitations of region growing, Region splitting and Merging

6. **Morphological Image Processing**: Structuring element, Fitting and hitting, Dilation, Erosion, Opening and closing, Hit–or–Miss Transform, Basic Morphological Algorithms, Grey Scale Morphology

**TEXT BOOKS:**

**REFERENCE BOOKS:**
UNIT – I

**Biological Neural Networks:** Neuron Physiology, Neuronal Diversity, Specifications of the brain, They Eye’s Neural Network.

**Concepts of Artificial Neural Networks:** Neural Attributes, Modeling, Basic Model of Neuron, Learning in Artificial Neural Networks, Characteristics of ANNs, ANN Parameters, ANN Topologies, ANN adaptability, The stability Plasticity Dilemma.

UNIT – II


UNIT – III

**Fuzzy Logic:** Propositional Logic, The Membership function, Fuzzy logic, Fuzzy Rule Generation, Defuzzification of Fuzzy Logic, Time – Dependent Fuzzy Logic, Crisp logics, Temporal Fuzzy logic (TFL), Time Invariant Membership function, Time-variant Membership function, Intervals, Semilarge Intervals, Interval operators, Temporal Fuzzy logic syntax, Applying Temporal Fuzzy operators, Defuzzification of Temporal Fuzzy logic, Applicability of TFL in communication systems

UNIT – IV

**Fuzzy Neural Networks:** Fuzzy Artificial Neural Network (FANN), Fuzzy Neural Example, Neuro-Fuzzy control, Traditional control, Neural control, Fuzzy control, Fuzzy – Neural control.

**Applications:** Signal Processing, Image Data Processing, Hand written characteristics Recognition, Visual Image Recognition, Communication systems, Call processing, Switching, Traffic control Intelligent control, Optimization techniques.

**TEXT BOOK:**

REFERENCE BOOKS:

EI 415 (C) COMPUTER NETWORKS

Class: IV/IV B.Tech. II Semester
Branch: EIE

Lectures: 4
University Examination: 100 marks
Sessionals: 50 marks

Duration of University Examination: 3 hours.

UNIT – I

Introduction: A Communications model, Data Communications, Data Communications Networking, Protocol and Protocol Architecture, Standards.

Data link control: Flow Control, Error Detection, Error Control, High – Level Data Link Control (HDLC), Other Data Link Control Protocols.


UNIT – II


Frame relay: Background, Frame Relay Protocol Architecture, Frame Relay Call Control, User Data Transfer, Network Function, Congestion Control.


UNIT – III

LAN Technology: LAN Architecture, Bus/Tree LANs, Ring LANs, Star LANs, Wireless LANs.

LAN Systems: Ethernet and Fast Ethernet (CSMA/CD), Token Ring and FDDI, 100VG-AnyLAN, ATM LANs, Fiber Channel, Wireless LANs.

Bridges: Bridge Operation, Routing with Bridges, ATM LAN Emulation.

UNIT – IV


Transport Protocols: Transport Services, Protocol Mechanisms, TCP, UDP.


TEXT BOOK:
EI 415 (D) OPTICAL INSTRUMENTATION

Class: B.Tech. IV/IV – I Semester 
Branch: EIE 
Duration of Unit Examination: 3 Hours

UNIT – I
Optical Fibers: Characteristics of Optical Radiation, Optical Fiber Fundamentals, Different types of fibers, Optical fibers for communication and instrumentation.

IR sources and Detectors: Principle, construction and operation of LED, Laser diode, PIN and Avalanche Photo Diode (APD).

UNIT – II
Opto – Electronic components: Direction Couplers, Polarizers, Optical Isolators, Single Mode fiber Filters, Wavelength Multiplexers and Demultiplexers, Switches and intensity modulators, Phase modulators and frequency modulators.

UNIT – III

UNIT – IV

Text Books:

Reference:
EI 416 COMPUTER AIDED DIGITAL DESIGN LAB

Class: IV/IV B.Tech. I -Semester
Branch: EIE
Duration of Univ. Examination: 3 Hours
Practicals : 3 hours
Univ. Examination : 50 marks
Sessionals: 25 Marks

LIST OF EXPERIMENTS:

VHDL / Verilog: Design, Simulation, Synthesis, Implementation of

A. Combinational Circuits:
   i) Adders / Sub factors / Parity Generators
   ii) Multiplexers, Encoders, Decoders.

B. Sequential Circuits:
   i) Flip Flops (SR, JK, D,T)
   ii) Counters
      a) Ripple Counters
      b) Synchronous Counters
   iii) Shift Registers.

C. ALU

D. MEMORIES

E. Layout design– Inverter, NAND and NOR (involves DRC, Spice netlist extraction, Spice Simulation, Using tools like LASI, Winspice)
**SCHEME OF INSTRUCTION AND EVALUATION**  
**II SEMESTER OF IV YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME**  
**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

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**Professional Elective-II: EI-422**

- **EI 422A** - Embedded Systems Design
- **EI 422B** - Advanced Sensors
- **EI 422C** - Mechatronics
- **EI 422D** - Adaptive Signal Processing
EI 421 PC BASED INSTRUMENTATION

Class: IV/IV B.Tech. II –Semester
Branch: E&I
Duration of University Examination: 3 Hours

Lectures: 4
University Examination: 100 marks
Sessionals: 50 marks

UNIT-I
CPU Characteristics: Summary of INTEL 80286, 80386 and 80486 Processors, Pentium are literature, architecture. Internal operations special Pentium instructions and addressing modes.

UNIT – II
Operating Systems: Essential features of OS for PC based instrumentation, Real time OS and its advantages, memory utilization in Protected mode, virtual memory addressing, Paged memory addressing, multi tasking.
Mother Board: Functional units of mother board and their inter communication, CPU Nucleolus logic, DMA, Interrupts & Interrupt handling; Data, Address and control bus logic, I/o Slot signals.

UNIT – III

UNIT – IV
Study of Standard I/o bus slots: I/o Ports, Parallel & Serial Ports, Bus Slots, Study of 8255 based I/o Add-on card.
Add-on cards Design: Design Considerations, Power & Physical Dimensions of Add-on cards Device driver development – A case study.
Introduction to Micro Processor & Micro Controller based system design; Implantation of simple control loops for temperature level & flow.

TEXT BOOKS:
2. IBM PC-AT Technical Reference

REFERENCES BOOKS:
EI 422 (A) EMBEDDED SYSTEM DESIGN

Class: B.Tech. IV/IV – II Semester
Branch: EIE

Duration of Unit Examination : 3 Hours
Univ. Examination: 100 marks

UNIT - I

Introduction to Embedded Systems: An Embedded Systems, Processor in the System, Other Hardware Units, Software Embedded into a System, Exemplary Embedded Systems, Embedded System-On-Chip (SOC) and in VLSI Circuit.

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.

UNIT - II

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 ISA, 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 for Context-Switching, Deadline and Interrupt Latency.

UNIT - III


UNIT-IV

Inter-Process Communication and Synchronisation of Processes, Tasks And Threads: Multiple Processes in an Application, Problem of Sharing Data by Multiple Tasks and Routines, Inter Process Communication.


TEXT BOOK:


REFERENCE BOOKS:


EI 422 (B) ADVANCED SENSORS

Class: IV/IV B.Tech. I Semester                          Lectures: 4
Branch : E&I                        University Examination : 100 marks

Duration of University Examination: 3 hours              Sessionals: 50 marks

UNIT – I

**Thermal Sensors:** Gas thermometric sensors, Thermal expansion type, acoustic temperature sensor, dielectric constant and refractive index thermosensors, nuclear type, magnetic thermometer, thermo sensors using semi conductor devices, junction semi conductor types, PTAT sensors, Quarz crystal thermoelectric sensors, NQR thermometry, Spectroscopic thermometry, noise thermometry, heat flux sensors

UNIT – II

**Magnetic Sensors:** Introduction to ADLCs, Matteucci effect, Villari effect, Wiedemann effect, thomson effect, skin effect, Sixtus-Tanks effet, SQUID, Joule Effect – Types of sensors using these effects, Yoke coil type, co-axial types, Force and displacement sensors, Anisotropic magnetostrictive sensing, Semiconductor magnetoresistors, Hall effect sensor, eddy current sensor, Switching magnetic sensors, SQUID sensors.

UNIT – III

**Radiation sensors:** X-ray and nuclear radiation sensors – Ionization chamber, Gieger counter, Scintillation detectors, Solid state detectors, plastic film and luminescent detectors, factors affecting the radiation measurement

**Fiber Optic Sensors:** Temperature sensors, liquid level sensing, fluid flow sensing, microbend sensors

**Electro-analytic sensors:** Electrochemical cell, SHE, reference electrodes, Sensor electrodes – metal types, membrane type, temperature sensing electrodes, electroceramics in gas media, Chemfet.

UNIT – IV

**Smart sensors:** Primary sensors, Excitation, Converters, non-linearity, noise, response time, drift, cross sensitivity, interference and their compensation, information coding and data communication

**Microsensors:** Thin films sensors, microsensors for sensing thermal, radiation, mechanical, magnetic and chemical signals

TEXT BOOK:


REFERENCE BOOKS:

EI 422 (C) MECHATRONICS

Class: IV/IV B.Tech. II Semester  
Lectures: 4

Branch : E&I  
University Examination : 100 marks

Duration of University Examination: 3 hours.  
Sessionals: 50 marks

UNIT-I

Introduction to Mechatronics: Measuring systems, Control systems, Microprocessor based controllers, Mechatronics approach.  
Actuation Systems: Pneumatic and Hydraulic systems, Directional control valves, pressure control valves, process control valves and rotatory actuators.  
Electrical Actuation Systems: Electrical system, Mechanical switches, solid state switches, solenoids, DC motors, AC motors, stepper motors.

UNIT-II

Basic models: Mathematical models, mechanical system building blocks, electrical system building blocks and thermal system building blocks.  
System Models: Engineering system, Rotational transnational system, Electro mechanical systems, hydraulic mechanical systems.

UNIT-III

System Transfer function: Transfer function, First order system, Second order system, Systems in series, systems with feedback loops.  
Closed Loop Controllers: Control modes, Two step mode, proportional mode, derivative control, integral control, PID control, digital controllers, velocity controllers and adaptive control.

UNIT-IV

Introduction to modern CNC machines and manufacturing systems, advantages of CNC machines, CNC machine center developments, tool monitoring on CNC machines, advanced manufacturing systems, benefits of FMS.  
CNC Systems: Schematic diagram of CNC machine tool, interfacing, monitoring, diagnostics, compensation for machine accuracies, PLC programming, Direct numerical control (DNC).  

TEXT BOOKS:

REFERENCE BOOK:
1. Cabin Craid, Mechatronics, ASME publication.
EI 422 (D) ADAPTIVE SIGNAL PROCESSING

Class: IV/IV B.Tech. II Semester
Lectures: 4
Branch : EIE
University Examination : 100 marks
Duration of University Examination: 3 hours.
Sessionals: 50 marks

UNIT – I
Multirate Digital Signal Processing: Multirate Signal processing, Decimation, Interpolation, Time domain and frequency domain characterization of sampling rate alteration devices, Fractional sampling rate conversion, Direct-form FIR structures, Polyphase filter structures, Time-variant filter structures, Multistage implementation of sampling rate conversion, Design of Phase shifters, Interfacing of digital system with different sampling rates, Implementation of Narrow band low pass filters, Implementation of digital filter banks, sub band coding of speech signals, Quadrature mirror filters, Transmultiplexers, oversampling ADCs and DACs.

UNIT – II
Power Spectrum Estimation: Cross correlation and Auto correlation of discrete – time signals, power spectral density, periodogram, use of DFT in power spectrum estimation, non parametric methods for power spectrum estimation – Bartlett method, Welch method, Blackman & Tukey method; Parametric methods for power spectrum estimation – Autoregressive (AR), Moving average (MA) and Auto regressive – Moving average (ARMA) models, Yule-Walker method, Burg method, Unconstrained least squares method.

UNIT – III

UNIT – IV
TEXT BOOKS:


REFERENCE BOOKS: