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

ELECTRONICS AND INSTRUMENTATION ENGINEERING

Course No.	Course	Hours of Instruction Per week			EVALUATION SCHEME			Total Marks
					External Evaluation		Sessionals	
		Lectures	Tutorials	Practicals	Duration of Exam–hours	Max. Marks	Max. Marks	
MH 211	Mathematics – II	3	1	-	3	100	50	150
EI 212	Electrical & Electronic Measurements	3	1	-	3	100	50	150
EC 214	Switching Theory & Logic Design	3	1	-	3	100	50	150
EI 215	Electronic Devices and Circuits – I	3	1	-	3	100	50	150
EE 216	Electrical Technology	3	1	-	3	100	50	150
EE 218	Network Analysis & Synthesis	3	1	-	3	100	50	150
EI 217	Electrical & Electronic Measurement Lab	-	-	3	3	50	25	75
EE 219	Electrical Technology & Networks Lab	-	-	3	3	50	25	75
		18	**6**	**6**				**1050**

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

COMPLEXINTEGRATION: Line integration in complex plan, Cauchy's integral theorem (simple proof only), Cauchy's integral formula. Taylor's series & Laurent's series expansion – Zeros and singularities. Residues – Residue theorem – Evaluation of real integrals using residue theorem (contours of the nature semicircle and circle only).

UNIT – II

LAPLACE TRANSFORMS: Laplace transforms – inverse transforms – Properties of Laplace transforms – Laplace transforms of unit step function, Impulse function and periodic functions – Convolution theorem. Solution of ordinary differential equation with constant coefficients and system of ordinary differential equations with constant coefficients and system of ordinary differential equations with constant coefficients using Laplace transforms.

UNIT – III

FOURIER SERIES: Fourier Series – Expansion in a given range – Fourier series even and odd functions – Half Range sine and cosine series expansions.

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:

1. B.Grewal, "Higher Engineering Mathematics", Khanna publishers, New Delhi.

REFERENCE BOOKS:

1. R.V.Churchill, "Complex Variables and its Applications", McGrawHill, Newyork.
2. Dr.M.K.Venkata Raman, "Engineering Mathematics", Vol.III, National Publishing Co., Madras.
3. E.Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd, New Delhi.

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

MEAURING INSTRUMENTS: Significance of Measurement & Block diagram of Measurement system, Accuracy and precision, Basic principle of operation of PMMC, MI, Electrodynamic, Electrostatic and Induction type Instruments, Expression for Torque Measurement of Current, Voltage, Power (Electrodynamic type). Range extension, Rectifier type and Thermal type Instruments. Series type and shunt type ohmmeters, megger, Single Phase Energy Meter. (10+3)

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

Q-Meter: Practical circuit, Measurement of Q, Inductance, Self Inductance and Capacitance.

Signal Analysis Instruments: Frequency Selective & Heterodyne Wave Analyzers, Harmonic distortion Analyzers, Total Harmonic Distortion.- Elementary Magnetic Tape Recorder.

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:

1. Helfrick. A.D and Cooper W.D.: "MODERN ELECTRONIC INSTRUMENTATION AND MEASUREMENT TECHNIQUES" – PHI

2. Golding E.W. and Wides.F.C.: "Electrical Measurements and Measuring Instruments" – wheeler Publications.

Reference Books:

1. Sawhney A.K: "ELECTRICAL AND ELECTRONIC MEASUREMENT AND INSTRUMENTATION" – Dhanpat Rai & Sons.

2. Larry D.Jones and A.Foster Chin: "electronic Instruments and Measurements" – John Wiley & Sons.

3. Oliver and Cage: "ELECTRONIC MEASUREMENTS AND INSTRUMENTATION" – McGraw Hill International Edition.

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

Number Systems and Codes: Review of Number systems, binary arithmetic – binary weighted and non weighted codes – error detecting and error correcting codes.

Boolean Algebra: Postulates and theorems – Logic gates and truth tables – Representation of switching functions – SOP & POS forms – Karnaugh Map representation – Minimization using K-Map. Quine Mc'Clusky method of minimization

UNIT – II

Design of Combinational Circuits:

Design of combinational circuits using conventional AND, OR, NOT, NAND, NOR & EX-OR gates – Adders / Subtractors: – Half Adder, Full Adder, Half Subtractor Full Subtractor, Parallel Adder, Serial Adder, Carry Look ahead Adder, BCD Adder, 1's complement subtractor, 2's complement subtractor, Decoders: BCD to 7 segment, BCD to decimal decoders. Encoders: Priority encoders, Multiplexers, Demultiplexers, Realization of switching functions using multiplexers and decoders.

UNIT – III

Sequential Circuits: Flip Flops – SR flip flop, JK flip flop, D flip flop, T flip flop, Excitation tables- Race around condition, Master slave flip flop, Excitation tables.

Design of Synchronous and Asynchronous counters, shift registers - Modes of operation, Bidirectional shift registers, Ring counters, Johnson counters. Glitches and delay problems in counters.

UNIT – IV

Synchronous Sequential Circuits and Iterative Networks: State table, state diagram, state assignment, state minimization, synthesis of synchronous, sequential circuits – Sequence detectors – Binary counters.

Capabilities and Minimization of Sequential Machines: Mealy and Moore Machines – Capabilities and limitations of finite state machine – state equivalence and machine minimization.

TEXT BOOKS:

1. Zvi. Kohavi, *Switching and Finite Automata Theory* , Tata McGraw-Hill, New Delhi.
2. Taub & Schilling, *Digital Integrated Circuits*, Tata McGraw-Hill, New Delhi.

REFERENCE BOOKS:

1. Moris Mano, *Digital Logic Design*, Prentice Hall of India, New Delhi.
2. Samuel.C.Lee & B.S.Sonde, *Digital Circuits & Logic Design*, Prentice Hall of India, New Delhi.

3**. R.P. JAIN**, *Modern Digital Electronics*, **Prentice Hall of India**

EI 215 ELECTRONIC DEVICES AND CIRCUITS – I

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

Lectures: 3, Tutorial: 1
University Examination: 100 marks
Sessionals: 50 marks

UNIT – I

Review of semiconductor diodes. Continuity equation. Junction capacitance. Temperature dependence of p-n junction. Halfwave rectifier – and fullwave rectifier, Bridge rectifier – with and without filters. Ripple, Regulation. Series and shunt regulators. Introduction to SMPS.

UNIT – II

Transistors, current components in NPN and PNP transistors, Ebers-Moll model. Small Signal LF h-parameter model, Determination of h-parameters – Analysis of transistor amplifier using h-parameters in CE, CB and CC configuration –simplified analysis for these configurations. BJT as switch

UNIT – III

FETs : JFET-V-I characteristics, MOSFET – Enhancement and Depletion type MOSFETs. Small signal model – Analysis of CS, CD amplifier.
Principles, characteristics and applications of SCR, UJT, Tunnel diode, Varactor diode. Diac Triac LED, Photo diode and Photo Transistor.

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:

1. Jocob Millman & Christos C.Halkias, Electronic Devices and Circuit, McGraw Hill, 1991.
2. Robert Boylestad & Lowis Nashelsky, electronic Devices and Circuit theory, Prentice Hall of India, 5th Ed., 1993.
3. Donald L Schilling & Charles Belove, Electronic Circuits: Discrete & Integrated, McGraw Hill International Edition, 3rd Edition., 1989.

EE 216 ELECTRICAL TECHNOLOGY & THEORY

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.

D.C.Machines: Constructional features, Methods of Excitation, Characteristics of Series, Shunt and Compound Generators and Applications, Torque development in D.C. motor, Characteristics of Series, Shunt and Compound motors and Applications.

Single Phase Transformers: Construction and operation principle, Development of No Load & On Load Phasor diagrams, Equivalent circuit, O.C. and S.C. tests, Losses and Efficiency, Voltage regulation. (9+3)

UNIT – IV

3-ϕ Induction Motor: Constructional features, Principle of Operation, Production of Rotating Magnetic Field, Torque – slip Characteristics, Applications.

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. Vinvent 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 ANYLYSIS AND SYNTHESIS" TMH.
4. Nagrath and Kothari " BASIC ELECTRICAL ENGINEERING" TMH.

EE 218 NETWORK ANALYSIS & SYNTHESIS

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

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

UNIT – I

Network Topology: Topological description of networks – Lumped Vs Distributed circuits – Network graph theory – Tress, co-Tress and loops – Incidence matrix – Tie-Set and Cut-Set Matrices – Kirchoff's Laws and analysis of Networks.

Time response analysis of Networks: Transient analysis of R-L, R-C, R-L-C series & parallel networks with step, impulse, sinusoidal and pulse excitation – Initial conditions – Special signal wave form Ramp, Triangular train of pulses, delayed input.

P-SPICE: Introduction to P-SPICE representation of circuit elements – Analysis of Circuits using P-SPICE – Simple problems.

UNIT – II

Two port Networks: Characterisation of linear time invariant two port networks – open circuit impedance parameters – Short circuit admittance parameters – transmission parameters – Inverse transmission parameters – Hybrid parameters – Inverse Hybrid parameters – Inter relationship between parameters – Inter connections of two port networks – Ladder network – Bridged T, Parallel T and Lattice T networks – Network representation of element devices – Network transmission criteria.

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.

Network Synthesis: Positive real function properties – Hurwitz Polynomials – Even and odd functions – Test for positive Real functions – Elementary synthesis operation – properties and Foster and Cauer forms of RL, RC and LC networks. (9+3)

UNIT-IV

Image and iterative impedance, transfer constants, insersion loss, attenuators,
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.
2. W.H.Hayt and Jr.Kemmerly "Engineering Circuit Analysis" TMH.
3. James W.Nilson " Electric Circuits" Pearson Education.
4. Muhammed H.Rasheed. " SPICE for circuits and Electronics Uning P-Spice"

REFERENCES:

1. J.Edminister & M.Nahvi. " Electric Circuits" Schaum's outlines, TMH.
2. D.Roy Choudhary "Networks analysis and Synthesis" New Age Publishers
3. K.A. Gangadhar "Circuit Theory" Khanna Publishers.

EI 217 - ELECTRICAL & ELECTRONICS MEASUREMENTS LAB

Class: **II/IV B.Tech. II Semester** Practicals: **2**
Branch **E&I** University Examination: **50 marks**
Duration of University Examination**: 2 hours** Sessionals: **25 marks**

LIST OF EXPERIMENTS

1. Range Extension of Ammeter.
2. Conversion of Ammeter to Voltmeter.
3. Design and Calibration of Ohmmeter.
4. Measurement of AC Voltage using Rectifier type meter.
5. Measurement of Low Resistance using Kelvin's Double bridge.
6. Measurement of Inductance using Maxwell's Bridge.
7. Measurement of Capacitance using Schering Bridge.
8. Measurement of Frequency using Wein's Bridge.
9. Measurement of Frequency using Lissajous Patterns.
10. Measurement of Phase using Lissajous Patterns.
11. Measurement of Resistance using Wheatstone bridge.
12. Calibration of Wattmeter
13. Single phase Energy meter
14. Testing of Instrument Transformer (CT/PT)
15. Q-factor measurement.

EE 218 ELECTRICAL TECHNOLOGY & NETWORKS LAB

Class: II/IV B.Tech. I-Semester
Branch: ECE/ EIE
Duration of Univ. Examination: 2 Hours

Practicals: 2
University Examination: 50 Marks
Sessionals: 25 marks

LIST OF EXPERIMENTS

1. Verification of Kirchhoffs 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
10. Brake test on 3-phae Induction Motor.
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

Course No.	Course	Hours of Instruction Per week			EVALUATION SCHEME			Total Marks
					External Evaluation		Sessionals	
		Lectures	Tutorials	Practicals	Duration of Exam–hours	Max. Marks	Max. Marks	
MH 221	Mathematics – III	3	1	-	3	100	50	150
EI 222	Instrument Transducers	3	1	-	3	100	50	150
EC 223	Digital Integrated Circuits	3	1	-	3	100	50	150
EI 224	Electronic Devices & Circuits – II	3	1	-	3	100	50	150
EC 225	Signals & Systems	3	1	-	3	100	50	150
EC 226	Electro Magnetic Theory	3	1	-	3	100	50	150
EI 228	Instrument Transducers Lab	-	-	3	3	50	25	75
EI 2210	Electronic Circuits Lab	-	-	3	3	50	25	75
		18	**6**	**6**				**1050**

MH 221 MATHEMATICS – III

Class: B.Tech. II/IV, II-Semester lectures: 3 Hrs, Tutorials:
Branch: CSE, IT, Mech, Civil, ECE, EEE, E&I Univ. Examination : 100 Marks
Duration of Univ. Examination: 3 Hrs. 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 9without proof) – Reduction to diagonal form and normal form. Reduction of a quadratic form to canonical form. (8+3)

UNIT – III

PROBABILITY AND STATISTICS: Curve fitting – Method of least squares – Straight line and parabolic curves – Correlation Coefficient – Rank Correlation – Regression – Linear Regression equations. Random variables – Discrete and continuou distribution – Density and distribution functions – Illustrations through Binomial, poisson and normal distributions. (8+3)

UNIT – III

NUMERICAL ANALYSIS: Interpolation. Forward, Backward interpolation – Newton's and Lagrange's formulae.

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

UNIT – IV

SOLUTION TO SYSTEM OF LINEAR EQUATIONS: Jacobi, Gauss Siedel iteration method – solution of algebraic and transcendental equations – Bisection method, Regula – Falsi method & Newton Raphson's Method.

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

TEXT BOOK:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi.

REFERENCE BOOKS:

1. S.S.Sastry, "Introductiory Numeriacal Analysis".
2. E.Kreyszic, "Advanced Engineering Mathematics", Wiley Eastern, New Delhi.
3. gupta and Kapoor, "Fundamentals of Mathematical Statistics" S.Chand and Co., New Delhi.

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, magneto strictive materials & their application to measurement of force.

Piezoelectric Transducers: Piezoelectric effect, Piezo-electric materials, sensitive co-efficients 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:

1. B.C. Nakra, K.K Choudhry, *Instrumentation Measurement & Analysis*, Tata McGraw-Hill, New Delhi.
2. D.V.S. Murthy, *Transducers and Instrumentation*, Prentice Hall of India, New Delhi.
3. Rangan, Sarma, Mani , *Instrumentation Devices & Systems* ,Tata McGraw-Hill, New Delhi

REFERENCE BOOKS:

1. A.K.Sawhney, *Electrical & Electronic Measurements & Instrumentation*, Dhanpatrai & Co.,New Delhi.
2. H.K.P.Neubert, *Instrument Transducers – An Introduction to Their Performance and Design* ,Oxford University Press, London.
3. E.O. Doeblin, *Measurement Systems : Application and Design*, McGraw-Hill, New York.
4. F.W. Considine, *Instrumentation Hand Book*, McGraw Hill, New York.
5. D. Patranabis, *Principles of Industrial Instrumentation*, Tata McGraw Hill. New Delhi

EC 223 DIGITAL INTEGRATED CIRCUITS

Class: **II/IV B.Tech. II Semester**. Lectures:**3,**Tutorials:**1**
Branch: **ECE / EIE** University Examination: **100 marks**
Duration of University Examination: **3 hours** Sessionals: **50 marks**

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.

Behavioral Modeling: Process assignment statements, WAIT, IF, CASE, NULL, LOOP, EXIT, NEXT, ASSERTION, REPORT statements. Simple Programming.

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:

1. VHDL – Dougles . L. Perry. McGraw Hill.
2. Digital – B.S.Sonde.

EI 224 ELECTRONIC DEVICES & CIRCUITS – II

Class: **II/IV B.Tech. II Semester**. Lectures:**3,**Tutorials:**1**
Branch: **ECE , EIE, EEE** University Examination: **100 marks**
Duration of University Examination: **3 hours** 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:

1. Milman & halkas, “Integrated Electronics” TMH, New Delhi.
2. Robart Boylestad & Lowis Nashelsky, “Electronic Devices & Circuits”

REFERENCE BOOKS:

M.S.Gausi, “Electronic Circuits”, John Wiley & Sons, New york.

EC 225 SIGNALS & SYSTEMS

Class: **II/IV B.Tech. II Semester**. *Lectures:***3,***Tutorials:***1**
Branch: **ECE, EIE, EEE** *University Examination:* **100 marks**
Duration of University Examination: **3 hours** *Sessionals:* **50 marks**

UNIT-I

Signals – Signals and their representation, classification of signals, singularity functions – Impulse, step, ramp functions, representation of signals withsingularity 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, Trigonometirc 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 valve of random variables, variance of a random variable, tchebycheffs 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.

Realization of Discrete Systems: Structural realization of discrete systems – Direct form – I, Direct form-II, Cascade and parallel forms.

TEXT BOOKS:

1. Simon & Haykins, Signals & Systems, Wiley Eastern Ltd.,
2. Zeimer, Signals & Systems, PHI.
3. Proakis, Digital Signal Processing: Principles, Algorithms and Applications.(PHI)
4. Simon & Haykin – " Signals & Circuits" – John Willey

REFERENCE BOOKS:

1. Oppenheim, Willsky & Young; Signals and Systems PHI, EEE, New Delhi.
2. P-Z Peebles – Probabilities, Random Variables and Random Signal Principles – TMH.
3. B.P. Lathi, Signals & Systems and Communication – BSP.

EC 226 ELECTRO MAGNETIC THEORY

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

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 Poissons'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

MAGNETO STATICS: Biot-savart's law, Magnetic field strength, Flux density Ampere's circuit law, stokes theorem, Ampere's force law, Magnetic potential, Magnetic boundary conditions, Energy stored in magnetic field, Energy density. Analogies between Electric and Magnetic fields

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:

1. " ELECTRO MAGNETIC WAVES AND RADIATING SYSTEMS ."
- E.C. Jordan & K.G. Balman, Prentice Hall of India

2. " ELECTRO MAGNETICS." - Krauss and Carver, Mc Graw Hilll Co. Pvt. Ltd.

3. "ENGINEERING ELECTROMAGNETICS."-Hayt William Jr,TMH Publishing

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** *Practicals:***3Hrs.**
Branch: **E&I** *Sessionals :* **25 Marks**
Duration of University Examination: **3 hours** *University Examination :* **50 Marks**

LIST OF EXPERIMENTS

1. Determination of Gauge factor and Cross-sensitivity of strain gauge.
2. Measurement of Force using strain gauge Force Transducer.
3. Measurement of Torque using strain gauge Torque Transducer
4. Measurement of displacement using capacitive pickup.
5. Measurement of displacement using LDR demonstration setup.
6. Measurement of Load using proving ring type Load cell
7. Measurement of displacement using Linear Variable Differential Transformer (LDVT) type transducer.
8. Measurement of temperature using Thermistor, Thermocouple, etc.,
9. Measurement of displacement using phototransistor demonstration setup.
10. Determination of Time Constant of I order system.
11. Measurement of displacement using Inductive pickup.
12. Measurement of temperature using thermopile transducer.
13. Bimetallic relay demonstration.

TEXT BOOKS:

1. B.C. Nakra, K.K Choudhry, *Instrumentation Measurement & Analysis,* Tata McGraw-Hill, New Delhi.
2. D.V.S. Murthy, *Transducers and Instrumentation,* Prentice Hall of India, New Delhi.
3. Rangan, Sarma, Mani , *Instrumentation : Devices & Systems* ,Tata McGraw-Hill, New Delhi

EI 2210 ELECTRONICS CIRCUITS LABORATORY

Class**: II/IV B.tech .II - Semester** Practicals**: 2Hrs**
Branch: **E&I, EEE** University Examination**: 50 Marks**
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).

3. Half **wave&Fullwave Rectifiers:** Without&with filters.

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.

10. **Feedback Amplifiers**: Voltage series/shunt; Current series/shunt.

11. **Oscillators**: RC, LC&Crystal.

12. Differential amplifier.

13. Class-B Power Amplifier.

14. Single Tuned Amplifier.

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

ELECTRONICS AND INSTRUMENTATION ENGINEERING

Course No.	Course	Hours of Instruction per week			Scheme of Evaluation			Total Marks
					External Evaluation		Sessionals	
		Lectures	Tutorials	Practicals	Duration of Exam–hours	Max. Marks	Max. Marks	
OE 311	Open Elective	4	-	-	3	100	50	150
EC 311	Computer Architecture	4	-	-	3	100	50	150
EI 313	Process Instrumentation	3	1	-	3	100	50	150
EC 314	Linear Integrated Circuits	3	1	-	3	100	50	150
EE 319	Control System Engineering	3	1	-	3	100	50	150
EC 316	Linear Integrated Circuits Lab	-	-	3	3	50	25	75
EI 317	Process Instrumentation Lab	-	-	3	3	50	25	75
EC 319	Digital Electronics Lab	-	-	3	3	50	25	75
		17	3	9				975

Open Electives: **OE 311 A. Operations Research**
OE 311 C. Enterpreneurship Development
OE 311 B. Management Information Systems
OE 311 D. Forex & Foreign Trade

OE311 (A) OPERATIONS RESEARCH

Course *:* **B.Tech. III/IV 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 (9)

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

UNIT-II (9)

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 (9)

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 (9)

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:

1. Handy.A.Taha, "Operation Research" 4th Edn, McMillan, 1984.
2. Kanthiswaroop, etal, Opertions Research, S.Chand & Sons, New Delhi.
3. V.K.Kapoor, "Operation Research" 5th Revd.Edn. S.Chand & sons,1990
4. J.C.Pant, Introduction Optimization, Jain Brothers, New Delhi.
5. S.S.Rao, Optimization Techniques, New Age International, New Delhi.
6. G.Hadley, Linear Programming, Addison Wesley, New Delhi.
7. Gillett, Introduction to Operations Research, Mc.Graw Hill New,Delhi

OE 311 (B) MANAGEMENT INFORMATION SYSTEMS

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

UNIT–I (9)

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.

Process of Management: Management Effectiveness, Planning, Organizing, Staffing, Coordinating and Directing, Controlling, MIS – A Tool for the Management Process.

Organization Structure and Theory: Basic Model of Organization Structure, Modifications to the Basic Model of Organization Structure, Organizational Behavior, Organization as a System, MIS – Organization.

Strategic Management of Business: The Concept of Corporate Planning, Essentiality of Strategic Planning, Development of the Business Strategies, Short Range Planning, Tools of Planning, MIS – Business Planning.

UNIT-II (9)

Decision Making: Decision Making Concepts, Decision Methods, Tools and Procedures, Behavioral Concepts in Decision Making, Organizational Decision Making, MIS and Decision Making Concepts.

Information: Information Concepts, Information – A Quality Product, Classification of the Information, Methods of Data and Information Collection, Value of the Information, General Model of a Human as an Information Processor, Summary of Information Concepts and their Implications, Organization and Information, MIS and the Information Concepts.

Systems: Systems Concepts, Systems Control, Types of System, Handling System Complexity, Post Implementation Problems in a System, MIS and System Concepts.

System Analysis and Design: Introduction, The Need for System Analysis, System Analysis of the Existing System, System Analysis of a New Requirement, System Development Model, Structured System Analysis and Design (SSAD), computer System Design, MIS and System Analysis.

UNIT-III (9)

Development of MIS: Development of Long Range Plans of the MIS, Ascertaining the Class of Information, Determining the Information Requirement, Development and Implementation of the MIS, Management of Quality in the MIS, Organization for Development of the MIS, MIS: The Factors of Success and Failure.

Choice of Information Technology: Introduction: Nature of IT Decision, Strategic Decision, Configuration Design, Evaluation, Information Technology Implementation Plan, Choice of the 'Information Technology' and the 'Management Information

System'.

Applications in Manufacturing Sector: Introduction, Personnel Management, Financial Management, Production Management, Materials Management, Marketing Management, Corporate Overview.
Applications in Service Sector: Introduction to the Service Sector, Creating a Distinctive Service, MIS Applications in Service Industry, MIS: Service Industry.

UNIT-IV (9)

Decision Support Systems: Concept and Philosophy, DSS: Deterministic Systems, Artificial Intelligence (AI) System, Knowledge Based Expert System (KBES), MIS and the Role of DSS.
Technology of Information Systems: Introduction, Data Processing, Transaction Processing, Application Processing, Information System Processing, TQM of Information Systems, Human Factors and User Interface, Real Time Systems and Design, Programming Languages for System coding, CASE Tools.
Business Process Re-engineering (BPR): Introduction, Business Process, Process Model of Organisation, Value Stream Model of Organization, Business Process Delays, Relevance of the Information Technology, MIS and BPR.
Overview of Database Management Systems, Object Oriented Technologies, Client-Server Architecture, Networks.
Case Studies in MIS.

SUGGESTED TEXT / REFERENCE BOOKS*:*

1. W.S.Jawadekar, "Management Information Systems", Tata McGraw Hill, 2nd Edition, ISBN: 0 – 07 – 044575 - 3, 2003.
2. Robert Schultheis, Mary Sumner, "Management Information Systems – The Manager's View", Fourth Edition, Tata McGraw Hill, ISBN: 0 – 07 – 463879 – 3, 2003.
3. Robert G.Murdick, Joel E.Ross, James R.Clagget, "Information Systems for Modern Management", Third Edition, Prentice Hall of India, ISBN: 81 – 203 – 0397 – 0, 2002.
4. Gordon B.Davis, Margrethe H.Olson, "Management Information Systems", Second Edition, Tata McGraw Hill, ISBN: 0 – 07 – 040267 – 1, 2000.
5. Jerome Kanter, "Managing with Information", Fourth Edition, Prentice Hall of India, ISBN: 81 – 203 – 1012 – 8, 2003.

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 (9)

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 (9)

Business opportunity selection, Opportunities in various branches of Engineering. Sources of new ideas, New product, Service and Trade etc. Planning and Launching of an entrepreneurial activity. Screening, Feasibility studies and market survey. Forecasting the demand. Technical feasibility, Financial viability. Break even analysis. Preparation of preliminary and bankable project reports planning infrastructure, Raw materials and human resource, requirements, fiscal incentives. An introduction to patents process, Trade marks etc.
Activity: Visit to a small scale industry.

UNIT-III (9)

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 (9)

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:

1. Robert D.Hisrich, Michael P. Peters, "Entrepreneurship", Fifth Edition, Tata McGraw-Hill, 2002.
2. David H. Holt, Entrepreneurship New venture creation prentice hall of India.
3. Handbook for New Entrepreneurs, Entrepreneurship Development Institute of India, Ahmedabad.
4. T.R. Banga, Project Planning and Entrepreneurship Development, CBS Publishers, New Delhi.
5. Personnel efficiency in Entrepreneurship Development-A Practical Guide to Industrial Entrepreneurs, S. Chand & Co., New Delhi.

OE 321 (D) FOREX AND FOREIGN TRADE

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 (9)

Business: Nature and Scope. Classification of Business Activities. Functions of Commerce & Trade. Business System: Characteristics and Components of Business System. Objectives of Business: Concept, Significance and Classification of Objectives. Objections against Profit Maximization Objective

UNIT-II (9)

Foreign Trade: Introduction of International Trade: Basic of External Trade. Special Problems of Foreign Trade.

Stages In Import Procedure. Stages In Export Procedure. Bill of Lading, Mate's Receipt, Certificate of Origin. State Trading Corporation of India. Export Credit and Guarantee Corporation. Minerals and Metals Trading Corporation of India.

UNIT-III
(9)

Foreign Exchange: Meaning and Importance of Exchange Rate. Methods of Foreign Payments. The Demand And Supply of Foreign Exchange. The Equilibrium Rate of Foreign Exchange. Functions of Foreign Exchange Market. Determination of Foreign Exchange Rate Under Different Monetary Systems: Mint Policy Theory, Balance of Payment Theory.

UNIT-IV (9)

Objectives of Exchange Control: Characteristics – Advantages of Exchange Control – Methods of Exchange Controls. Intervention, Exchange Restriction; Multiple Exchange Rates; Exchange Clearing Agreements – Method of Operation – Exchange Clearing Agreements In Practice. Payments Agreements – Transfer Moratoria – Indirect Methods. Progress Towards Evaluation. Opposition To Exchange Control.

SUGGESTED TEXT / REFERENCE BOOKS:

1. Macro Economics by M.L.Seth Lakshmi Narayan Agarwal, Hospital Road, AGRA – 3.
2. Money Banking, Trade & Finance by K.P.M. Sundaram Sultan Chand And Sons, 23, Daryaganj, New Delhi -110 002.
3. Monetary Theory by M.C. Vaish, Ratan Prakashan Mandir, Educational & University Publishers, 21, Dayanand Marg Darya Ganj, Delhi – 2.
4. Business Organization and Modern Management By Y.K.Bhushan

5. Business Organization and Management by S.A. Sherlekhar.

6. Macro Economics by P.N.Chopra. Kalyani Pubnlishers, 1/1, Rajinder Nagar, Ludhiana-141 008.

7. Business Organization & Management by C.B.Gupta Sultan And Sons Publishers, 23. Daryaganj, New Delhi – 110 002.

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. **12**

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. **8**

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. **8**

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. **8**

TEXT BOOK:

1. Morris Mano, *Computer System Architecture*, Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. John P. Hayes, *Computer Organization and Architecture,* McGraw-Hill, New York.
2. W.Stallings, *Computer Organization and Architecture,* Prentice Hall of India, New Delhi.

EI 313 PROCESS INSTRUMENTATION

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

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

Flow Measurement : Head type Flow meters: Expression for volume flow rate, velocity profiles, venturi tube orifice plate, Flow nozzle, pitot tube – Rotameter – Electromagnetic flow meter – Turbine flow meter – strain gauge type flow meter – ultrasonic flow meter – Hotwire Anemometers – Laser Anemometer – Thermal Flow meters. **9+3**

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. **8+3**

TEXT BOOKS:

1. B.C. Nakra & KK Choudhry, *Instrumentation Measurement & Analysis*, Tata McGraw-Hill, New Delhi.
2. Rangan, Mani, Sharma, *Instrumentation Devices & Systems*, Tata McGraw-Hill, New Delhi.
3. D.V.S. Murthy, *Transducers and Instrumentation*, Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. F.W. Kirk and N.R. Rimboi, INSTRUMENTATION, D.B.TARA POREVALA SONS & Co. Pvt. Ltd.
2. A.K.Sawhney, *Electrical and Electronics Measurements and Instrumentation*, *Dhanpatrai* & Co., New Delhi.
3. E.O. Doeblin, *Measurement Systems: Application and Design*, McGraw-Hill, New York.
4. C.D. Johnson, *Process Control and Instrumentation Technology*, Prentice Hall of India, New Delhi.
5. B.G. LIPTAK, *Hand Book of Instrumentation*. (Vol . 1 & Vol.2.)
6. F.W.Considine, Instrumentation Hand Book.

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

Integrated circuits: Introduction, classification of Ics, Fabrication Techniques of Ics. Introduction to OPAMP: Introduction, Internal blocks of Op-Amps, Ideal & Practical characteristics of Op-Amps, Measurement of Op-Amp parameters, Analysis of Basic Inverting & Non-Inverting Amplifiers and voltage follower.

D.C. Characteristics of OPAMP: Open loop and closed loop frequency response, Op-Amp stability, Frequency compensation techniques. Ideal & Practical characteristics of IC-741.

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 Mulitivibrator (Square wave generator) and Monostable Multivibrator.

UNIT-III

Active Filters: Introduction of filters, Ideal and Realistic frequency responses of various filters, Second Order filters: Analysis and design of I.G.M.F., V.C.V.S configuration of L.P.F, H.P.F., B.P.F. and notch filters.

Monolithic Timers and their applications: Introduction to IC 555 Timer, Functional Diagram, Design of Astable and Monostable multivibrators using 555timer.

UNIT-IV

Voltage regulators: Basic voltage regulator using Op-Amps, General purpose IC Regulator, uA723, Functional diagram, specifications, Design consideration of 723 as low & high voltage regulators. Current limit protection, current feed back, current bossting. Three terminal voltage (fixed) Regulators: Introduction and general features of three terminal regulators, Ic series of three terminal Regulators, their Design, current boosting.

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:

1. Roy Choudhary, Shail Jain, Linear Integrated Circuits, New Age International, New Delhi.
2. Ramakant Gayakwad, Opamp and Linear Integrated Circuits, Pearson Education.
3. G.B. Clayton, Integrated Circuits & Applications, ELBS, Lodon.
4. Rodert F.Coughlin, Frederick F.Driscoll, Operational Amplifiers and Linear Integrated Circuits, Pearson Education, New Delhi.

REFERENCE BOOKS:

1. R.Botkar, Integrated Circuits, Khanna Publishers, New Delhi.
2. Franco, Integrated Circuits & Applications, McGraw Hill, New York.

EE 319 CONTROL SYSTEM ENGINEERING

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

UNIT – I

INTRODUCTION: *Types of systems, Properties of systems, Linearity, Time-inverience, Stability, Causality. Open loop control system, Closed loop control system, Effect of Feedback on over all 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, Tacho generator and Potentiometer. **(9+3)**

TIME DOMAIN ANALYSIS: Design specifications, Typical test signals, Time response of first order and of 2^{nd} 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, Diagonolization, 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

1. M. Gopal, *"Modern Control System Theory",* Wiley Eastern Publishers, New Delhi.
2. B.C. Kuo, *"Automatic Control Systems"* 7/e Prentice Hall of India. New Delhi.
3. K.Ogata, *" Modern Control Engineering"* Prentice Hall of India, New Delhi.

REFERENCES

1. I.J. Nagarth & M. Gopal, *"Control System Engineering",* New Age International Publishers, New Delhi.

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

1. Measurement of parameters of an operation Amplifier.

(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.
5. Design and Testing of Instrumentation Amplifier.
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** *Practicals:***3Hrs.**
Branch: **E&I** *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
2. Measurement of acceleration using piezo electric accelerometer.
3. Measurement of Temperature using RTD, SC sensor (AD590).
4. Measurement of Sound using sound level meter
5. Measurement of differential pressure using Bellows.
6. Measurement of flow using venturi, orifice, rotameter, turbine flow meter.
7. Study & use of I-P and P-I demonstration set up.
8. Measurement of level using Rheostatic method.
9. Measurement of level using capacitive method.
10. Measurement of speed using stroboscope demonstration set up.
11. Measurement of High temperature using optical radiation pyrometer.
12. Measurement of Pressure using differential type capacitive.
13. Study and use of Instrumentation Amplifier.

TEXT BOOKS:

1. B.C. Nakra & K.K Choudhry, *Instrumentation Measurement & Analysis*, Tata McGraw-Hill, New Delhi.
2. Rangan, Mani, Sharma, *Instrumentation Devices & Systems*, Tata McGraw-Hill, New Delhi.
3. D.V.S. Murthy, *Transducers and Instrumentation,* Prentice Hall of India, New Delhi.

SCHEME OF INSTRUCTION AND EVALUATION
II SEMESTER OF III YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS AND INSTRUMENTATION ENGINEERING

Course No.	Course	Hours of Instruction per week			Scheme of Evaluation			Total Marks
					External Evaluation		Sessionals	
		Lectures	Tutorials	Practical	Duration of Exam–hours	Max. Marks	Max. Marks	
MH 321	Management Economics & Accountancy	4	-	-	3	100	50	150
EI 322	Bio-Medical Instrumentation	4	-	-	3	100	50	150
EI 323	Microprocessors & Microcontrollers	3	1	-	3	100	50	150
EI 324	Process Control	3	1	-	3	100	50	150
EC 326	Digital Signal Processing	3	1	-	3	100	50	150
EC 329	Communication Engineering	3	1	-	3	100	50	150
EI 328	Microprocessors & Microcontrollers Lab	-	-	3	3	50	25	75
EC 3210	Digital Signal Processing Lab	-	-	3	3	50	25	75
		20	**4**	**6**				**1050**

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

Economics: Meaning, Definition, Scope: Micro and Macro. Assumptions and Methods. Usefulness. (2 periods)

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 proprietaryship, parthnership concern, cooperative societies joint stock company. Types of partners, Types of joint Stock companies. Merits and Demerits. (6 periods)

MANAGEMENT

UNIT – II

Management: Meaning and Definition. Scope of management – Principles of Management. Scientific management: Definition, Characteristics and Criticism. (4periods)

Functions of Management: Planning; Definition and Process. Organizing Definition of Organization; Characteristics and types. Principles of Organization. Departmentation; Meaning and Fundamentals of Departmentation. Centralization and Decentralization; Definition; features Merits and Demerits. Communication; Process of Communication, Channels, media, and Barriers. (10 periods)

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

Double Entry Book Keeping: definition. Journalization of Transactions. Ledger Posting and Balancing. Preparation of Trial Balance. (10 periods)

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

REFERENCE BOOKS:

1. Modern Economic Theory – K.K.Dewett.
2. Principles and Practice of Management – L.M.Prasad.
3. Introduction to Accountancy – T.S.Grewal.
4. Business Organization and Management – Y.K.Bhushan.

EI 322 BIOMEDICAL INSTRUMENTATION

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

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. **9**

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. **9**

UNIT – III

Blood Pressure: Direct and Indirect measuring techniques of BP.

Blood Flow: Blood measurement by electromagnetic, Doppler and plethysmographic and dilution methods. Pacemaker, Defibrillator and Phonocardiography, diathermy, Arrhythmia monitor. **9**

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

UNIT – IV

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

Electrical Hazards During Bio-Electric Monitoring: Safety, codes, standards Micro and Macro shock and their physiological effects, leakage currents and protection by use of isolation transformer. Equipotential grounding and earth free monitoring.
Electrical factors in Hospital Design: Electrical Power Supply systems in a hospital building, proper installation and grounding for providing safe patient – electrical environment. **9**

TEXT BOOKS:

1. L. Cromwell, *Biomedical Instrumentation*, Prentice Hall of India, New Delhi.

2. Webster, *Medical Instrumentation – Application and Design*, John Wilies, New York.

REFERENCE BOOKS:

1.R.S.Khandpur, *Handbook of Biomedical Instrumentation,* Tata McGraw-Hill, New Delhi

2.L.A.Geddes, *Principles of Applied Biomedical Practice,* Kothari Medical Publications, Bombay.

EC / EI 323 MICROPROCESSORS & MICRCONTROLLERS

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

Lectures: 3
University Examination: 100 marks
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

8051 Microcontroller: Architecture, Instruction set, addressing modes, Assembly language Programming, timers, I/o Ports, interrupts, serial ports, interfacing with LEDS Switches & Stepper Motor. Real Time Clock. **10+3**

TEXTBOOKS:

1. D.V.Hall, *Microprocessors & Interfacing*, Tata McGraw Hill, New Delhi.
2. Yuchangliu, Glen A.Gibson, *Microcomputer Systems. The 8086/8088 family, architecture, programming and design*, Prentice Hall of India, New Delhi.
3. Muhammed Ali Mazidi, *The 8051 Microcontrollers and Embedded systems*, Pearson, New Delhi.

REFERENCE BOOKS:

1. Kennet Ayala, *8086 Microprocessor: Programming & Interfacing with PC*, Penram Publications, Bombay.
2. Brey, *Advanced Microprocessors*, Prentice Hall of India, New Delhi.
3. Kennet Ayala, *The Microcontroller Architecture, Programming and Applications*, Penram Publications, Bombay.

EI 324 PROCESS CONTROL

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

UNIT-I

PROCESS DYNAMICS:
Introduction: Process Variables, Load Variables, Process degree of freedom, Characteristics of Physical Systems, Mathematical Process Modeling of Liquid Processes, gas processes, flow processes and Thermal Processes (with and without dead time) Interacting and Non-Interacting systems, self regulation, servo and regulator problems. (10+3)

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; $1/4^{th}$ 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-for ward 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:

1.G.Stephanoponlos, "Chemical Process Control" – PHI, New Delhi.
2. C.D.Johnson, "Process Control Instrumentation Technology" – PHI, New Delhi.

3. D.p> Eckmann, ‘ Automatic Process Control” – Wiley Eastern Ltd., New Delhi.

REFERENCE BOOKS:

1. D.R.Coughanowr, “Process Systems Analysis and Control” – McGraw Hill, 2nd edition.
2. B.W.Bequette, “Process Control Modelling, Design & Simulation” – PHI, New Delhi.
3. P.Harriott, “Process Control” TMH, New Delhi.
4. Shinskey, “Process Control Design, Applications & Analysis” –
5. G.Liptase, “Process Control” – Vol.3.

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

Basic Elements of Digital Signal Processing, Discrete Time Fourier Transform (DTFT): Definition of DTFT, Properties of DTFT, Magnitude and phase transfer function, steady state response of LTI System to a sinusoidal input,

Discrete Fourier Transform (DFT):- Definition of DFT, Properties of DFT, Inverse Discrete Fourier Transform (IDFT), Relation between DTFT, DFT and z-transform.

Fast Fourier Transform (FFT):- Computational Complexity of DFT, Introduction to FFT, Radix-2 FFT Algorithms, Decimation-in-time FFT Algorithm, Decimation-in-Frequency FFT algorithm,

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

Finite Impulse Response (FIR) Filters: Introduction to FIR filters, Inherent stability of FIR filters, Linear phase in FIR filters, Design of linear phase FIR filters using windows, Rectangular window, Triangular window, Hamming window, Hanning window and Kaiser window. Design of Linear phase FIR filter using frequency sampling method. Comparison of IIR and FIR filters.

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:

1. John G.Proakis & D.G.Manolakis, Digital Signal Processing: Principles, Algorithms and Applications (PHI)
2. A.V.Oppenheim & R.W.Schafer, Discrete-Time Signal Processing (Pearson education, PHI)
3. Digital Signal Processors – B.Venkataramani, M. Bhaskar – TMH.

REFERENCE BOOKS:

1. Sanjit K.Mitra, Digital Signal Processing – A Computer Based Approach (TMH)
2. Lyons, Understanding DSP (Pearson Education)
3. Adreas Antanio, Digital filter Analysis and Design (TMH)
4. L.R. Rabiner & Bearnard Gold, Theory and Applications of Digital Signal Processing.(PHI).

EC 329 COMMUNICATION ENGINEERING

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

Lectures: 3
University Examination: 100 marks
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 Tramitters (9+3)

UNIT-II

Angle Modulation: Instantaneous frequency –phase and frequency Modulation-Single tone FM and its spectral analysis – NBFM and WBFM band width – requirements of NBFM & WBFM – Generation and demodulation of FM waves Balanced slope detectors, phase discriminators, Ratio Detector.

UNIT-III

AM & FM Receivers: TRF, Superheterodyne receivers, RF, IF stages, AGC, AFC, Sensitinly, 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

Noise in Communication System: Thermal Noise – Time domain representation of narrow based noise- signal to noise ration – Noise figure – Equivalent bandwidth.

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:

1. "*Communication Systems"* – Simon Haykin (John Wiley, 1988)
2. " *Principles of Communications"* – Taub and Schilling (McGraw Hill)
3. "*Electronic Communication Systems"* – George Kennedy & Bernard Davis (TMH)

REFERENCE BOOKS:

1. "*Communication Systems"* – Bruce Carlson (McGraw Hill, 1988)
2. "*Analog Communication Systems"* – P.Chakrabarthi (Dhanpatrai & Co.)
3. " *Communication System"* – R.P.Singh, S.D.Sapre (TMH)

EI 328 MICROPROCESSORS & MICROCONTROLLERS LAB

Class:III/IV B.Tech. II –Semester Practicals: 3
Branch: ECE, E&I, EEE University Examination: 50 marks
Duration of University Examination: 3 Hours Sessionals: 25 marks

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
18. Stepper motor, LED, switches – interfacing.

TEXT BOOKS:

1. D.V.Hall, Microprocessors & Interfacing, Tata McGraw Hill, New Delhi.

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

ELECTRONICS AND INSTRUMENTATION ENGINEERING

Course No.	Course	Hours of Instruction per week			Scheme of Evaluation			Total Marks
		Lectures	Tutorials	Practical	External Evaluation		Sessionals	
					Duration of Exam–hours	Max. Marks	Max. Marks	
EI 411	Telemetry & Telecontrol	3	1	-	3	100	50	150
EI 412	Computer Control of Processes	3	1	-	3	100	50	150
EC 413	V.L.S.I. Design	4	-	-	3	100	50	150
EI 414	Analytical Instrumentation	4	-	-	3	100	50	150
EI 415	Professional Elective – I	4	-	-	3	100	50	150
EI 416	Computer Aided Digital Design Lab (CADD)	-	-	3	3	50	25	75
EI 417	Project Work & Seminar	-	-	3	-	-	50	50
		18	**2**	**6**				**875**

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

Basics of Satellite Telemetry: Satellite Communication System, Satellite transmitter power, Typical TT & C system for spacecraft, Digital transmission system in satellite telemetry, TT & C – subsystems, Multiple access techniques – FDMA, TDMA, CDMA.
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.
TELECONTROL METHODS: Analog and Digital techniques in Telecontrol, Telecontrol apparatus – Remote adjustment, Guidance and regulation – Telecontrol using information theory. – Example of a Telecontrol System.

TEXT BOOK:

1. D.Patranabis, *Telemetry Principles* ,Tata McGraw-Hill,New Delhi.
2. Telecontrol Methods and Applications of Telemetry and Remote control – by Swoboda G., Reinhold Publishing Corp., London, 1991.
3. Gruenberg, E.L, *Handbook of Telemetry And Remote Control*,McGraw Hill, New York.

REFERENCE BOOKS:

1. Foster, *Telemetry Systems* L.E., John Wiley, New York.
2. Nichols.M.H, L.L Rauch, *Radio Telemetry*, John Wiley, New York.
3. Telemetry Engineering – by Young R.E., Little Books Ltd., London Intl, Englewood cliffs, New Jersey, 1987.

EI 412 COMPUTER CONTROL OF PROCESSES

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

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, spate 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

DISCRETE STATE PROCESS CONTROL: Introduction, Discrete – State Variables, Continuous Control Versus Discrete Control, Composite Discrete / Continuous Control. Process specifications: Process objectives, Process hardware, Event Sequence Description, Ladder Diagram: Elements, Examples, Programmable Logic Controller (PLC) & its operation.

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

TEXT BOOKS:

1. C.D. Johnson, " Process Control Instrumentation Technology", PHI, New Delhi.

2. B.C.KUD, " Digital Control Systems", II-Edn., Oxford University Press, New York.
3. M.Gopal, "Digital Control & State Variable methods", TMH, New Delhi.

REFERENCE BOOKS:

1. K.Ogata "Discret Time Control Systems", PHI, New Delhi.
2. G.Liptak, "Process Control: Hand Book" Vol.3.
3. G.Stephnapoulous", Chemical Process Control", PHI, New Delhi.
4. A.Srivastava, "Exploring PLC's and its Applications", BPB Publishers.
5. C.L.Sunith, "Digital Computer Process Control", Indent Educational Publishers, 1972.

EC 413 VLSI DESIGN

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

UNIT-I

Review of Micro electronics 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. 9

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. 9

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. 9

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. 9

TEXT BOOK:

1. **Dourglas A Pucknell & Kamran Eshraghian**, *Basic VLSI Design.*

REFERENCE BOOK:

1. **Neil H E Weste & Earman Eshraghian**, *Principles of CMOS VLSI Design.*

EI 414 ANALYTICAL INSTRUMENTATION

Class: **III/IV B.Tech. I Semester** *Lectures:* **4**
Branch : **E&I** *University Exam. :* **100 marks**
Duration of University Examination : **3 hours** *Sessionals :* **50 marks**

UNIT – I

Properties of Electromagnetic radiation, Electromagnetic Spectrum, Energy Levels, Nuclear and Electron spin behaviour.
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

Fluorescence and Phosphorescence spectrophotometry – Principle and measurement of fluorescence and Phosphorescence, quenching, Spectrofluorimeters and phosphorimeters, flame photometers, X-Ray Methods – X-Ray absorption, X-Ray Fluorescence and X-Ray diffraction methods, NMR spectroscopy – Basic principles, continuous wave NMR spectrometer, pulsed Fourier transform NMR spectrometer.

UNIT-III

Polarimetry – plane polarization, optical activity, polarimeter, Applications of polarimetry Mass Spectrometry – Inlet Sample systems, Ionization methods, mass analyzers, Ion-collection systems, Fourier Transform mass spectrometry, Tandem Mass Spectrometry. Electrochemical methods – Electrochemical cell, types of electrodes, potentiometers, conductivity meters.
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 Chromatographys - 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)
2. Hand Book of "Analytical Instruments" – R.S. Khandpur (TMH)

REFERENCE BOOKS:

1. "Instrumental Methods of Chemical Analysis" – Galen.W.Ewing – McGraw Hill.

EI 415 (A) DIGITAL IMAGE PROCESSING

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

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, Hodamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling (K-L) Transform **9+3**

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. **9+3**

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, Transform coding **9+3**

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 **9+3**

TEXT BOOKS:

1. R.C.Gonzalez and R.E. Woods, ***Digital Image processing***, Pearson Education, New Delhi.
2. B.chanda, D.Dutta Majumder, *Digital image processing and analysis*, Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. Nick Efford, *Digital Image Processing Using Java* , Pearson Education, New Delhi.
2. Gregory Baxes, *Digital Image Processing: Principles and Applications*, John Wiley & Sons, New York.

EI 415 (B) NEURAL NETWORKS & FUZZY LOGIC

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

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. **9**

UNIT – II

Neural Network Paradigms: McCulloch – Pitts Model, The perception, ADALINE and MADALINE Models, Winner – Takes – All Learning algorithm, Back-propagation Learning Algorithm, Cerebellum Model Articulation Controller (CMAC), Adaptive Resonance Theory (ART) paradigm, Hopfield Model, Competitive Learning Model, Memory – Type paradigm, Linear Associative Memory, Real – Time Models, Linear Vector Quantization, Self-organizing Map, Probabilistic Neural Network, Radial Basis function, Time-Delay Neural Net, Congnitron and Neo congnitron Models, Simulated Annealing, Boltzmann Machine. **9**

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 **9**

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. **9**

TEXT BOOK:

1. Stamatios V. Kartalopoulos, *Understanding Neural Networks & Fuzzy Logic*, Prentice Hall of Inida, (IEEE Press), New Delhi.

REFERENCE BOOKS:

1. Hassoun,*Fundamentals of Artificial Neural Networks,* Prentice Hall of India, New Delhi.
2. Anderson, *Introduction to Neural Networks*, Prentice Hall of India, New Delhi.
3. Kosko, *Neural Networks and Fuzzy Systems*, Prentice Hall of India, New Delhi.
4. Junhong Nie & Derek Linkens, *Fuzzy-Neural Control*, Prentice Hall of India, New Delhi.
5. George J.Klir & Bo Yuan, *Fuzzy sets and Fuzzylogic,* Prentice Hall of India, New Delhi.

EI 415 (C) COMPUTER NETWORKS

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

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.

Circuit Switching: Switched Networks, Circuit-Switching Networks, Switching Concepts, Routing in Circuit-Switched Networks, Control Signaling.

Protocols and Architecture: Protocols, OSI, TCP/IP Protocol Suite. **9**

UNIT – II

Packet Switching: Packet-Switching Principles, Routing, Congestion Control, X.25.
Frame relay: Background, Frame Relay Protocol Architecture, Frame Relay Call Control, User Data Transfer, Network Function, Congestion Control.
Asynchronous transfer mode: Protocol Architecture, ATM Logical Connections, ATM Cells, Transmission of ATM Cells, ATM Adaptation Layer, Traffic and Congestion Control. **9**

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, ATMLANs, Fiber Channel, Wireless LANs.
Bridges: Bridge Operation, Routing with Bridges, ATM LAN Emulation.
9

UNIT – IV

Internetworking: Principles of Internetworking, Connectionless Internetworking, The Internet Protocol, Routing Protocol, Ipv6, ICMPv6.
Transport Protocols: Transport Services, Protocol Mechanisms, TCP, UDP.
Network Security: Security Requirements and Attacks, Privacy with Conventional Encryption, Message Authentication and Hash Functions, Public-Key Encryption and Digital Signatures, IPv4 and IPv6 Security.
9

TEXT BOOK:

1. William Stallings, *Data and Computer Communications, 6/e*, Prentice Hall of India, New Delhi.

EI 415 (D) OPTICAL INSTRUMENTATION

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

Lectures: 4 Hours
Sessionals: 50 marks
Univ. Examination: 100 marks

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

Optical Fiber Sensors: Introduction, Advantages of Optical Sensors, Optical Modulation schemes, general configuration of intensity modulated sensor and its alignment characteristics shutter / Schlieren Multimode optical sensors, Reflective fiber optic sensors, microbend optical fiber sensors, intensity modulated fiber optic thermometers, Application of interferometric optical fiber sensors.

UNIT – IV

Laser Fundamentals: Interaction of matter with E.M. radiation, Absorption, Spontaneous and stimulated emission, Einsteins coefficients, population inversion, pumping schemes, Energy level diagrams, different types of lasers, Industrial and Non Industrial applications of lasers.

Text Books:

1. Gerd Keiser: Optical Fiber Communications – 3rd edition – McGH, publications.
2. Bishnu .P.PAL - Fundamentals of Fiber Optics in Telecommunication and Sensor Systems – New Age International Ltd.,
3. Thyagarajan K and Ghatak A.K. Lasers: Theory and Applications : Plenum Press , New York.

Reference:

1. Ghatak A.K. and Thyagarajan . K: Optical Electronics – Foundation Books.
2. Das P.Springers : Lasers and Optical Engineering – International Students Edition.

EI 416 COMPUTER AIDED DIGITAL DESIGN LAB

Class: IV/IV B.Tech. I -Semester — Practicals : 3 hours
Branch: EIE — Univ. Examination : 50 marks
Duration of Univ. Examination: 3 Hours — 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 netlistextraction, 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

Course No.	Course	Hours of Instruction per week			Scheme of Evaluation			Total Marks
		Lectures	Tutorials	Practicals	External Evaluation		Sessionals	
					Duration of Exam–hours	Max. Marks	Max. Marks	
EI 421	PC Based Instrumentation	4	-	-	3	100	50	150
EI 422	Professional Elective – II	4	-	-	3	100	50	150
EE 425	Industrial Electronics	4	-	-	3	100	50	150
EI 424	Process Control Lab	-	-	3	3	50	25	75
EI 426	Project Work & Seminar	-	-	8	Viva-Voce & Report	100	150	250
		12	**-**	**11**				**775**

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 **Lectures**: 4
Branch: E&I **University Examination**: 100 marks
Duration of University Examination: 3 Hours **Sessionals**: 50 marks

UNIT-I

INTRODUCTION: PC is in automated Measurement & Control Systems, Evolution of PC family, subsystems of PC, IBM-PC XT/AT, Hardware and Software Elements of PC-based instrumentation.

CPU Characteristics: Summary of INTEL 80286, 80386 and 80486 Processors, Pentium are litecture, architecture. Internal operations special Pentium instructions and addressing modes. (9)

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. (9)

UNIT – III

Bus Standards: Introduction to Micro Computer Buses, Bus Communication Protocols, bus topologies, Bus control Signals; Data transter control Signals, Bs allocation Control Signals; device Synchronization Control Signals, Bus Utility Signals, Introduction to GPIB, mod-Bus Con-Bus, ISA bus. (9)

UNIT – IV

Study of Standard I/o bus slots: I/o Ports, Parallel & Sarial 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 care study.

Introduction to Micro Processor & Micro Controller based system design; Implantation of simple control loops for temperature level & flow. (9)

TEXT BOOKS:

1. James.L.Antonakos, The Pentium Microprocessors, Pearson Education, New Delhi.
2. IBM PC-AT Technical Reference
3. Arthur L.Dexter, Micro Computer Bus Structures & Bus Interface Design, (Marlel Dekker)

REFERENCES BOOKS:

1. Berry B.Brey, Advanced Microprocessors, Pearson education, New Delhi.
2. IBM PC and its Colnes, Trouble shooting & Mantaince, Tata McGraw Hill, New Delhi.

EI 422 (A) EMBEDDED SYSTEM DESIGN

Class: B.Tech. IV/IV – II Semester | Lectures: 4 Hours
Branch: EIE | Sessionals: 50 marks
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 'I^2C','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

Program Modeling Concepts in Single and Multiprocessor Systems Software-Development Process : Modeling Processes for Software Analysis Before Software Implementation, Programming Models for Event Controlled or Response Time Constrained real Time Programs, Modeling of Multiprocessor Systems.

Software Engineering Practices in the Embedded Software Development Process: Software Algorithm Complexity, Software Development 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).

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.

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 RTOS's, 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.LB 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 Synchronisation between the Processes , ISR's , OS Functions and Tasks and for Resource Management, Embedded Linux Internals : Linux Kernel for the Device Drivers and Embedded System, OS Security Issues, Mobile OS.

TEXT BOOK:

1) "Embedded Systems", Raj Kamal, Tata McGraw Hill, 2003.

REFERENCE BOOKS:

1) "Fundamentals of Embedded Software-where C and Assembly meet", Daniel W.Lewis, Pearson Education, 2002.
2) "Programming Embedded Systems", Dream Tech Software Team, John Wiley Pub, 2004.

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 **9**

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. **9**

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. **9**

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 **9**

TEXT BOOK:

1. D.Patranabis, *Sensors & Transducers*, Wheeler Publishers, Allahabad.

REFERENCE BOOKS:

1. Middlehoek.S and Audel S.A, *Silicon Sensors*, Academic Press, London.
2. Edmonds T E, *Chemical Sensors*, Balckie, London.

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. **9**

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. **8**

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. **9**

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).
CAD/CAM Systems: Elements of CAD/CAM Systems. **10**

TEXT BOOKS:

1. Bolton.W, *Mechatronics, 2/e* Addison Wesley, New York, 1999.
2. HMT, *Mechatronics,1/e,* Tata McGraw-Hill, New Delhi,2000.

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. **9**

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. **9**

UNIT – III

Adaptive Signal Processing: Adaptive Systems, Open and closed loop adaptations, General form of adaptive linear combines, performance surface, gradient and minimum mean-square error, input correlation matrix, eigen values and eigen vectors of correlation matrix, Gradient search methods, Simple gradient search algorithm and its solution, learning curve, newton method, Method of Steepest descent; Gradient component estimation – derivative measurement, Variance of gradient estimate, Weight-vector solution, mis adjustment. **9**

UNIT – IV

Adaptive Algorithms & Structures: Derivation of LMS algorithm, Convergence of weight vector, learning curve, noise in the weight-vector solution, mis adjustment, comparison of steepest descent and LMS algorithms, Z-transform in adaptive signal processing – Correlation function and power spectra, performance function, performance surfaces; LMS/Newton algorithm, sequential Regression (SER) algorithm, Linear Random Search (LRS), Adaptive recursive filters, Lattice Structures **9**

TEXT BOOKS:

1. John. G. Proakis, D.G. Manolakis, *Digital Signal Processing*: *Principles, Algorithms & Applications,*Prentice Hall India,New Delhi.
2. Bernard Widrow, S.D. Stearns, *Adaptive Signal Processing*, Pearson Publication, New Delhi.

REFERENCE BOOKS:

1. S. K. Mitra, Digital Signal Processing: A Computer Based Approach, Tata McGraw-Hill, New Delhi.
2. L.R. Rabiner & B. Gold, *Digital Signal Processing*, Prentice Hall of India, New Delhi.
3. A.V.Oppenheim & R.W. Schafer, *Digital Signal Processing*, Pearson Publication, New Delhi.