COURSE STRUCTURE

&

SYLLABUS
(3rd – 8th SEMESTER)

FOR B.TECH PROGRAMME
IN
APPLIED ELECTRONICS
&
INSTRUMENTATION ENGINEERING

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY ORISSA,
ROURKELA

2007 - 2008

COURSE STRUCTURE
SECOND YEAR B.TECH PROGRAMME
APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING

3rd Semester				4th Semester			
Theory		*Contact Hrs.*	*Credit*	*Theory*		*Contact Hrs.*	*Credit*
		L-T-P				**L-T-P**	
BSCM 2201	Mathematics - III	3-1-0	4	BSCM 2202	Mathematics - IV	3-1-0	4
BENG 1208	Fluid Mechanics & Hydraulic Machines /	3-1-0	4	BENG 1201	Electrical Machines	3-1-0	4
	or				or		
CPES 5201	Network Theory			CPES 5201	Network Theory /		
	or			BENG 1208	Fluid Mechanics & Hydraulic Machines		
BENG 1201	Electrical Machines						
BSCP 2201	Physics - II /	3-0-0	3	BSCC 2201	Chemistry - II /	3-0-0	3
BSCP 2202	Physics of Semi-Conductor Devices			BSCC 2202	Material Sciences		
	or				or		
BSCC 2201	Chemistry - II /			BSCP 2201	Physics - II /		
BSCC 2202	Material Sciences			BSCP 2202	Physics of Semi-Conductor Devices		
BCSE 3201	Object Oriented Programming	3-0-0	3	BCSE 3202	Relational Database Management System	3-0-0	3
HSSM 4201	Engineering Economics & Costing	3-0-0	3	HSSM 4202	Organisational Behaviour	3-0-0	3
	or				or		
HSSM 4202	Organisational Behaviour			HSSM 4201	Engineering Economics & Costing		
CPES 5202	Analog Electronics Circuit	3-1-0	4	CPES 5203	Digital Electronics Circuit	3-1-0	4
	Total		**21**		**Total**		**21**
Practicals/Sessionals		*Contact Hrs.*	*Credit*	*Practicals/Sessionals*		*Contact Hrs.*	*Credit*
BENG 9202	Basic Electronics Laboratory	0-0-3	2	BENG 9201	Basic Electrical Engineering Laboratory	0-0-3	2
	or				or		
BENG 9201	Basic Electrical Engineering Laboratory			BENG 9202	Basic Electronics Laboratory		
BCSE 9201	Computer Lab (OOP)	0-0-3	2	BCSE 9202	Computer Laboratory (RDBMS)	0-0-3	2
BENG 9203	Mechanical Engineering Lab.	0-0-3	2	CPES 9201	Network & Devices Laboratory	0-0-3	2
	or						2
CPES 9201	Network & Devices Laboratory				or		
				BENG 9203	Mechanical Engineering Lab.		
CPES 9202	Analog Electronics Laboratory	0-0-3	2	CPES 9203	Digital Electronics Laboratory	0-0-3	2
			8				**8**
	Total		**29**		**Total**		**29**

L-Lecture **T-Tutorial** **P-Practical**

3rd Semester

BSCM 2201 MATHEMATICS - III (3-1-0)

Module - I (9 Lectures)

Partial differential equations : The vibrating string. The wave equation & its solution.
The Heat equation and its solution

Module - II (10 Lectures)

Two - dimensional wave equation and its solution.
Laplace equation in polar, cylindrical and spherical coordinates. Potential.

Module - III (13 Lectures)

Complex analysis : Complex numbers and functions conformal mappings
Complex integration. Cauchy's Theorem Cauchy's integral formulas.

Module - IV (8 Lectures)

Taylor's and Laurent's series, Residue theorem, evaluation of real integrals.

The Course covered by : Advance Mathematics by E. Kreyszig, John Wiley & Son's (P) Ltd. (8th Edition)
Chapter 11 (except 11.6)
Chapter 12, 13, 14, 15

BENG 1208 - FLUID MECHANICS AND HYDRAULIC MACHINE (3-1-0)

Module – I (12 hours)

Introduction : Scope of fluid mechanics and its development as a science
Physical property of Fluid
Density, specific gravity, specific weight, specific volume, surface tension and capillarity, viscosity, compressibility and bulk modulus, Fluid classification.

Fluid static

Pressure, Pascal's Law, Pressure variation for incompressible fluid, atmospheric pressure, absolute pressure, gauge pressure and vacuum pressure, monometer.
Hydrostatic process on submerged surface, force on a horizontal submerged plane surface, force on a vertical submerged plane surface.

Module – II (12 hours)

Buoyancy and flotation, Archimedes' principle, stability of immersed and floting bodies, determination of metacentric height.
Fluid kinematics : Introduction, description of fluid flow, classification of fluid flow. Acceleration of fluid particles, flow rate and continuity equation, differential equation of continuity.
Fluid dynamics : Introduction, Euler's equation along a streamline, energy equation, Bernoulli's equation, Analysis of finite control volumes and its application to siphon, venture meter, orifice meter

Module – III (6 hours)

Turbine : Classification, reaction, Impulse, outward flow, inward flow and mixed flow turbines, Francis & Kaplan turbines, Pelton wheel, Physical description and principle of operation, Governing of Turbine.

Module – IV (8 hours)

Centrifugal Pump : Principles of classification, Blade angles, Velocity triangle, efficiency, specific speed, characteristics curve.
Reciprocating Pump : Principles of working, slip, work done, effect of acceleration and frictional resistance, separation

Text Books

1. Fluid Mechanics, A.K. Mohanty, PHI
2. Introduction to Fluid Mechanics and Fluid Machines, S.K. Som and G. Biswas, TMH
3. Fluid Mechanics, Modi & Seth

CPES 5201 NETWORK THEORY (3-1-0)

MODULE - I (12 hours)

Topological description of networks; Reviews of mesh & nodal analysis. Reciprocity & Millman's theorem, Maximum power transfer theorem.

Q factor, Bandwidth and Selectivity in Series & parallel resonance Circuits.

Coupled Circuits : Dot Convention for representing coupled circuits, coefficient of coupling.

Loop Analysis of coupled circuits, single and double tuned coupled circuits Transiet study in RLC networks by Laplace transform method with DC and AC excitation.

Response to step, impulse and ramp inputs S - domain circuits

Two Port networks : Z, Y, h, & ABCD representation of T and TT2 - port networks both in transmission parameters T - TT networks, 2 port network, Cascade and Parallel Connections.

Image and iterative impendances.

MODULE - II (12 hours)

Network Functions & Responses :

Concept of complex frequency, driving point and transfer functions for one port and two network, poles & zeros of network functions, Restriction on Pole and Zero locations of network function. Impulse response and complete response. Time domain behaviour form pole-zero plot.

Filters : Design of low pass, high pass, band pass & band elimination filters. Active filters. Input Power, Power Transfer and Insertion loss.

Problems in Optimizing power transfer; Insertion loss.

MODULE - III (10 hours)

Fourier Series & Fourier Transforms : Fourier Series representation of non sinusoidal waves. Discrete spectra, rms values of non sinusoidal waves, Steady state response of linear circuits to non sinusoidal waves, power in such circuits. Fourier Internal and Fourier transform of signum and step functions. Applications to RL and RC circuits.

Network Synthesis :

Driving point functions, properties of positive real function.

MODULE - IV (8 hours)

Foster's reactance Theorem, Synthesis of LC, RC and RL networks by Cauer - I, Cauer - II, Foster - I, & II forms. Synthesis of active filters - Butterworth and Chebyshev Techniques.

TEXT BOOKS

1. Network Analysis : M.E Van Valkenbrg
2. Network Analysis & Synthesis : Franklin F. Kua Second Edition

REFERENCE BOOKS :

1. A Course in Electrical Circuits and Analysis : M. L. Soni, J. C. Gupta
2. Network Synthesis : M. E. Van Valkenberg
3. Eloectrical Networks : Alexander & Sadiku

BENG 1201 ELECTRICAL MACHINES (3-1-0)

Module I (10 Lectures)

D.C Mechanics :

D.C Generator – construction and principle of operation, E.M.F. equation ; types of generator; no load and load characteristics; Voltage build-up of shunt

Generator; voltage regulation, Application.

D.C Motor –construction and principle of operation ; back E.M.F; torque and speed equations; characteristics and performance curves; speed control of series and shunt motors; motor starters; industrial application.

Losses and Efficiency of D.C machines.

Module II (10 Lectures)

Transformer:

Single phase – construction and principle of operation; E.M.F. equation; Phasor diagram; actual and approximate equivalent circuits; open and short circuit tests, voltage regulation; losses and efficiency.

Three Phase – Construction and principle of operation; connection of three single –phase units in wye, delta, open delta configurations; Autotransformer; conventional transformer connected as Autotransformer. Special Transformers – induction heating and high impedance and high frequency transformer.

Module III (10 Lectures)

Synchronous Machines :

Three- phase alternators – construction and principle of operation; E.M.F. equation; distribution and pitch factors; Synchronous reactance; performance of alternators on no-load and load; Phasor diagram; voltage regulation, power calculations of turbine and hydro-generators,; synchronization of a generator.

Three-Phase Synchronous Motor- construction and principle operation; V- curves; Phasor diagram; methods of starting; applications.

Module IV (10 Lectures)

Three-Phase induction Motor- construction of slip ring and squirrel cage type induction motors; Phasor diagram and equivalent circuit; torque-slip characteristics; maximum torque calculations; open and short-circuit tests; losses and efficiency; starting of induction motors; speed control; Induction generator.

Single-Phase Induction Motor- construction and principle of operation; capacitor- start and capacitor-run motors; Universal motor; Stepper motors.

Books :

1. Electrical Machines, Drives and Power Systems, 5th edition by Theodore Wildi (Pearson) : Text.
2. Electrical Machinery by A.E. Fitzerald and Charles Kingsley, Jr., and S.D. Umans, Tata McGraw Hill Publication.
3. Principles of Electric Machines by V.K Meheta and R. Meheta , S. Chand Publication.

BSCP 2201 PHYSICS - II (3-0-0)

This one semester Physics course is divided into four units. The unit - I deals with some aspects of nuclear physics, unit - II introduces certain features of condensed matter physics, unit - III

deals with certain aspects of semiconductors and superconductors and unit - IV introduces Opto-electronic devices and fibre-optic communication system.

Unit - 1

This unit covers the basic principles and applications of different types of accelerators and their important applications.

Detailed constructional features of accelerators are not necessary.

1. Need for nuclear accelerators.
2. D.C. Accelerators : Cockcroft - Walton, Van de Graff, Tandem accelerators.
3. RF accelerators : Linear accelerator, cyclotron, electron accelerator, betatron.
4. Application of nuclear accelerators - production of radioisotopes, radiation processing of materials, medical applications.

Unit - 2

This Unit deals with diffraction in crystals and its role in determining crystal structure.

Study of crystal structure by diffraction methods, Bragg's condition for crystal diffraction, Lau condition, Miller indices, Reciprocal lattice, Geometrical structure factor, Atomic form factor.

Unit - 3

This unit deals with certain features of semiconductors and superconductors.

1. Energy bands in solids: Kronig - Penny model, allowed bands and forbidden gaps, elemental and compound semiconductors.
2. Superconductivity : Superconductors and their properties, Meisner effect, Type - I and Type - II Superconductors, Thermodynamic properties of superconductors, London equation, Application of superconductors.

Unit - 4

This unit introduces some Opto - electronic devices and fibre - optic communication system.

Laser : Principle of lasing, properties of Laser, construction and working of semiconductor laser, Application of laser.

LED : Principle construction of operation and application, Introduction to fibre optics, basic characterstics of optical fibres, optical fibre communication system.

Books Recommended

1. Nuclear Physics, P. R. Roy & B. P. Nigan
2. Particle Accelerators, M. S. Livingston & J. P. Blewett
3. Concepts of Modern Physics, A. Beiser
4. Introduction to Solid State Physics, C. Kittel
5. Introduction to Lasers, A. Avadhnulu
6. Physics - II, B. B. Swain and P. K. Jena.

BSCP 2202 PHYSICS OF SEMICONDUCTOR DEVICES (3-0-0)

Module I (9 hours)

An appreciation of Quantum Mechanics in determining electrical properties of semiconductor.

The Semiconductor in Equilibrium :

Equilibrium distribution of electrons & holes, the n0 and p0 equation, intrinsic carrier concentration; Do pant atoms and energy levels, ionization energy; the extrinsic semiconductor, the n0 p0 product, position of Fermi-energy level, variation of EF with doping concentration and temperature.

Carrier Transport Phenomena :

Carrier drift: mobility, conductivity, velocity saturation:
Carrier Diffusion: Diffusion current density. Total current density. The Einstein relation.

Module II (9 hours)

Non-equilibrium Excess Carrier in Semiconductor

Excess carrier generation and recombination, characteristics of excess carriers-continuity equation and time – dependent Diffusion equation. Ambipolar Transport – Derivation of equation and applications.

The Pn junction and Diode

Basic structure, built-in potential barrier, Electric field, space charge width; Reverse applied bias-space charge width and Electric field. Junction capacitances.
Pn junction Diode : Ideal – current voltage relationship, Minority Carrier distribution, Ideal Pn junction currents under forward and reverse bias.

Module III (9 hours)

Pn junction diode (contd.):

Temperature effects, Small signal model of Pn junction, Equivalent circuits Recombination Current. Junction Breakdown.

Metal-Oxide- Semiconductor FET (MOSFET)

The MOS structure : Energy band diagrams, Depletion Layer thickness, Work function difference, Flat band Voltage, Threshold Voltage, Charge distribution, Capacitance –Voltage characteristics.

The basic MOSFET operation, Current –Voltage relation (Concepts)

Frequency limitation : Small signal Equivalent circuit.

The CMOS Technology.

Module IV (8 hours)

The Bipolar Transistor

Basic Principle of Operation., Simplified Transistor Current Relation. Modes of operation, Amplification with Bipolar transistors, Minority Carrier distribution Forward active mode, other modes of operation. Low Frequency Common Base Current gain,. Non-ideal effects –Base width Modulation, Breakdown Voltage. Equivalent Circuit Models –Eber's –Moll Model, Hybrid- Pi model. Frequency limitation. Large Signal Switching characteristics.

Text Book :

1. Semiconductor Physics and Devices- Basic Principles BY Donald A. Neamen, 3rd Edition, Tata McgrawHill Edition. (Selected portion from chapters 2,4,4,6,7,8,10 &11.)

For additional reading :

2. Solid state Electronics Devices – y Ben G. Strectman and Sanjay Benerjee, 5th Edition, Pearson Edu.

BSCC 2201 CHEMISTRY - II (3-0-0)

Module I (12 Lectures)

(To develop awareness about Water Treatment)

Water quality parameters and standards.

Hardness of Water : Types of hardness, Units of hardness, Determination of hardness. Disadvantages of hardwater, acidity and alkalinity, Water Softening Techniques. Boiler feed water, Water for Domestic purposes (municipal / Drinking Water)

Module II (16 Lectures)

(To develop the basic concepts about the transition metal compounds and corrosion)

1. Corrosion :

Dry and wet corrosion, Galvanic Corrosion, Stress Corrotion, Factors affecting corrosion, Corrosion Control : (Proper design and fabrication procedure, Cathodic protection, Passivation).

(8 Lectures)

2. Polymers :

Nomenclature and classification, Thermoplastic and thermosetting resins, Some typical useful polymers:Polyethylene,PVC, polystyrene, PMMA, Nylon 6:6, Nylon 6, Bakelite, Terylene, Silicones. Natural and synthetic rubbers: Neoprene, Butyl and Polyuarethane rubber, Vulcanization.

(8 Lectures)

Module III (10 Lectures)

(To introduce the students about the basic concepts of fuels)

1. Fuels:

   Classification of fuels, calorific value, Analysis of Coal and Coke, Refining of Crude oil, Fractional distillation, Cracking, Knocking and antiknocking, Octane and Cetane number.

   Gaseous Fuel : Prodcer gas, Water gas, LPG & CNG.

   Cobustion Calculation.

Module IV (10 Lectures)

(To develop awareness amongst the students about the importance of water quality in domestic and industrial world and concepts of various kinds of pollutions)

1. Water Treatment:

   Water quality parameters and standards, treatment of water for industrial and domestic purpose.

2. Environment pollution:

   Green house effect, acid rain, depletion of ozone layer; Water pollution- bio chemical effect of lead, arsenic, mercury and fluorides, sewage-B.O.D. and C.O.D.

Books:

1. Organic Chemistry by Morrison and Boyd, 5th/6th Ed., Prentice Hall.
2. Organic Chemistry by Solomons and Fryhle, Wiley Publishing
3. Guide to Organic Reaction Mechanism by Peter Sykes
4. Concise Inorganic Chemistry by J. D. Lee, 4th/5th Ed. ELBS

5. Inorganic Chemistry by D. F. Shriver, P. W. Atkins, C. H. Langaford ,Oxford, 1990
6. A Text Book on Engineering Chemistry by B. Pani, Galgotia Publication.
7. Engineering Chemistry by P. C. Jain and M. Jain.
8. Engineering Chemistry by R. Gopalan, D. Venkapaya and S. Nagarajan, Vikas Publishing House.

BSCC 2202 MATERIAL SCIENCES (3-0-0)

MODULE - I (10 Lectures)

1. Classification of Engineering Materials. Engineering properties of materials. Selection of Materials.
2. Electron theory of solids : Free electron theory of metals. Electrical conductivity; Thermal conductivity, Quantum theory of free electrons. Band theory of solids, Conductivity of metals
3. Conductors, Insulators, Semiconductors, Intrinsic and extrinsic semiconductors, Band theory of semi conductors Hall effect.
4. Super Conductors - Zero resistivity, Critical magnetic field and critical current density. Type I and II super conductors. Applications of Supercoductors.

MODULE - II (10 Lectures)

5. Dielectric Materials : Microscopic Displacement of atoms and molecules in an external dc electric field, Polarization and dielectric constant, Dielectric susceptibiity. Temperature dependence, Dielectric Breakdown. Ferro electric material Piezoelectrics, Pyroelectrics, Dielectric Materials as electrical isulators.
6. Magentic Properties of Materials : Dia, Para and Ferro magenetic materials. Theory of magnetism, Ferro magnetic materials or Ferrites, Comparison of magnetic behaviour and magnetic parameters of Dia, Para and Ferro magnetic materials.
7. Optical Properties of Materials : Scattering, Refraction, Theory of Refraction and absorption, Atomic Theory of optical properties. Lasers, Optical fibres - Principle, structure, application of optical fibre.

MODULE - III (10 Lectures)

8. Organic Materials : Polymers - Mechanism of Polymerization : Addition, condensation and co-polymerisation, applications.

   Plastics - Types : Thermosetting and thermoplastics. Transfer moulding, injection moulding, extension moulding, Blow moulding, Welding of plastics; Rubber types, application.
9. Ceramics : Types, Structure, Mechanical properties, applications

MODULE - IV (10 Lectures)

10. Composite Materials : Agglomerated Materials : Cermets, Reinforced Materials : Reinforced Concrete. Glass fibre reinforced plastics, Carbon fibre reinforced plastics. Whiskers, fibre reinforced plastics, Laminated plastic sheets. Tufnol, Properties of composites. Metal matrix composites, manufacturing procedure for fibre reinforced composites.
11. Performance of Materials in Service : Service performance, failure, design considerations, Corrosion - types, (Atmospheric, Pitting, Stress Corrosion), Control & prevention, protective coating, Performance of metals and Ceramics at high temperature.

Text Books :

1. Callister W.D., Materials Science and Engineering, John Wiley & Sons.
2. Vijaya M. S., Rangarajan G, Materials Science, TMH
3. Rajendra V., Marikani A., Materials Science, TMH
4. Van Vlack L. H., Elements of Material Science and Engineering, Addison Wesley
5. Material Science, Raghavan
6. Processes and Material of manufacture : Lindberg, PHI.

BCSE 3201 OBJECT ORIENTED PROGRAMMING USING C++ (3-0-0)

Module I (10 hours)

Introduction to object oriented programming, user defined types, polymorphism, and encapsulation. Getting started with C++ -syntax, data-type, variables, strings, functions, exceptions and statements, namespaces and exceptions, operators. Flow control, functions, recursion. Arrays and pointers, structures.

Module II (10 hours)

Abstraction mechanisms: Classes, private, public, constructors, member functions, static members, references etc. Class hierarchy, derived classes.
Inheritance: simple inheritance, polymorphism, object slicing, base initialization, virtual functions.

Module III (12 hours)

Prototypes, linkages, operator overloading, ambiguity, friends, member operators, operator function, I/O operators etc.
Memory management: new, delete, object copying, copy constructors, assignment operator, this input/output.
Exception handing: Exceptions and derived classes, function exception declarations, Unexpected exceptions, Exceptions when handling exceptions, resource capture and release etc.

Module IV (8 hours)

Templates and Standard Template library: template classes, declaration, template functions, namespaces, string, iterators, hashes, iostreams and other type.
Design using C++ design and development, design and programming, role of classes.

Text Books :

1. Bhave & Patekar- Object oriented Programming with C++, Pearson Education
2. Ashok N. Kamthane- Object oriented Programming with ANSI & Turbo C++, Pearson Education.
3. Robert Lafore- Object oriented programming in Microsoft C++.
4. Balguru Swamy-C++, TMH publication

HSSM 4201 ENGINEERING ECONOMICS AND COSTING(3-0-0)

Module I (10 hours)

Time value of money : Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time –value equivalences.

Present worth comparisons, Comparisons of assets with equal, unequal and infite lives, comparison of deferred investments, Future worth comparison, pay back period comparison.

Module II (10 hours)

Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions. Analysis of public Projects : Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis.

Module III (10 hours)

Depreciation, Computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models. Sensitivity analysis: single and multiple parameter sensitivity.

Module IV (12 hours)

Fixed and variable cost, Product and Process Costing, Standard Costing, Cost estimation, Relevant Cost for decision making, Cost estimation, Cost control and Cost reduction techniques.

Text Book

1. Horn green, C.T., Cost Accounting, Prentice Hall of India
2. Riggs, J.L ., Dedworth, Bedworth, D.B, Randhawa, S.U. Engineering Economics, McGraw Hill International Edition, 1996 (Chapter 2,3,4,5,7,8,9,11,12)

HSSM 4202 ORGANIZATIONAL BEHAVIOUR (3-0-0)

Module I (8 hours)

The Study of Organizational Behaviour : Learning objectives, Definition and Meaning, Why Study OB, An OB Model, New Challenges for OB Manager.
Learning – Nature of Learning, How Learning occurs, Learning and OB.
Case Analysis

Module II (10 hours)

Foundations of Individual Behaviour : Personality – Meaning and Definition, Determinants of Personality, Personality Traits, Personality and OB.
Perception – Meaning and Definition, Perceptual Process, Importance of Perception in OB. Motivation – Nature and Importance, Hertzberg's Two Factor Theory, Maslow's Need Hierarchy Theory, Alderfer's ERG Theory, Evaluations.
Case Analysis

Module III (12 hours)

Organizational Behaviour Process : Communication – Importance, Types, Gateways and Barriers to Communication, Communication as a tool for improving Interpersonal Effectiveness. Groups in Organizations - Nature, Types, Why do people join groups, Group Cohesiveness and Group Decision-making Managerial Implications, Effective Team Building. Leadership – Leadership & Management, Theories of Leadership – Trait theory, Leader Behaviour theory, Contingency Theory, Leadership and Follwership, How to be an effective Leader. Conflict – Nature of Conflict and Conflict Resolution.

An Introduction to Transactional Analysis (TA).
Case Analysis

Module IV (10 hours)

Organization : Organizational Culture – Meaning and Definition, Culture and Organizational Effectiveness. Introduction to Human Resource Management – Selection, Orientation, Training and Development, Performance Appraisal, Incentives Organizational Change – Importance of Change, Planned Change and OB techniques. International Organizational Behaviour – Trends in International Business, Cultural Differences and Similarities, Individual and Interpersonal Behaviour in Global Perspective.
Case Analysis

TEXTBOOKS:

Keith Davis, Organizational Behaviour, McGraw – Hill.
K.Aswathappa, Organizational Behaviour, Himalaya Publishing House.

REFERENCE BOOKS:

Stephen P. Robbins, Organizational Behaviour, Prentice Hall of India.
Pradip N. Khandwalla, Organizational Behaviour, McGraw – Hill, New Delhi.

CPES 5202 ANALOGUE ELECTRONICS CIRCUITS (3-1-0)

MODULE - I (11 hours)

1. DC biasing of BJTs and FETs : Load lines, Operating Point, Fixed bias and Voltage - divider bias. DC bias with voltage feedback. Bias stabilization. Design of bias.
2. Small Signal Modelling of BJT and Analysis : The r_e transister model, hybrid model, graphical determination of h-parameters. Low frequency small signal analysis of CE, CC and CB configurations without feedback.

MODULE - II (14 hours)

3. Small Signal Modelling and Analysis of FETs : Small Signal Model, Analysis of JFET C-S and C-D configuration. Analysis of E-MOSFET and D-MOSFET configurations.
4. System Approach - Effects of R_S and R_L : Two-port system, Individual and combined effects of R_S and R_L on CE, Emitter follower and C-S networks.
5. BJT and JFET Frequency Response : General frequency considerations. Low-frequency analysis of R-C combination in single stage BJT or FET amplifier - Bode Plot. Lower Curt Off frequency for the system. Low frequency response of BJT and FET amplifiers. Miller Effect Capacitance. High - frequency modelling of BJT and FET. High frequency analysis of BJT and FET amplifiers - Bode plot. Square Wave testing of amplifiers.

MODULE - III (14 hours)

6. Compound Configurations : Cascade, Cascode and Darlington connections, C-MOS Circuit, Current Source Circuits, Differential amplifier circuit.
7. Feedback and Oscillator Circuit : Feedback and Oscillator Circuit : Feedback concept, Type of feedback circuits, Practical feedback circuit. Analysis of only voltage-series feedback type amplifier. Effects of negative feedback. Positive feedback, Barkhausen Criterion of Oscillation. Oscillator Operation. R-C phase shift oscillator. Crystal Oscillator.
8. Ideal Operational Amplifiers : Differential and Common mode operation, OP-AMP basics. Equivalent Circuit Analysis of Inverting and Non - inverting OP - AMP circuits. Input impedence.

MODULE - IV (8 hours)

9. Practical OP-AMPS : OP-AMP Specifications, DC offset parameters, frequency parameters, gain - bandwidth. OP-AMP applications on constant gain multiplier, Voltage summing, Inegrator, Differentiator and Controlled sources. Instrumentation Amplifier and Active Filters- low, high and bandpass.
10. Power Amplifiers : Definition of A, B and C types. Conversion efficiency, Distortion analysis. Push - pull configuration.

TEXT BOOK

1. Electronic Devices and Circuit Theory By - Robert L. Boylestad and Lowis Nashelsky. 8th Edition Pearson Publication.
   Selected portion from Chapter 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 17.

SUPPLEMENTARY BOOKS :

2. Electronic Design - By Martin S. Roden etl. Fourth Edition, SPD Publication.
3. Integrated Electronics - By Millman & Halkias, Mcgraw Hill Internation students Edition.
4. Electronic Devices and Circuits By David A. Bell, 4th Edition, PHI.

PRACTICALS

BENG 9202 BASIC ELECTRONICS LAB. (0-0-3)

(At least 8 experiments including 1 - 7 and any one from 8 - 10)

1. Familiarity with electronics components and Devices
   Testing of a semiconductor Diode and a Transisitor. IC pins connection (Digital Multimeter should be used should be used in testing components and devices).
2. Study and use of Oscilloscope to view waveforms and measure its amplitude and frequency.
3. V - I Characterstic of a semiconductor diode. Determining DC and AC resistance.
4. Half wave and Full wave rectifiers without and with capacitor filter. Record of waveforms, Measurement of Average and rms values.
5. V - I Characterstics of anpn or pnp transistor. DC Biasing and measurement of dc voltages and currents.
6. Gain - frequency response of JFET common source R-C coupled amplifier/BJT CE RC coupled Amplifier.
7. Op amp in Inverting, non inverting, Integrating and Differentiating configuration, Record of wave forms.
8. Truth Tables of logic gates.
9. Study and experiment using MUX - DEMUX ICs / Shift Register IC.
10. Study on CMOS logic Inverter.

BENG 9201 BASIC ELECTRICAL ENGINEERING LAB. (0-0-3)

List of Experiment (Any 8 of the following)

1. Study and measurement the armature and field resistance of a DC machine.
2. Calibration of ammeter, voltmeter and wattmeter with the help of sub-standard instrument.
3. Verification of circuit theorems. Thevenin's and Superposition theorems (with DC source only).

4. Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
5. Measurement of current, voltages and power in R-L-C series circuit excited by Single Phase AC supply.
6. Connection and starting of a three phase induction motor using direct online (DOL). or star-delta starter.
7. Connection and measurement of power consumption of a fluorescent lamp.
8. Determination of open circuit characteristics (OCC) of DC machine.
9. Starting and speed control of a DC shunt motor.
10. Connection and testing of a single phase energy meter (unity power factor load only)
11. Study of fan motor

BCSE 9201 COMPUTER OOP WITH C++ LAB. (0-0-3)

(10 classes for 10 different programs)

1. Programs on concept of classes and objects.(1 class)
2. Programs using inheritance.(1 class)
3. Programs using polymorphism.(1 class)
4. Programs on use of operator overloading.(1 class)
5. Programs on use of memory management.(1 class)
6. Programs on exception handling and use of templates.(1 class)
7. Programs on File handling in C++.(1 class)
8. Design problem on stock and accounting of a small organization, railway reservation, payroll preparation and optimization problem.(3 classes)

BENG 9203 MECHANICAL ENGINEERING LAB. (0-0-3)

Group A (Mechanics / Material Testing Lab.

1. Determination of equilibrium of coplanar forces.
2. Determination of Moment of Intertia of Flywheel
3. Determination of tensile strength of materials by Universal Testing Machine.

Group B

4. Determination of Metacentric Height and application to stability of floating bodies.
5. Verification of Bernoulli's Theorem and its application to Venturimeter.
6. Determination of Cd and Cd of Orifices.

Group C

7. Calibration of Bourden Type Pressure gauj and measurement pressure using manometers.
8. Study of Cut-Sections of 2 stroke and 4 stroke Diesel Engine.
9. Study of Cut-Sections of 2 stroke and 4 stroke Petrol Engine.

CPES 9201 NETWORK DEVICES LAB. (0-0-3)

1. Verification of Network Theorems
2. Study of D.C. and A.C. transients RL, RC, and RLC circuits.
3. Determination of parameters of a 2 port network Z, Y, h and ABCD parameters.

4. Determination of frequency response, attenuation and phase characterstics of the following networks : Low Pass, High Pass, Band Pass and Band Elimination filters.
5. Study of a transformer as a coupled circuit and determination of its self and mutual inductance.
6. Response of single of double tuned coupled circuits.
7. Spectral analysis of a non - sinusoidal wave form.

CPES 9202 ANALOG ELECTRONICS LAB. (0-0-3)

List of Experiments

(At least 10 out of 12 experiments should be done)

1. BJT Bias circuit –Design, construction & test
2. JEET Bias circuits – Design, construction and test.
3. Design, Build and test of BJT common-emitter circuit –D.C and A.C performance, A.C voltage gain, input impedance and output impedance with bypassed and unbypassed emitter resistor.
4. Design, Build and test of BJT emitter-follower-D.C and A.C performance voltage gain, input impedance and output impadance investigated.
5. Design, Build and Test of JFET common- source and common-drain amplifiers : D.C and A.C performance, Voltage gain, input impedance and output unpedance investigated.
6. Frequency response of a common –emitter amplifier: low frequency, high frequency and mid frequency response.
7. feed back amplifiers : series and shunt feedback types- input and output impedance and A.C gain with and without feedback.
8. Differential amplifiers circuits: D.C bias and A.C operation without and with current source.
9. OP- Amp Schmitt Trigger Circuits.
10. OP-Amp Frequency Response and Compensation.
11. Square wave Testing of an amplifier.
12. R.C phase shift oscillator / Wien-Bridge Osc-using OP-Amp/ Crystal Osc.
13. Class A and Class B Power Amplifier.

4th Semester

BSCM 2202 MATHEMATICS - IV (3-1-0)

Module - I

Solution of equations by iteration, Newton's method, Secant method, Interpolation
Numerical integration and differntiation

Module - II

Gauss Siedel iteration method for solving a system of linear equations, Ruage Kutta Methods, Introductory Linear Programming, Introductory Programming

Module - III

Probability, Random variables, Probability distribution, mean & variance of distribution
Binomial, Poisson, hyper-geometric and normal distributions

Module - IV

Random sampling, estimation of parameters, confidence intervals, Testing of hypothesis, acceptance sampling, correlation and regression

Course covered by : Advance Mathematics by E. Kreyszig (8th Edition)

Chapter 17 (17.1 - 17.3, 17.5), Chapter 18 (18.4), Chapter 19 (19.1), Chapter 20, Chapter 21, Chapter 22

BENG 1201 ELECTRICAL MACHINES (3-1-0)

Module I (10 Lectures)

D.C Mechanics :

D.C Generator – construction and principle of operation, E.M.F. equation ; types of generator; no load and load characteristics; Voltage build-up of shunt

Generator; voltage regulation, Application.

D.C Motor –construction and principle of operation ; back E.M.F; torque and speed equations; characteristics and performance curves; speed control of series and shunt motors; motor starters; industrial application.

Losses and Efficiency of D.C machines.

Module II (10 Lectures)

Transformer:

Single phase – construction and principle of operation; E.M.F. equation; Phasor diagram; actual and approximate equivalent circuits; open and short circuit tests, voltage regulation; losses and efficiency.

Three Phase – Construction and principle of operation; connection of three single –phase units in wye, delta, open delta configurations; Autotransformer; conventional transformer connected as Autotransformer. Special Transformers – induction heating and high impedance and high frequency transformer.

Module III (10 Lectures)

Synchronous Machines :

Three- phase alternators – construction and principle of operation; E.M.F. equation; distribution and pitch factors; Synchronous reactance; performance of alternators on no-load and load; Phasor diagram; voltage regulation, power calculations of turbine and hydro-generators,; synchronization of a generator.

Three-Phase Synchronous Motor- construction and principle operation; V- curves; Phasor diagram; methods of starting; applications.

Module IV (10 Lectures)

Three-Phase induction Motor- construction of slip ring and squirrel cage type induction motors; Phasor diagram and equivalent circuit; torque-slip characteristics; maximum torque calculations; open and short-circuit tests; losses and efficiency; starting of induction motors; speed control; Induction generator.
Single-Phase Induction Motor- construction and principle of operation; capacitor- start and capacitor-run motors; Universal motor; Stepper motors.

Books :

1. Electrical Machines, Drives and Power Systems, 5th edition by Theodore Wildi (Pearson) : Text.
2. Electrical Machinery by A.E. Fitzerald and Charles Kingsley, Jr., and S.D. Umans, Tata McGraw Hill Publication.
3. Principles of Electric Machines by V.K Meheta and R. Meheta , S. Chand Publication.

CPES 5201 NETWORK THEORY (3-1-0)

MODULE - I (12 hours)

Topological description of networks; Reviews of mesh & nodal analysis. Reciprocity & Millman's theorem, Maximum power transfer theorem.

Q factor, Bandwidth and Selectivity in Series & parallel resonance Circuits.

Coupled Circuits : Dot Convention for representing coupled circuits, coefficient of coupling.

Loop Analysis of coupled circuits, single and double tuned coupled circuits Transiet study in RLC networks by Laplace transform method with DC and AC excitation.

Response to step, impulse and ramp inputs S - domain circuits

Two Port networks : Z, Y, h, & ABCD representation of T and TT2 - port networks both in transmission parameters T - TT networks, 2 port network, Cascade and Parallel Connections.

Image and iterative impendances.

MODULE - II (12 hours)

Network Functions & Responses :
Concept of complex frequency, driving point and transfer functions for one port and two network, poles & zeros of network functions, Restriction on Pole and Zero locations of network function. Impulse response and complete response. Time domain behaviour form pole-zero plot.
Filters : Design of low pass, high pass, band pass & band elimination filters. Active filters. Input Power, Power Transfer and Insertion loss.
Problems in Optimizing power transfer; Insertion loss.

MODULE - III (10 hours)

Fourier Series & Fourier Transforms : Fourier Series representation of non sinusoidal waves. Discrete spectra, rms values of non sinusoidal waves, Steady state response of linear circuits to non sinusoidal waves, power in such circuits. Fourier Internal and Fourier transform of signum and step functions. Applications to RL and RC circuits.
Network Synthesis :
Driving point functions, properties of positive real function.

MODULE - IV (8 hours)

Foster's reactance Theorem, Synthesis of LC, RC and RL networks by Cauer - I, Cauer - II, Foster - I, & II forms. Synthesis of active filters - Butterworth and Chebyshev Techniques.

TEXT BOOKS

1. Network Analysis : M.E Van Valkenbrg
2. Network Analysis & Synthesis : Franklin F. Kua Second Edition

REFERENCE BOOKS :

1. A Course in Electrical Circuits and Analysis : M. L. Soni, J. C. Gupta
2. Network Synthesis : M. E. Van Valkenberg
3. Eloectrical Networks : Alexander & Sadiku

BENG 1208 - FLUID MECHANICS AND HYDRAULIC MACHINE (3-1-0)

Module – I (12 hours)

Introduction : Scope of fluid mechanics and its development as a science

Physical property of Fluid

Density, specific gravity, specific weight, specific volume, surface tension and capillarity, viscosity, compressibility and bulk modulus, Fluid classification.

Fluid static

Pressure, Pascal's Law, Pressure variation for incompressible fluid, atmospheric pressure, absolute pressure, gauge pressure and vacuum pressure, monometer.

Hydrostatic process on submerged surface, force on a horizontal submerged plane surface, force on a vertical submerged plane surface.

Module – II (12 hours)

Buoyancy and flotation, Archimedes' principle, stability of immersed and floting bodies, determination of metacentric height.

Fluid kinematics : Introduction, description of fluid flow, classification of fluid flow. Acceleration of fluid particles, flow rate and continuity equation, differential equation of continuity.

Fluid dynamics : Introduction, Euler's equation along a streamline, energy equation, Bernoulli's equation, Analysis of finite control volumes and its application to siphon, venture meter, orifice meter

Module – III (6 hours)

Turbine : Classification, reaction, Impulse, outward flow, inward flow and mixed flow turbines, Francis & Kaplan turbines, Pelton wheel, Physical description and principle of operation, Governing of Turbine.

Module – IV (8 hours)

Centrifugal Pump : Principles of classification, Blade angles, Velocity triangle, efficiency, specific speed, characteristics curve.

Reciprocating Pump : Principles of working, slip, work done, effect of acceleration and frictional resistance, separation

Tex Books

1. Fluid Mechanics, A.K. Mohanty, PHI
2. Introduction to Fluid Mechanics and Fluid Machines, S.K. Som and G. Biswas, TMH
3. Fluid Mechanics, Modi & Seth

BSCC 2201 CHEMISTRY - II (3-0-0)

Module I (12 Lectures)

(To develop awareness about Water Treatment)

Water quality parameters and standards.

Hardness of Water : Types of hardness, Units of hardness, Determination of hardness. Disadvantages of hardwater, acidity and alkalinity, Water Softening Techniques. Boiler feed water, Water for Domestic purposes (municipal / Drinking Water)

Module II (10 Lectures)

(To develop the basic concepts about the transition metal compounds and corrosion)

1. Corrosion:
   Dry and wet corrosion, Galvanic Corrosion, Stress Corrotion, Factors affecting corrosion, Corrosion Control : (Proper design and fabrication procedure, Cathodic protection, Passivation).

(8 Lectures)

2. Polymers:
   Nomenclature and classification, Thermoplastic and thermosetting resins, Some typical useful polymers:Polyethylene,PVC, polystyrene, PMMA, Nylon 6:6, Nylon 6, Bakelite, Terylene, Silicones. Natural and synthetic rubbers: Neoprene, Butyl and Polyuarethane rubber, Vulcanization.

(8 Lectures)

Module III (10 Lectures)

(To introduce the students about the basic concepts of fuels)

1. Fuels:
   Classification of fuels, calorific value, Analysis of Coal and Coke, Refining of Crude oil, Fractional distillation, Cracking, Knocking and antiknocking, Octane and Cetane number.
   Gaseous Fuel : Prodcer gas, Water gas, LPG & CNG.
   Cobustion Calculation.

Module IV (10 Lectures)

(To develop awareness amongst the students about the importance of water quality in domestic and industrial world and concepts of various kinds of pollutions)

1. Water Treatment:
   Water quality parameters and standards, treatment of water for industrial and domestic purpose.
2. Environment pollution:
   Green house effect, acid rain, depletion of ozone layer; Water pollution- bio chemical effect of lead, arsenic, mercury and fluorides, sewage-B.O.D. and C.O.D.

Books:

1. Organic Chemistry by Morrison and Boyd, 5th/6th Ed., Prentice Hall.
2. Organic Chemistry by Solomons and Fryhle, Wiley Publishing
3. Guide to Organic Reaction Mechanism by Peter Sykes
4. Concise Inorganic Chemistry by J. D. Lee, 4th/5th Ed. ELBS
5. Inorganic Chemistry by D. F. Shriver, P. W. Atkins, C. H. Langaford ,Oxford, 1990
6. A Text Book on Engineering Chemistry by B. Pani, Galgotia Publication.
7. Engineering Chemistry by P. C. Jain and M. Jain.
8. Engineering Chemistry by R. Gopalan, D. Venkapaya and S. Nagarajan, Vikas Publishing House.

BSCC 2202 MATERIAL SCIENCES (3-0-0)

MODULE - I (10 Lectures)

1. Classification of Engineering Materials. Engineering properties of materials. Selection of Materials.
2. Electron theory of solids : Free electron theory of metals. Electrical conductivity; Thermal conductivity, Quantum theory of free electrons. Band theory of solids, Conductivity of metals

3. Conductors, Insulators, Semiconductors, Intrinsic and extrinsic semiconductors, Band theory of semi conductors Hall effect.
4. Super Conductors - Zero resistivity, Critical magnetic field and critical current density. Type I and II super conductors. Applications of Supercoductors.

MODULE - II (10 Lectures)

5. Dielectric Materials : Microscopic Displacement of atoms and molecules in an external dc electric field, Polarization and dielectric constant, Dielectric susceptibiity. Temperature dependence, Dielectric Breakdown. Ferro electric material Piezoelectrics, Pyroelectrics, Dielectric Materials as electrical isulators.
6. Magentic Properties of Materials : Dia, Para and Ferro magenetic materials. Theory of magnetism, Ferro magnetic materials or Ferrites, Comparison of magnetic behaviour and magnetic parameters of Dia, Para and Ferro magnetic materials.
7. Optical Properties of Materials : Scattering, Refraction, Theory of Refraction and absorption, Atomic Theory of optical properties. Lasers, Optical fibres - Principle, structure, application of optical fibre.

MODULE - III (10 Lectures)

8. Organic Materials : Polymers - Mechanism of Polymerization : Addition, condensation and co-polymerisation, applications.
   Plastics - Types : Thermosetting and thermoplastics. Transfer moulding, injection moulding, extension moulding, Blow moulding, Welding of plastics; Rubber types, application.
9. Ceramics : Types, Structure, Mechanical properties, applications

MODULE - IV (10 Lectures)

10. Composite Materials : Agglomerated Materials : Cermets, Reinforced Materials : Reinforced Concrete. Glass fibre reinforced plastics, Carbon fibre reinforced plastics. Whiskers, fibre reinforced plastics, Laminated plastic sheets. Tufnol, Properties of composites. Metal matrix composites, manufacturing procedure for fibre reinforced composites.
11. Performance of Materials in Service : Service performance, failure, design considerations, Corrosion - types, (Atmospheric, Pitting, Stress Corrosion), Control & prevention, protective coating, Performance of metals and Ceramics at high temperature.

Text Books :

1. Callister W.D., Materials Science and Engineering, John Wiley & Sons.
2. Vijaya M. S., Rangarajan G, Materials Science, TMH
3. Rajendra V., Marikani A., Materials Science, TMH
4. Van Vlack L. H., Elements of Material Science and Engineering, Addison Wesley
5. Material Science, Raghavan
6. Processes and Material of manufacture : Lindberg, PHI.

BSCP 2201 PHYSICS - II (3-0-0)

This one semester Physics course is divided into four units. The unit - I deals with some aspects of nuclear physics, unit - II introduces certain features of condensed matter physics, unit - III deals with certain aspects of semiconductors and superconductors and unit - IV introduces Opto-electronic devices and fibre-optic communication system.

Unit - 1

This unit covers the basic principles and applications of different types of accelerators and their important applications.

Detailed constructional features of accelerators are not necessary.

1. Need for nuclear accelerators.
2. D.C. Accelerators : Cockcroft - Walton, Van de Graff, Tandem accelerators.
3. RF accelerators : Linear accelerator, cyclotron, electron accelerator, betatron.
4. Application of nuclear accelerators - production of radioisotopes, radiation processing of materials, medical applications.

Unit - 2

This Unit deals with diffraction in crystals and its role in determining crystal structure.

Study of crystal structure by diffraction methods, Bragg's condition for crystal diffraction, Lau condition, Miller indices, Reciprocal lattice, Geometrical structure factor, Atomic form factor.

Unit - 3

This unit deals with certain features of semiconductors and superconductors.

1. Energy bands in solids: Kronig - Penny model, allowed bands and forbidden gaps, elemental and compound semiconductors.
2. Superconductivity : Superconductors and their properties, Meisner effect, Type - I and Type - II Superconductors, Thermodynamic properties of superconductors, London equation, Application of superconductors.

Unit - 4

This unit introduces some Opto - electronic devices and fibre - optic communication system.
Laser : Principle of lasing, properties of Laser, construction and working of semiconductor laser, Application of laser.
LED : Principle construction of operation and application, Introduction to fibre optics, basic characterstics of optical fibres, optical fibre communication system.

Books Recommended

1. Nuclear Physics, P. R. Roy & B. P. Nigan
2. Particle Accelerators, M. S. Livingston & J. P. Blewett
3. Concepts of Modern Physics, A. Beiser
4. Introduction to Solid State Physics, C. Kittel
5. Introduction to Lasers, A. Avadhnulu
6. Physics - II, B. B. Swain and P. K. Jena.

BSCP 2202 PHYSICS OF SEMICONDUCTOR DEVICES (3-0-0)

Module I (9 hours)

An appreciation of Quantum Mechanics in determining electrical properties of semiconductor.

The Semiconductor in Equilibrium :

Equilibrium distribution of electrons & holes, the n0 and p0 equation, intrinsic carrier concentration; Do pant atoms and energy levels, ionization energy; the extrinsic semiconductor, the n0 p0 product, position of Fermi-energy level, variation of EF with doping concentration and temperature.

Carrier Transport Phenomena :

Carrier drift: mobility, conductivity, velocity saturation:

Carrier Diffusion: Diffusion current density. Total current density. The Einstein relation.

Module II (9 hours)

Non-equilibrium Excess Carrier in Semiconductor

Excess carrier generation and recombination, characteristics of excess carriers-continuity equation and time – dependent Diffusion equation. Ambipolar Transport – Derivation of equation and applications.

The Pn junction and Diode

Basic structure, built-in potential barrier, Electric field, space charge width; Reverse applied bias-space charge width and Electric field. Junction capacitances.

Pn junction Diode : Ideal – current voltage relationship, Minority Carrier distribution, Ideal Pn junction currents under forward and reverse bias.

Module III (9 hours)

Pn junction diode (contd.):

Temperature effects, Small signal model of Pn junction, Equivalent circuits Recombination Current. Junction Breakdown.

Metal-Oxide- Semiconductor FET (MOSFET)

The MOS structure : Energy band diagrams, Depletion Layer thickness, Work function difference, Flat band Voltage, Threshold Voltage, Charge distribution, Capacitance –Voltage characteristics.

The basic MOSFET operation, Current –Voltage relation (Concepts)

Frequency limitation : Small signal Equivalent circuit.

The CMOS Technology.

Module IV (8 hours)

The Bipolar Transistor

Basic Principle of Operation., Simplified Transistor Current Relation. Modes of operation, Amplification with Bipolar transistors, Minority Carrier distribution Forward active mode, other modes of operation. Low Frequency Common Base Current gain,. Non-ideal effects –Base width Modulation, Breakdown Voltage. Equivalent Circuit Models –Eber's –Moll Model, Hybrid- Pi model. Frequency limitation. Large Signal Switching characteristics.

Text Book :

1. Semiconductor Physics and Devices- Basic Principles BY Donald A. Neamen, 3rd Edition, Tata McgrawHill Edition. (Selected portion from chapters 2,4,4,6,7,8,10 &11.)

For additional reading :

2. Solid state Electronics Devices – y Ben G. Strectman and Sanjay Benerjee, 5th Edition, Pearson Edu.

BCSE 3202 RELATIONAL DATABASE MANAGEMENT SYSTEMS (3-0-0)

Module I (10 hours)

Database System Architecture - Data Abstraction, Data Independence, Data Definitions and Data Manipulation Languages.

Data models - Entity Relationship(ER), Mapping ER Model to Relational Model, Network .Relational and Object Oriented Data Models, Integrity Constraints and Data Manipulation Operations.

Module II (10 hours)

Relation Query Languages, Relational Algebra, Tuple and Domain Relational Calculus, SQL and QBE. Relational Database Design: Domain and Data dependency, Armstrong's Axioms, Normal Forms, Dependency Preservation, Lossless design, Comparison of Oracle & DB2

Module III (8 hours)

Query Processing and Optimization: Evaluation of Relational Algebra Expressions, Query Equivalence, Join strategies, Query Optimization Algorithms.

Module IV (12 hours)

Storage Strategies: Indices, B-Trees, Hashing, Transaction processing: Recovery and Concurrency Control, Locking and Timestamp based Schedulers, Multiversion and Optimistic Concurrency Control Schemes.

Advanced topics: Object-Oriented and Object Relational databases. Logical Databases, Web Databases, Distributed Databases, Data Warehouse and Data Mining.

Text Books :-

1. Elmaski & Navathe -Fundamentals of Database Systems, 4th Edition, Pearson Education
2. C.J.Date - An introduction to Database Systems, Pearson Education
3. Bipin Desai -An introduction to Database System, Galgotia Publication.

HSSM 4202 ORGANIZATIONAL BEHAVIOUR (3-0-0)

Module I (8 hours)

The Study of Organizational Behaviour : Learning objectives, Definition and Meaning, Why Study OB, An OB Model, New Challenges for OB Manager.

Learning – Nature of Learning, How Learning occurs, Learning and OB.

Case Analysis

Module II (10 hours)

Foundations of Individual Behaviour : Personality – Meaning and Definition, Determinants of Personality, Personality Traits, Personality and OB.

Perception – Meaning and Definition, Perceptual Process, Importance of Perception in OB. Motivation – Nature and Importance, Hertzberg's Two Factor Theory, Maslow's Need Hierarchy Theory, Alderfer's ERG Theory, Evaluations.

Case Analysis

Module III (12 hours)

Organizational Behaviour Process : Communication – Importance, Types, Gateways and Barriers to Communication, Communication as a tool for improving Interpersonal Effectiveness. Groups in Organizations - Nature, Types, Why do people join groups, Group Cohesiveness and Group Decision-making Managerial Implications, Effective Team Building. Leadership – Leadership & Management, Theories of Leadership – Trait theory, Leader Behaviour theory, Contingency Theory, Leadership and Follwership, How to be an effective Leader. Conflict – Nature of Conflict and Conflict Resolution.

An Introduction to Transactional Analysis (TA).

Case Analysis

Module IV (10 hours)

Organization : Organizational Culture – Meaning and Definition, Culture and Organizational Effectiveness. Introduction to Human Resource Management – Selection, Orientation, Training and Development, Performance Appraisal, Incentives Organizational Change – Importance of Change, Planned Change and OB techniques. International Organizational Behaviour – Trends in International Business, Cultural Differences and Similarities, Individual and Interpersonal Behaviour in Global Perspective.

Case Analysis

TEXTBOOKS :

Keith Davis, Organizational Behaviour, McGraw – Hill.
K.Aswathappa, Organizational Behaviour, Himalaya Publishing House.

REFERENCE BOOKS :

Stephen P. Robbins, Organizational Behaviour, Prentice Hall of India.
Pradip N. Khandwalla, Organizational Behaviour, McGraw – Hill, New Delhi.

HSSM 4201 ENGINEERING ECONOMICS AND COSTING(3-0-0)

Module I (10 hours)

Time value of money : Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time –value equivalences.

Present worth comparisons, Comparisons of assets with equal, unequal and infite lives, comparison of deferred investments, Future worth comparison, pay back period comparison.

Module II (10 hours)

Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IIR with other methods, IRR misconceptions. Analysis of public Projects : Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis.

Module III (10 hours)

Depreciation, Computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models. Sensitivity analysis: single and multiple parameter sensitivity.

Module IV (12 hours)

Fixed and variable cost, Product and Process Costing, Standard Costing, Cost estimation, Relevant Cost for decision making, Cost estimation, Cost control and Cost reduction techniques.

Text Book

1. Horn green, C.T., Cost Accounting, Prentice Hall of India
2. Riggs, J.L ., Dedworth, Bedworth, D.B, Randhawa, S.U. Engineering Economics, McGraw Hill International Edition, 1996 (Chapter 2,3,4,5,7,8,9,11,12)

CPES 5203 DIGITAL ELECTRONICS CIRCUITS (3-1-0)

Module I (11 hours)

Number System and Codes

Binary Number base Conversations, Octal and Hexadecimal numbers, Complements, Signed Binary Numbers, Binary Codes- BCD Codes, Gray Code, ASCII Character Code, Codes for serial data transmission and storage. **Boolean Algebra and Logic Gates**

Axiomatic definition of Boolean algebra. Basic theorems and properties of Boolean algebra, Boolean functions; Canonical and Standard forms; minterms and maxterms standard forms; minterms and maxterms, standard forms Digital Logic Gates, multiple inputs.

Module II (13 hours)

Gate Level Minimization

The Map Method, K Maps, input five variables, Product of Sums Simplification, Don't care conditions. Nand and NOR implementation. AND –OR invent, OR-AND invent implementation, Ex-OR function, Parity generation and checking, Hardware Description Language (HDL).

Combinational Logic

Combinational Circuits, Analysis and Design Procedure; Binary Adder-Sub tractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multipliers, HDL for Combinational Circuits.

Module III (12 hours)

Synchronous Sequential Logic

Sequential Circuit, Latches, Flip-flop, Analysis of Clocked sequential Circuits, HDL for Sequential Circuits, State Reduction and Assignment. Design Procedure.

Registers and Counters

Shift Register, Ripple Counters, Synchronous Counters Asynchronous Counter, Ring Counters, Modulo-N Counters, HDL for Registers and Counters.

Module IV (15 hours)

Memory and Programmable Logic

Random Access Memory (RAM), Memory Decoding, Error detection and Correction, Read only Memory, Programmable Array Logic, Sequential Programmable Devices.

Register Transfer Levels

Register transfer level notion, Register transfer level in HDL, Algorithm, State Machine, Design Examples. HDL Description of Design, Examples, Binary Multiplier, HDL, Description of Binary Multiplier.

Digital Integrated Logic Circuits

RTL, DTL, TTL, ECL, MOS and CMOS logic circuits. Switch –lever-Modeling with HDL.

Text Book

1. Digital Design, 3rd Edition by M. Morries Mano, Pearson Edu. India, Additional Reading Ch. ! to 10 except 9.
2. Digital Design – Principle & Practice, 3rd Edition by John F. Wokerly, Pub. Pearson Education.

PRACTICALS

BENG 9201 BASIC ELECTRICAL ENGINEERING LAB. (0-0-3)

List of Experiment (Any 8 of the following)

1. Study and measurement the armature and field resistance of a DC machine.
2. Calibration of ammeter, voltmeter and wattmeter with the help of sub-standard instrument.

3. Verification of circuit theorems. Thevenin's and Superposition theorems (with DC source only).
4. Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
5. Measurement of current, voltages and power in R-L-C series circuit excited by Single Phase AC supply.
6. Connection and starting of a three phase induction motor using direct online (DOL). or star-delta starter.
7. Connection and measurement of power consumption of a fluorescent lamp.
8. Determination of open circuit characteristics (OCC) of DC machine.
9. Starting and speed control of a DC shunt motor.
10. Connection and testing of a single phase energy meter (unity power factor load only)
11. Study of fan motor

BENG 9202 BASIC ELECTRONICS LAB. (0-0-3)

(At least 8 experiments including 1 - 7 and any one from 8 - 10)

1. Familiarity with electronics components and Devices
   Testing of a semiconductor Diode and a Transisitor. IC pins connection (Digital Multimeter should be used should be used in testing components and devices).
2. Study and use of Oscilloscope to view waveforms and measure its amplitude and frequency.
3. V - I Characterstic of a semiconductor diode. Determining DC and AC resistance.
4. Half wave and Full wave rectifiers without and with capacitor filter. Record of waveforms, Measurement of Average and rms values.
5. V - I Characterstics of anpn or pnp transistor. DC Biasing and measurement of dc voltages and currents.
6. Gain - frequency response of JFET common source R-C coupled amplifier/BJT CE RC coupled Amplifier.
7. Op amp in Inverting, non inverting, Integrating and Differentiating configuration, Record of wave forms.
8. Truth Tables of logic gates.
9. Study and experiment using MUX - DEMUX ICs / Shift Register IC.
10. Study on CMOS logic Inverter.

BCSE 9202 COMPUTER (RDBMS) LAB. (0-0-3)

(10 Classes for 10 Different Programs)

1. Use of SQL syntax : Insertion, Deletion, Join), Updation using SQL. (1 class)
2. Program segments in embedded SQL using C as host language to find average grade point of a student, etc.. (1 class)
3. Program for Log based data recovery technique. (1 class)
4. Program on data recovery using check point technique. (1 class)
5. Concurrency control problem using lock operations. (1 class)
6. Use of package (ORACLE) for programming approaches(2 classes)
7. Use of package (DB2) for programming approaches(2 classes)
8. Programs on JDBC/ODBC to print employee's / student's information of a particular department. (1 class)

CPES 9201 NETWORK DEVICES LAB. (0-0-3)

1. Verification of Network Theorems
2. Study of D.C. and A.C. transients RL, RC, and RLC circuits.
3. Determination of parameters of a 2 port network Z, Y, h and ABCD parameters.
4. Determination of frequency response, attenuation and phase characterstics of the following networks : Low Pass, High Pass, Band Pass and Band Elimination filters.
5. Study of a transformer as a coupled circuit and determination of its self and mutual inductance.
6. Response of single of double tuned coupled circuits.
7. Spectral analysis of a non - sinusoidal wave form.

BENG 9203 MECHANICAL ENGINEERING LAB. (0-0-3)

Group A (Mechanics / Material Testing Lab.

1. Determination of equilibrium of coplanar forces.
2. Determination of Moment of Intertia of Flywheel
3. Determination of tensile strength of materials by Universal Testing Machine.

Group B

4. Determination of Metacentric Height and application to stability of floating bodies.
5. Verification of Bernoulli's Theorem and its application to Venturimeter.
6. Determination of Cd and Cd of Orifices.

Group C

7. Calibration of Bourden Type Pressure gauj and measurement pressure using manometers.
8. Study of Cut-Sections of 2 stroke and 4 stroke Diesel Engine.
9. Study of Cut-Sections of 2 stroke and 4 stroke Petrol Engine.

CPES 9203 DIGITAL ELECTRONICS LAB. (0-0-3)

(10 experiments out of 13 should be done during the Semester)

1. Digital Logic Gates : Investigate logic behaviour of AND, OR, NAND, NOR, EX-OR, EX-NOR. Invert and Buffer gates, use of Universal NAND Gate.
2. Gate–level minimization : Two level and multi level implementation of Boolean functions
3. Combinational Circuits: design construct and test : address and subtractors, code converters, gray code to binary and 7 segment display.
4. Design, implement and test a given design example with (i) NAND Gates only (ii) XOR Gates only and (iii) Decide and NAND Gates.
5. Design with multi-plexers and de-multiplexers.
6. Flip-Flap : construct, Test and investigate operation of SR, D & J-K flipflops.
7. Shift Registers : Investigate the operation of all types of shift registers with parallel load. Design.
8. Counters : Design, construct and test various ripple and synchronous counters – decimal counter, Binary counter with parallel load.
9. Memory Unit : Investigate the behaviour of RAM unit and its storage capacity – 16 X 4 RAM : testing, simulating and memory expansion.
10. Clock-pulse generator- design, implements and test.
11. Parallel adder and accumulator : design, implement and test.

12. Binary Multiplier : design and construct a circuit that multiplier 4-bit unsigned numbers to produce a 8-bit product.
13. Verilog HDL simulation of experiments : choose any form Sl No 3 to 12 and implement it.

COURSE STRUCTURE
THIRD YEAR B.TECH PROGRAMME
APPLIED ELECTRONICS AND INSTRUMENTATION ENGINEERING

5th Semester				**6th Semester**			
Theory		*Contact Hrs.*	*Credit*	*Theory*		*Contact Hrs.*	*Credit*
		L-T-P				**L-T-P**	
HSSM 4301	Optimisation in Engineering	3-0-0	3	HSSM 4302	Production & Operation Mgmt.	3-0-0	3
CPEE 5307	Electromagnetic Theory	3-1-0	4	CPEC 5305	Microprocessors & Microcontrollers	3-1-0	4
CPEE 5302	Control System Engineering	3-0-0	3	CPEC 5302	Digital Signal Processing	3-0-0	3
CPEE 5306	Power Electronics	3-0-0	3	CPEN 5303	Electronics Instr. & Measurement	3-1-0	4
CPEN 5301	Sensor and Signals	3-1-0	4	CPEN 5304	Fibre Optic Instrumentation	3-0-0	3
CPEN 5302	Principles of Measurement Systems	3-0-0	3	CPEN 5305	Advanced Electronics Circuits	3-0-0	3
	Total		**20**		**Total**		**20**
Practicals/Sessionals		*Contact Hrs.*	*Credit*	*Practicals/Sessionals*		*Contact Hrs.*	*Credit*
CPEE 9305	Power Electronics Laboratory	0-0-3	2	CPEC 9304	Microprocessor & Microconrollers Lab.	0-0-3	2
CPEN 9301	Sensor & Signal Lab.	0-0-3	2	CPEC 9302	Digital Signal Processing Lab.	0-0-3	2
CPEN 9302	Measurement Lab.	0-0-3	2	CPEN 9301	Instrumentation Design & Simulation	0-0-3	2
			6				**6**
	Total		**26**		**Total**		**26**

L-Lecture **T-Tutorial** **P-Practical**

5th Semester

HSSM 4301 OPTIMIZATION IN ENGINEERING (3-0-0)

Course Objective : The course aims at acquainting the students to mathematical modeling of engineering design, operation and maintenance problems and their optimization algorithms.

Module – I (10 hours)

Formulation of engineering optimization problems : Decision variables, objective function and constraints. Example of typical design, operation and maintenance problems in engineering : Design of a water tank, design of a truss, design of a network (electrical, communication sewerage and water supply networks), product mix problem, transportation and assignment problems, shift scheduling of employees, design of reliable devices, design of reactors, shortest route problem, set covering problem, traveling salesman problems. Only physical problems and their mathematical models to be discussed.

Linear Programming Problem : Formulation, Graphical solution, Simplex method, Duality theory, Dual simplex method, Formulation and solution of engineering problems of planning and scheduling.

Module – II (10 hours)

Sensitivity Analysis, Transportation Problem, Assignment Problem, Network Models : Minimal Spanning Tree Problem, Maximal Flow Problem, Shortest Route Problem, Minimum Cost Flow Problem. Algorithms and applications to be covered.

Module – III (10 hours)

Integer Linear Programming Problem. Branch and Bound and Cutting Plane Methods. Zero-one Programming Problem, Knapsack Problem, Set covering Problem, Set Partitioning Problem, Traveling Salesman Problem. Deterministic Dynamic Programming Problems. Applications and algorithms to be discussed.

Module – IV (12 hours)

Queueing theory, Game theory, Simulation, Decission theory & Sequencing Problem

References :

1. H. A. Taha – Operations Research, Prentice Hall of India, 2004.
2. D. T. Phillips, A Ravindran and J.J. Solaberg, Principles of Operation Research, John Wiley and Sons
3. S. Kalavathi, Operations research, Vikash Publication.
4. B.E Gillett, Introduction to operations research, TMH

CPEE 5307 ELECTROMAGNETIC THEORY (3-1-0)

Module I (5 hours)

The Co-ordinate Systems; Rectangular, Cylindrical, and Spherical Co-ordinate System. Co-ordinate transformation. Gradient of a Scalar field, Divergence of a Vector field and Curl of a Vector field. Their Physical interpretation. The Laplacian. Divergence Theorem, Stokes' Theorem. Useful Vector identifies .

Electrostatics : (7 hours)

The experimental law of Coulomb, Electric field intensity. Field due to a line charge, Sheet Charge and Continuous Volume Charge distribution. Electric Flux and Flux Density; Gauss's law. Application of Gauss's law. Energy and Potential . The Potential Gradient. The Electric dipole. The Equipotential surfaces. Energy stored in an electrostatic field. Boundary Conditions. Capacitors and Capacitances. Poisson's and Laplace's equations. Solutions of Simple Boundary value problems. Method of Images.

Module II (3 hours)

Steady Electric Currents: Current densities , Resistance of a Conductor; The Equation of Continuity . Joules law. Boundary Conditions for Current densities. The EMF.

Magnetostatics: (8 hours)

The Biot-Savart law. Amperes' Force Law . Torque exerted on a current carrying loop by a magnetic field. Gauss's law for magnetic fields. Magnetic Vector Potential . Magnetic Field Intensity and Ampere's Circuital law. Boundary conditions. Magnetic Materials . Energy in magnetic field . Magnetic circuits. Application to cathode Ray Oscilloscope.

Module III (5 hours)

Faraday's Law of Induction; Self and Mutual inductance . Maxwell's Equations from Ampere's and Gauss's Laws. Maxwell's Equations in Differential and Integral forms; Equation of Continuity. Concept of Displacement Current. Electromagnetic Boundary Conditions.
Poynting's Theorem, Time – Harmonic EM Fields. Application to Transformer.

Plane wave Propagation : (6 hours)

Helmholtz wave Equation. Plane wave solution. Plane wave propagation in lossless and lossy dielectric medium and conducting medium . Plane wave in good conductor, surface resistance, depth of penetration. Polarization of EM wave– Linear, Circular and Elliptical polarization. Normal and Oblique incidence of linearly Polarized wave at the plane boundary of a perfect conductor, Dielectric – Dielectric Interface. Reflection and Transmission Co-efficient for parallel and perpendicular polarizations, Brewstr angle.

Module IV

Antennas : (10 hours)

Physical Concept of radiation from an antenna. Wave equations in terms of Potential Functions. The Concept of retarded Vector Potential . Hertzian Dipole: Near Zone Fields, Radiation Fields, Radiation resistance, Directive gain and Directivity. A Magnetic Dipole. A Short dipole Antenna. The Half wave Dipole Antenna. Monopole Antenna. Pattern Multiplication Antenna Arrays, Linear Arrays. Receiving Antennas.

Text Books :

1. Electromagnetic Field Theory, Fundamental by B. S. Guru & Huseyn

   R. Hiziroglu. Publication : Thomson Asia Pte. Ltd. Singapore.

   Vikas Publishing Home Pvt. Ltd. New Delhi.

2. Electromagnetic waves and Radiating Systems E. C. Jordan & K. G. Balmin, 2nd Edition. PHI Pvt. Ltd.

Additional Reading

1. Elements of Electromagnetic by Mathew N. O. Sadiku, Publisher Oxford University Press.
2. Fields and Wave Electromagnetics, By David K. Cheng, 2nd Edition , Publisher : Pearson Education.

CPEE 5302 CONTROL SYSTEM ENGINEERING (3-0-0)

Module - I

Introduction: (10 hours)

Basic concepts of control systems, Open loop and closed loop systems, difference between open loop and closed loop systems, classifications

Mathematical model of physical systems, transfer function, block diagram algebra, signal flow graph (SFG), Mason's gain formula, application of SFG to control systems

Feed back theory,: Types of feedbacks, effect of degenerative feedback on control system, regenerative feedback.

Components: A.C. Servo motor, DC servo motor, AC tacho meter, synchros, amplidyne, stepper motor

Module -II (10 hours)

Time domain analysis: Standard test signals: Step, ramp, parabolic and impulse signals. Time response of 1&1 order systems to unit step and unit ramp inputs. Time response of second order systems to unit step input. Time response specifications. Steady sta_e errors and error constants of different types of control systems Generalised error series method

Concepts of stability: Necessary conditions of stability, Hurwitz stability criterion, routh stability criterion, application of routh stability criterion to linear feed back systems, relative stability

Root locus techniques: Root locus concepts, rules for construction of root loci, determination of roots from root locus, root contours. systems with transportation lag

Module – III (10 hours)

Frequency domain analysis: Introduction, Bode plots, determination of stability from Bode plots, polar plots, nyquist stability criterion, application of nyquist stability criterion to linear feed back systems

Closed loop frequency response: Constant M circles, constant N circles, use of Nicolas chart

Controllers: Introduction, Propo_ional, derivative and integral control actions, PO, PI and PID controllers and their applications to feed back control systems, Zeigler- Nichols method of tuning PID controllers for known dynamic model of the plant.

Module – IV (10 hours)

State variable analysis: Introduction, concept of state variables, state vector, input and output vector, general state model representation of linear time invariant, SISO and MIMO systems and their block diagram representations, state model representations of physical systems

Digital Control System: Introduction to digital control system, Shanon's sampling theorem, signal reconstruction, transfer function of ZOH, the z-transforms of various functions, inverse z transform, properties of z-transform, soluti()n of difference equations, the pulse-transfer function of linear feedback systems.

Introduction to MAT Lab.

Text Books:

1. Control Systems Engineering by LJ. Nagrath, M. Gopal, Third Edition, New Age International Publishers.
2. Modem Control Engineering by K. Ogata, PHI
3. Modem Control Engineering by D. Roy Choudhury, PHI

Reference Books :

1. System Dynamics and Control: Eroni Umez Erani, PWS Publishing, International Thompson Publishing Company

2. CQntrol System, Theory & Applications by Sama_it Ghosh, Pearson Education

CPEE 5306 POWER ELECTRONICS (3-0-0)

Module - I (8 hours)

Power Semiconductor Devices: Power diodes, Power Transistors and Thyristors, Static V-I Characteristics of SCR, TRIAC, GTO & IGBT, Turn-On & Turn-OFF Mechanism of SCR, its gate characteristics , Device Specification and rating, series and parallel operation, thyristor protection circuits, design of snubber circuit.

Triggering Circuits:
Types of triggering schemes : DC, AC & pulsed triggering, UJT triggering scheme, R-C triggering scheme, cosine – law triggering scheme.
Commutation.
Principle of natural commutation and forced commutation, circuits for forced commutation (Resonant commutation, voltage commutation, current commutation, load commutation).
(4 Lectures)

Module-II

Control Rectifiers (AC to DC Converter)

Single Phase- Circuit Configuration and Principle of operation of operation of half wave, full wave controlled rectifiers (full converters and semi converters) wave form of voltage and current at the output and across the thyristor for R-L & R-L-E load, effect of source inductance, importance pf free wheeling diode for inductive loads. Input power facter for R& R-L load, Ripple factor. Average output voltage and currents.

Three Phase Controlled Rectifiers :
Half wave and full wave full controlled bridge rectifiers. Three phase semi-converters, average output voltage and current for R & R-L load.

Module –III (10 hours)

Inverters (DC to AC Converters):
Single Phase – Series inverters :Circuit description and principle of operation for simple and improved circuit. Parallel inverter : Basic circuit description and principle of operation without and with feed back diodes.
Bridge Inverters: Principle of operation :
Principle of operation of modified Mc Murray & Mc Murray Bedford inverters . Concept of voltage source inverter & current- source inverter.
Three Phase : Concept of three phase bridge inverters, principle of operation (180° conduction mode & 120° conduction mode), wave form of output voltage and current for R & RL load.

Module –IV (10 hours)
DC Choppers:
Basic Principles of class A, B, C, D, E Choppers, voltage commuted chopper, current commutated chopper and load commutated chopper.
Jones Chopper & Morgan Chopper .

Cyclo Converter (Single Phase) :
Basic Principle of Single phase Mid Point Cyclo Converters and brides types cyclo converters.
Application:
Over voltage protection, zero voltage switch, integral cycle triggering (or Burst Firing), Uninterruptible power supply (UPS), Arc welding, HVDC transmission.

Text Book:

1. Power Electronics – Singh & Khanchandani TMH
2. Power Electronics – P. S. Bhimbra

Reference Book :

1. Power Electronics – P. C. Sen TMH.

CPEN 5301 SENSORS AND SIGNALS (3-1-0)

Sensors :

Module – I (15 hours)

Resistive Sensing Elements: Resistance Thermometers and Thermistors, Metal and Semiconductor Resistance strain Gauges. Capacitive Sensing Elements. Inductive Sensing Elements : Variable Inductance displacement Sensor, (LVDT displacement Sensor) Electromagnetic Sensing Elements. Thermodectric Sensing Elements. Elastic Sensing Elements. Piezoelectric Sensing Elements, Electromechanical Sensing Elements: Ion Selective Electrodes, Solid state Gas Sensors. Pneumatic Transducers, Differential Pressure Transducers, Turbine Transducer – Rotating Toothed Ferromagnetic wheel Radiation Sensors – Photodetector, Photosensistor, X-ray and Nuclear Radiation Sensors .

Module – II (12 hours)

Signal Conditioning Elements :

Deflection Bridges. Thevenin's Equivalent Circuit. Design of Resistive Deflection Bridges, Two Element Resistance Thermometer Bridge. Design of Reactive Deflection Bridge, Amplifiers: Limitations of Practical Operational OpAmps. IC Instrumentation Amplifier Isolation Amplifier. A. C Carrier Systems Current Transmitters : Closed Loop Differential Pressure transmitter. Open loop Differential pressure and Temperature transmitters. Intelligent transmitters. Oscillators and Resonators.

Module – III (6 hours)

Signal Processing Elements :

A/D Converter : Sampling, Quantization, Encoding . Frequency to digital conversion, Digital to Analogue Converters (DAC). Analogue to Digital Converters (ADC) .

Module – IV (6 hours)

Display Elements:

Review and choice of Data Presentation elements. Pointer Scale Indicators, Analogue Chart Recorders . Small Scale alphanumeric displays. Liquid Crystal displays. Monitors. Digital Printers.

Module –V (5 hours)

Intrinsically safe Measurement Systems.

Pneumatic Measurement Systems, Intrinsically safe electronics measurement Systems.

Text Books :

1. Principles of Measurement Systems – 3rd Edition by John Bantly. Ch. 8,9,10,11 and 13.
2. Instrumentation and Process Measurements by W. Bolton Ch, 2,3, and 4.
3. Industrial Control and Instrumentation by W. Bolton . Ch. 3,4, and 7.

Additional Reading :

1. Elements of Electronics Instrumentation and Measurement , 3rd Edition by Joseph J. Carr, Pearson Education.
2. Sensors and Transducers by D. Patranabis Wheeler publishing.

CPEN 5302 PRINCIPLES OF MEASUREMENT SYSTEMS (3-0-0)

Module – I (5 hours)

The General Measurement System – Purpose & Basic Elements. Static Characteristics of Measurement System elements: Systematic Characteristics, Generalized Model of a System element . Statistical characteristics-repeatability, tolerance . Identification of static characteristics – Calibration, standards. Experimental Measurements and evaluation of results.

The Accuracy of Measurement Systems in Steady state : (4 hours)

Measurement error of a system of ideal elements. The error probability density function of a system of non ideal elements. Error reduction techniques.

Module – II (6 hours)

Dynamic Characteristics of Measurement Systems : Transferfunction G (s) of typical First order and Second order System elements. Response of First & Second order elements to step and sine wave input. Dynamic Errors in Measurement Systems. Techniques for Dynamic Compensation .

Loading effects and two part Networks: (6 hours)

Electrical Loading : Theyenin's & Nortons' equivalent circuits. Two part Networks : Equivalent circuits for Mechanical and Thermal Systems and sensing elements. Process loading. Bilateral Transducers.

Module – III (12 hours)

Signals & Noise in Measurement systems. Statistical Representation of Random Signals, Power Spectral Density function. Auto Correlation Function. Effects of Noise and Interference on Measurement circuits. Sources of Noise. Coupling Mechanism to external sources. Methods of reducing effects of noise and interference–Electromagnetic Shielding, Electrostatic Screening, use of Differential amplifiers, Filtering, Modulation , auto Correlation, averaging.

Reliability choice Fundamental Principles of Reliability Practical Reliability Definition, Failure rate & its relation to Reliability. Failure Rate Function. Reliability of Systems, Design & Maintenance for reliability.

Module – IV (8 hours)

Measurement techniques for Process variables, Pressure measurement; Measurement of level and Density; Measurement of flow and Measurement of Temperature.

Text Books:

1. Principles of Measurement System , 3rd Edition by John P. Bentley , Pearson Education. Selected portion from Chapter 1-7, and 12, 13 & 14 .

2. Instrumentation and Process Measurements by W. Bolton , University Press. Selected Portion from Chapter 1,5,6,7 and 8.

Additional Readings

1. Elements of Electronics Instrumentation and Measurement, 3rd Edition by Joseph J. Carr, Pearson Education.
2. Industrial Control and Instrumentation by W. Bolton, University Press.
3. Introduction to Instrumentation and Control By A.K, Ghosh, PHI.

PRACTICALS

CPEE 9305 POWER ELECTRONICS LAB. (0-0-3)

(Any 10 experiments must be done)

1. V-I characteristics of SCR.
2. Different method of triggering of SCR.
    a) Phase controlled method.
    b) UIT Triggering method.
    c) Cosine controller triggering method.
3. Study of triac and full wave voltage control method of it.
4. 1 phase half wave and full wave full controlled converter with R, R-L and D. C motor load with / without freewheel diode. .
5. 3- Phase half and fill wave full controlled converter with R, R-L and D.C motor load with/without freewheeling diodes.
6. Study of characteristics curves of a 3 phase diode bridge.
7. Study of DC chopper with PWM controller
8. Study of SCR communication
    a) Forced Communication
    b) Load communication
9. Study of single phase series inverter.
10. Three phases IGBT based four quadrant chopper drive for D. C. motor.
11. Three phase IGBT based four quadrant chopper drive for induction motor.
12. Study of 1 phase cycle converter.

CPEN 9301 SENSORS AND SIGNALS LAB. (0-0-3)

(Any five from 1-10 and 11,12,13,14 and 15 should be done)

Credit = 2

Passive Electrical Transducers:

1. Resistance temperature Characteristics of a thermiter. (3hrs)
2. Strain Gauge transducer. (3hrs)
3. Linear variable differential Transducer. (3hrs)
4. Capacitive Transducer. (3hrs)

Active Electrical Transducers :

5. Temperature – emf characteristics of thermocouple. (3hrs)
6. Piezoelectric Transducer and their characteristics. (3hrs)
7. Hall –effect transducer. (3hrs)
8. Electro-chemical Transducer – measurement of Bioelectric signals. (3hrs)
9. Photodiode – Measurement of VI characters. (3hrs)
10. Digital Displacement Transducers. (3hrs)
11. Low pass, high pass, band pass active filters. (6hrs)
12. IC instrumentation Amplifier. (6hrs)
13. Analogue to Digital Conversion of a sinusoidal signal. (3hrs)
14. Digital to Analogue Conversion. (3hrs)
15. Amplitude modulation - Balanced Modulator. (3hrs)

CPEN 9302 MEASUREMENT LAB. (0-0-3)

(Any six experiments from 1-8, 9,10 &11 expt.12 should also be done)

Oscilloscope measurements

1. Sine wave , Square wave and Pulse Measurement .
   (3 hrs)
2. Phase and frequency measurement - Time base method and Lissageous figure method.
   (3 hrs)
3. Pulse Delay measurement - in Digital counters.
   (3 hrs)
4. Frequency Response Measurement and square wave Testing.
   (3 hrs)
5. Linearity measurement of an Amplifier.
   (3 hrs)
6. Dynamics measurement - Displaying VI characteristics of a component.
   (3 hrs)
7. Amplitude modulation measurement.
   (3 hrs)
8. Time domain Reflectometry.
   (3 hrs)

Other Measurements :

9. Spectrum Analysis by bank –of-fillters.
   (6 hrs)
10. Wavemeter measurement.
    (3 hrs)
11. Resolution of bandwidth measurement.
    (3 hrs)
12. Spectrum Analyzer Measurements
    (6 hrs)

Electronic Test Instruments Analogue and Digital Measurements – 2nd Edition by Robert A White . Pearson.

6th Semester
HSSM 4302 PRODUCTION AND OPERATIONS MANAGEMENT (3-0-0)

Objective : This course aims at acquainting all engineering graduates irrespective of their specializations the basic issues and tools of managing production and operation functions of an organization.

Module I

1. Operation Function in an Organization, Manufacturing Vrs Service Operation, System view of Operations, Strategic Role of Operations, Operations Strategies for Competitive Advantages, Operations Quality and Productivity Focus, Meeting Global Challenges of Production and Operations Imperatives.

   (3 hours)

2. Designing Products, Services and Processes New Product Design : Product Life Cycle, Product Development Process, Product Quality and Reliability Design, Process Technology : Project , Jobshop, Batch, Assembly Line, Continuous Manufacturing, Process Technology Life Cycle, Process Technology Trends; FMS, CIM, CAD, CAM, GT, Design for Services, Services Process Technology, Services Automation. Value Engineering, Standardization, Make or buy Decision.

   (4 hours)

3. Job Design and Work Measurement, Method Study : Techniques of Analysis, recording, improvement and standardization. Work Measurement : Work Measurement Principles using Stopwatch Time Study, Predetermined Motion Time Standards and Work Sampling, Standard Time Estimation.

   (4 hours)

Module II

4. Location and Layout Planning : Factor Influencing Plant and Warehouse Locations, Impact of Location on cost and revenues. Facility Location Procedure and Models : Qualitative Models, Breakeven Analysis, Single Facility, Location Model, Multi-facility Location Model, Mini max Location, Total and Partial Covering Model.

   Layout Planning : Layout Types : Process Layout, Product Layout, Fixed Position Layout Planning, Systematic Layout Planning, CRAFT.

   Group Technology and Cell Formation, Rank Order Clustering Method for Machine – Component Assignment,. Line Balancing : Basic concepts, General Procedure, Rank Positional Weight Method.

   (7 hours)

5. Forecasting : Principles and Method, Moving Average, Double Moving Average, Exponential Smoothing, Double Exponential Smoothing, Winter's Method for Searonal Demand, Forecasting Error Analysis.

   (4 hours)

Module III

6. Manufacturing Planning and Control : The Framework and Components : Aggregate Planning, Master Production Scheduling, Rough-cut-Capacity Planning, Material Requirements Planning, Capacity Requirements Planning, Shop Order System and Purchase Order System. Transportation Method for Aggregate Production Planning, Material Requirement Planning, Scheduling and Dispatching Functions, Progress Monitoring and Control.

(4 hours)

7. Sequencing and Scheduling : Single Machine Sequencing : Basics and Performance Evaluation Criteria, Methods for Minimizing Mean Flow Time, Parallel Machines : Minimization of Makespan, Flowshop sequencing : 2 and 3 machine cases : Johnson's Rule and CDS heuristic. Jobshop Scheduling : Priority dispatching Rules.

8. Inventory Control : Relevant Costs, Basic EOQ Model, Model with Quantity discount, Economic Batch Quantity, Periodic and Continuous Review Systems for Stochastic Systems, Safety Stock, Reorder Point and Order Quantity Calculations. ABC Analysis.

(4 hours)

Module - IV

9. Project Management : Project Management through PERT / CPM. Network Construction, CPM, Network Calculation, Crashing of Project Network, Project Scheduling with Limited Resources. Line of Balance.

(5 hours)

10. Modern Trends in Manufacturing : Just in Time (JIT) System; Shop Floor Control By Kanbans, Total Quality Management, Total Productive Maintenance, ISO 9000, Quality Circle, Kaizen, Poke Yoke, Supply Chain Management

(6 hours)

Reference

1. J. L. Riggs : Production Systems : planning Analysis and Control, John Wiley.
2. E. E Adam and R. J. Ebert " Production and Operation Management", Prentice Hall of India, 2004.
3. S.N. Chary, " Production and Operations Management", Tata McGraw Hill.
4. R. Paneerselvam, "Production and Operation Management, Prentice Hall of India, 2005.

CPEC 5305 MICROPROCESSOR & MICROCONTROLLER (3-1-0)

Module – I (12 hours)

Microprocessor Architecture:- Introduction to Microprocessor and Microcomputer Architecture, Pins & Signals, Register Organization, Timing & Control Module, 8085 Instruction Timing & Execution.

Instruction Set and Assembly Language Programming of 8085:- Instruction set of 8085, Memory & I/O Addressing, Assembly language programming using 8085 Instruction Set, use of Stack & Subroutines.

Memory Interfacing:- Interfacing EPROM & RAM Memories: 2764 & 6264,

Interrupts :- 8085 Interrupts

Module – II (12 hours)

Microprocessor Based System Development Aids:- Programmable Peripheral Interface: 8255, Programmable DMA Controller: 8257, Programmable Interrupt Controller: 8259

Microcontroller (Architecture and Programming):- Introduction to 8051 Microcontrollers (Architecture, Pin description), 8051 Assembly Language Programming (JUMP, LOOP, CALL Instructions), I/O Port Programming, 8051 Addressing Modes, Arithmetic & Logic Instructions

Module – III (12 hours)

Microcontroller Interrupts and Interfacing to 8255:– 8051 Interrupts, Interfacing to 8255

Intel 8086 (16 bit processors):- 8086 Architecture, Addressing Modes, Instruction Format, Pins & Signals, 8086 Basic System Concept, Interfacing with Memories, 8086 Interrupts.

Module – IV (11 hours)

Intel 80386 :- Introduction to 80386 Microprocessor, Architecture, Pins & Signals, Memory System, Registers, 80386 Memory Management, Paging Technique, Protected Mode Operation, brief introduction to 80387 Math Coprocessor.

Pentium Processors (Only features):- Introduction to Pentium Processors, Memory System, Input/Output System, Branch Prediction Logic, Floating Point Module, Cache

Structure, Superscalar Architecture.

(Only the features of Pentium Processor mentioned above are to be discussed)

TEXT BOOKS:

1. 0000 to 8085 – Introduction to Microprocessor for Scientists & Engineers by Ghosh & Sridhar, PHI publication (for Module I to Module – III)
2. Advanced Microprocessor and Peripherals (Architecture, Programming & Interfacing) by A.K. Roy & K.M. Bhurchandi – TMH Publication (For Module-V to Module- VII)
3. The 8051 Microcontroller & Embedded Systems by Mazidi & Mazidi – Pearson / PHI publication (For Module-IV)
4. Microcontrollers [theory and applications] TMH publication by Ajay V. Deshmukh. (Chapter – 2 to Chapter – 6)
5. Microprocessors and programmed logic (2nd Edition), Pearson Education by Kenneth L. Short

REFERENCE:

1. Microprocessor architecture, programming & application with 8085 by R.S. Gaonkar.
2. Microprocessor – Theory & Applications. (Intel & Motorola) by M. Rafiqzzaman.
3. The Intel Microprocessor – (Architecture, Programming & Interfacing) by Barry B. Brey.

CPEC 5302 DIGITAL SIGNAL PROCESSING (3-0-0)

Module – I (10 hours)

Discrete Time Signals and System

Discrete Time Signals (Elementary examples , classification : periodic and a periodic Signals energy and Power signals , Even and Odd Signals) .

Discrete Time System :

Block diagram representation of discrete time systems, classification of discrete time systems –static and dynamic, time variant and time – invariant, linear and non-linear, casual and anti-casual, stable and unstable.

Analysis and response (convolution sum) of discrete - time linear LTI system, Recursive and Non-recursive discrete time system. Constant coefficient differences equations and their solutions, impulse response of LTI system , structures of LTI systems Recursive and Non-recursive realization of FIR system. Correlation of dispute time Signal.

Selected portions from Chapter 2 (2.1, 2.2,2.3,2.4,2.5, 2.6.1) of Textbook – I

Chapter 1 of Textbook- 2.

Module – II (10 hours)

The Z transform :

The Z-transform and one-sided Z-transform, properties of Z-transform , inverse of the Z-transform , Solution of difference equations.

Selected portions from Chapters 3 (3.1, 3.2,3.5) of Textbook – I

Selected portion of chapter 4 of Textbook - 2

The Discrete Fourier Transform

The DFT and IDFT, relationship , DFT with Z- transform , the DFT as a linear transformation Relationship of DFT with Z-transform , properties of DFT: periodicity, linearity, summery and time reversal of a sequence.

Circular convolution, circular correlation, circular correction by convolution, method linear convolution by overlap save methods and by overlap add method, Circular convolution and correlation by DFT method, Overlap add and save filtering by DFT method.

Selected portion from Chapter – 5 (5.1.2,5.1.3,5.1.4,5.2,5.2.1,5.2.2, 5.2.3, 5.3.2) of textbook – 1.

Selected portion of chapter 6 of textbook - 2.

Module- III (10 hours)

Fast Fourier Transform :

Operation counts by direct copulation of DFT, Radix – 2 FFT algorithm- Decimation –in-time (DIT) and Decimation – in frequency (DIF) algorithm, Efficient computation DFT of Two real sequences , Efficient Computation of DFT of a 2 N-pt real sequences.

Selected portions from chapter 6 (6.1.1,6.1.3, 6.2.1, 6.2.2) of Text book –I

Selected portions from chapter 7 and 8 of Text book – 2.

Design and Digital Filters:

Casually and its implication, Design of linear phase FIR filters using different windows. Design of IIR filters – Impulse Invariance Method and Bilinear transformation method.

Selected portions from chapter 8 (8.1.1, 8.2.1, 8.2.2., 8.3.2,8.3.3.) of Text book – I

Module – IV (10 hours)

Estimation of spectra from finite duration signals, Non-parametric method of power spectrum estimations. The Bartleff method and the Blackman and Tukey method.

Selected portion from chapter 12 of Text book - 1: 12.1,12.1.1,12.1.2,12.1.3,12.2.1, 12.2.3.

Selected portion from chapter 12 of Text book – 2

Implementation of Discrete Time System structure of FIR systems – Direct form, cascaded form. Structure IIR Systems – Direct form I & II realizations

Selected portions from chapter 7 (7.2, 7.2.1, 7.2.2, 7.3, 7.3.1) of Text book –I

Selected portions from chapter 9 of Text book – 2.

Text Books :

1. Digital Signal Processing – Principles, Algorithms and Applications by J. G. Proakis and D. G. Manolakis, 3rd Edition, Pearson.
2. Digital Signal Processing by S. Salivahanan, TMH

Reference Book :

Introduction of Digital Signal Processing – J. R. Johnson, PHI.

CPEN 5303 ELECTRONICS INSTRUMENTATION AND MEASUREMENTS (3-1-0)

Module – I (5 hours)

Analogue Electronics Volt-ohm-Milliammeters. Transistor Voltmeter Circuits. FET-Input Voltmeter. OPAMP Voltmeter Circuits. Ohmmeter function in Electronic Instruments, AC Electronic Voltmeters. Analogue Electronic Multimeters. Multimeter Prober

Digital Voltmeters and Frequency meters. (5 hours)

Ramp and Dual-slope-Integrator Digital Voltmeters, Digital Multimeters, Digital Frequency meter. Time and Ratio Measurement.

Module – II (10 hours)

Cathode Ray Oscilloscopes

Cathode Ray Tube, Deflection Amplifiers, Time Base, Dual Trace Oscilloscope, Oscilloscope Controls, Oscilloscope Probes, Measurement of Amplitude, Phase and frequency. Pulse Measurements. Display of Device Characteristics, X-Y and Z Displays. Oscilloscope Specification & Performance. Special Oscilloscopes: Delayed Time Base Oscilloscope; Sampling Oscilloscope; Digital Storage Oscilloscope , DSO Application.

Module – III (6 hours)

Signal Generators

Low Frequency Signal Generators, Function Generators, Pulse Generators , RF Signal Generators, Sweep frequency Generators, Frequency Synthesizer

Calibration of Instrument : (4 hours)

Comparision Methods, Digital Multimeters as standard Instruments. Calibration Instruments. Potentiometer calibration Methods.

Module – IV (3 hours)

Spectrum Analyzer: Block diagram , Operation, performance and application- Digital spectrum Analyzer.

Measurements : (4 hours)

Measurement of frequency and Time standard broadcast by Radio Stations. Squarewave. Testing of an amplifier. Measurement on tuned Circuits . Measurement on Noise figure of a Communication Receiver.

Text Books :

1. Electronic Instrumentation and Measurements, 2nd Edition, by David A. Bell, Prentice Hall of India. Chapter 4,6,9,10,11,12,and 14.
2. Elements of Electronic Instrumentation and Measurement, 3rd Edition, by Joseph J. Carr, Pearson Education, Selected portion from 7,8,9,14,18,20 and 22.

Additional Reading :

1. Electronic Test Instruments – Analog and Digital Measurements, 2nd Edition By Robert A. Witte, Pearson Education.
2. Modern Electronic Instrumentation and Measurement Techniques by Albert D. Helfrick and Willim D. Cooper, Pearson Education, First Indian Reprint, 2005.

CPEN 5304 FIBER OPTIC INSTRUMENTATION (3-0-0)

Module I (7 hours)

Optical Sources : Light Emitting Diodes (LEDs) . LED Structures. Light Source Materials Quantum Efficiency and LED Power, Modulation of an LED.

LASER diodes : Principle of Operation. Modes and Threshold Conditions. Structure Optical output power and drive current- Quantum efficiency, Resonant frequencies. Radiation Pattern. Single Mode Lasers. Modulation of Laser diode

Optical Detectors : (7 hours)

P-n junction Photo diodes–how they work . Power relationship , Responsivity Vrs wavelength Equivalent Circuit of a p-n Photo detector. Bandwidth . p-i-n photo diode and APD photodiode. Principle of operation. Sources of noise, Noise Equivalent Circuits . Signal to noise ratio for p-i-n and APD Photodiodes. Photodiode Sensitivity.

Module II

Optical Fiber (6 hours)

Fiber Materials - Ray Propagation in Step-Index Fibers, Total internal reflection. Ray Propagation in Graded Index Fibers. Mode Theory. Monomode Fibers. Attenuation in Optical Fibers – absorption, scattering and bending losses.

Power Launching and Coupling 4 hours)

Source-to- Fiber Power Launching. Power launching calculation. Equilibrium Numerical Aperture. Lensing Schemes for coupling Improvement.

Module - III

Fiber-Optic Sensors (5 hours)

Intensity Modulated Sensors. Phase Modulated Sensors. Fiber-optic Mech-Zehnder Interferomatric sensor . Fiber-optic Gyroscope Spectrally Modulated Sensors. Distributed Fiber Optic Sensors.

Optical Amplifiers : (4 hours)

Semiconductor Optical amplifiers (SOA). Fabry –Perot type Erbium Dioped Fiber amplifiers.

Module IV

Fiber –optic Measurements: (4 hours)

Modulation of Intensity by sources. Modulation of Intensity by Transmission medium. Two Wave Noveleyth Systems. Interferometers.

Text Books:

1. Optical Fiber Communication, 3rd Edition by Gerd Keiser, McGraw Hill International Edition. Selected Portions from Ch. 4,5,6 and 11.
2. Fiber Optics and Opto electronics by R. P. Khare, Oxford University Press Selected Portion from Ch. 2,3,4,5, & 13.
3. Principles of Measurement Systems, 3rd Edition by John P. Bentley. Ch. 15.

Additional Reading:

4. Fiber optic Communications by Harold Kolimbins, Pearson Education.

CPEN 5305 ADVANCED ELECTRONICS CIRCUITS (3-0-0)

Module – I (10 hours)

Active Filters :

First & Second order low pass / high pass, band pass, band reject, and all pass filters. Universal active filter design. Wien Bridge oscillator, Sawtooth wave generator OP Amps. Voltage Controlled Oscillator.

Module – II (10 hours)

Bistable Multivibrator : Stable States, Fixed Biased and Self-biased Transistor binary, Commutating capacitors, Symmetrical / Unsymmetrical triggering, Schmitt trigger Circuit. Cathode coupled Binary, Emitter coupled Binary .

The Monostable Multivibrator: Gatewidth Collector coupled, wave forms triggering. Emitter- coupled Monostable Multi.

Astable – Multivibrator : Emitter coupled, Collector coupled , Wave forms.

Module – III (12 hours)

Wideband amplifiers and Negative resistance devices :

Frequency response; Transient response of transistor stage, shunt compensation of a transistor stage in cascade, Other methods of compensation. Rise time of cascaded compensated stages, low frequency compensation.

Negative Resistance Switching Circuits:

Tunnel Diode operation and characteristics, Monostable Astable, Bistable circuits using tunnel diode , Voltage controllered Negative Resistance Switching Circuits. UJT operation and characteristics . Application of UJT to generate Sawtooth waveform .

Module - IV (10 hours)

Analysis & Design of : Voltage time base generator. Current time base generator

Instrumentation Amplifier , IC 555 Timer , Phase Locked Loop.

Text Book:

1. Pulse , Digital and switching Waveforms - Jacob Millman and Herbert, Taub (TMH Publication).

2. OP-Amps and Linear Integrated Circuits – Ramakant A. Gayakwad (PHI Publication).
3. Pulse and Degital Circuits by A. Anand Kumar, PHI

Supplementary Books:

1. OP-Amps and Linear Integrated Circuits – Robert F. Coughlin, Frederick F. Driscoll (Pearson Education Publication).

PRACTICALS

CPEC 9304 MICROPROCESSOR & MICROCONTROLLER LAB. (0-0-3)

A) 8085 (2 hours)

1. Addition, Subtraction, Multiplication, Division two 8 bit numbers resulting 8/16 bit numbers.
2. Smallest /Largest number among n number in a given data array + Binary to Gray Code / Hexadecimal to decimal conversion.

(1 hour)

B) INTERFACING (5 hours)

COMPULSORY (1 hour)

1. Generate square waves on all lines of 8255 with different frequencies (concept of delay program) 1 lecturer)
2. Study of stepper Motor and its operations (Clockwise, anticlockwise, angular movement, rotate in various speeds)

OPTIONAL (Any Two) (1 hour)

1. Study of Traffic Light controller
2. Study of Elevator Simulator
3. Generation of Square , triangular and saw tooth wave using Digital to Analog Converter
4. Study of 8253 and its operation (Mode 0, Mode 2, Mode 3)
5. Study of Mode 0, Mode 1, BSR Mode operation of 8255.
6. Study of 8279 (keyboard & Display interface)
7. Study of 8259 Programmable Interrupt controller.

C) 8051MICROCONTROLLER (3 hours)

COMPULSORY (2 hours)

1. Initialize data to registers and memory using immediate, register , direct and indirect addressing mode

OPTIONAL (any one) (1 lecture)

1. Addition, subtraction of 16 bit numbers.
2. Multiplication, Division of 16 bit numbers
3. Transfer a block of data to another memory location using indexing.
4. Operation of 8255 using 8051 microcontroller

D) 8086 (2 hours)

COMPULSORY (1 hour)

1. Addition, subtraction, Multiplication , Division of 16 bit nos + 2's complement of a 16 bit no.

OPTIONAL (Any One) (1 hour)

1. Finding a particular data element in a given data array.
2. Marking of specific bit of a number using look-up table.
3. Largest /Smallest number of a given data array.
4. To separate the Odd and Even numbers from a given data array.
5. Sorting an array of numbers in ascending/descending order

Total – 13 hours

NOTE Total 10 (Ten) experiments have to be completed .

Two from GP-A , four from Gp- B, Two from Gp – C Two from Gp – D

CPEC 9302 DIGITAL SIGNAL PROCESSING LAB. (0-0-3)

(Experiments 1-8 are compulsory. But all expts. should be done))

1. Different types of Signal generation using Matlab. (both continuous and discrete.) (3 hours)
2. Linear Convolution of sequences. (Without using the inbuilt function (conv) available in Matlab.) (3 hrs)
3. Circular Convolution of two Sequences Comparission of result with the result obtained from Linear convolution. (3 hours)
4. i) Finding Auto correlation of a sequence
   ii) Finding cross correlation of 2 sequences.
   iii) Finding power spectral density of a sequence. (3 hours)
5. Finding the convolution of periodic sequence using DFT and IDFT. (3 hours)
6. Implementation of FFT (Fast Fourier Transform) algorithm
   i) Decimation in Tane (DIT)
   ii) Decemation in Frequency (DIF) (6 hours)
7. Design of FIR filter (lowpass, highpass,bandpass). Using windowing technique (harming window, haming, window rectangular window, Kaiser window. (9 hrs)
8. Design of IIR filter. (Design of Butterworth Filter Design of Chebyshev filter) . (6 hrs)
9. Convolution of long duration sequences using overlap add, overlab save meter. (3 hrs)
10. Working with a DSP processor. (fixed point -TMS320C-5X / Floating point) series.
    i) Implement convolution (Linear & circular convolution)
    ii) FIR & IIR implementation. (6 hrs)

Lab. Reference :

Digital Signal Processing a hands –on approach by Schucer C, Mohesh Chgave. (TMH)

CPEN 9301 INSTRUMENTATION DESIGN & SIMULATION LAB. (0-0-3)

(All to be done)

1. Design and Simulation of comparators and Schmidt Trigger circuits using Op Amps. (6 hrs)
2. Design and Simulation of an Instrumentation amplifier . (6 hrs)
3. Design of an SMPS Power supply. (6 hrs)
4. Design and simulation of a function generator to generate .
   i) Sine wave
   ii) Square wave
   iii) Pulse

   (9 hrs)
5. Designing a Digital Multimeter.

   (6 hrs)
6. Design and simulation of frequency counter.

   (6 hrs)
7. Design & simulation of a Bank -of- Filters spectrum analyzer.

   OR

   Designing a FFT spectrum analyzer.

   (6 hrs)

COURSE STRUCTURE
FOURTH YEAR B.TECH PROGRAMME
APPLIED ELECTRONICS AND INSTRUMENTATION ENGINEERING

7th Semester				8th Semester			
Theory		*Contact Hrs.*	*Credit*	*Theory*		*Contact Hrs.*	*Credit*
		L-T-P				**L-T-P**	
HSSM 4403	Environmental Engineering	3-0-0	3	HSSM 4404	Marketing Management	3-0-0	3
CPEC 5403	VLSI Design	3-0-0	3	CPEN 5401	Process Control Instrumentation	3-1-0	4
CPBM 8401	Biomedical Electronics & Inst.	3-1-0	4		**Electives** (***Any Two***)	6-0-0	6
PECS 3401	Soft Computing	3-0-0	3	PEEN 5401	ModernRadarTechnique		
CPEC 5308	Communication Engg.	3-0-0	3	PEEN 5402	IndustrialInstrumentation		
	Electives (***Any one***)	3-0-0	3	PEEC 5411	AdvancedCommunication Systems		
BCSE 3306	Computer Networks			PECS 3408	ImageProcessing		
BCSE 3401	Computer Graphics & Multimedia			PECS 3414	ComputerOrganization		
PEEC 5402	Adaptive Signal Processing			BCSE 3305	OperatingSystem		
PEBM8401	Biomedical Inst. & Mesurement						
	Total		**19**		**Total**		**13**
Practicals/Sessionals		*Contact Hrs.*	*Credit*	*Practicals/Sessionals*		*Contact Hrs.*	*Credit*
CPEN 9401	Project		3	CPEN 9403	Project		7
CPEC 9408	Communication Engg. Lab	0-0-3	2	CPEN 9404	Seminar		1
CPEC 9403	VLSI Lab.	0-0-3	2	CPEN 9405	Process Control Laboratory	0-0-3	2
CPEN 9402	Seminar		1	CPEN 9406	Entrepreneurship Project	0-0-3	2
				CPEN 9407	Comp. Viva Voce		2
			8				**14**
	Total		**27**		**Total**		**27**

L-Lecture **T-Tutorial** **P-Practical**

7th Semester

HSSM 4403 ENVIRONMENTAL ENGINEERING (3-0-0)

Objective : This course introduces the students to the environmental consequences of Industries, development actions etc. and the methods of minimizing their impact through technology and legal systems.

Module – I

Ecological Concepts and Natural Resources : Ecological perspective and value of environment. Environmental auditing, Biotic components, Ecosystem Process : Energy, Food Chain, Water cycle, Air cycle etc., Environmental gradients, Tolerance levels of environment factor, EU, US and Indian Environmental Law, Global Perspective.

Chemistry and Microbiology in Environmental Engineering : Physical and chemical properties of water, Atmospheric chemistry, Soil chemistry, Microbiology, Chemical and biochemical reactions, Material balances and Reactor configurations.

Concept in Hydrology : Hydrological cycle, Water balance, Energy budget, Precipitation, Infiltration, evaporation and evapotranspiration, Rainfall-runoff relationships, Urban hydrology, Ground water, Ground water chemistry, Water contamination and pollution prevention.

Module – II (9 hours)

Water Pollution : water quality standards and parameters, Assessment of water quality, Aquatic pollution, Freshwater pollution, Estuarine water quality, Marine pollution, Organic content parameters, DO and BOD demand in streams, Transformation process in water bodies, Oxygen transfer by water bodies, Turbulent mixing, Water quality in lakes and preservers, Ground water quality.

Air Pollution : Air pollution and pollutants, criteria pollutants, Acid deposition, Global climate change –green house gases, non-criteria pollutants, emission standard form industrial sources, air pollution metereology, Atmospheric dispersion.

Noise Pollution : Physical Properties of sound, Noise criteria, Noise Standards, Noise measurement, Noise control.

Module – III (15 hours)

Water Treatment : Water quality standards, Water sources and their quality, Water treatment processes, Pre-treatment of water, Conventional process, Advanced water treatment process.

Waste Water Treatment : Water flow rate and characteristics, Design of waste water network, Waste water treatment process, pretreatment, primary and secondary treatment of waste water, Activated sludge treatment : Anaerobic digestion and its microbiology, Reactor configurations and methane production. Application of anaerobic digestion. Bio-solids regulations, Characteristics and processing of bio-solids, first and second stage processing of sludge. Sludge disposal,. Integrated sewage and sludge management.

Solid Waste Management

Source classification and composition of MSW : properties and separation, storage and transportation, MSW Management, Waste minimization of MSW, Reuse and recycling, Biological treatment, Thermal treatment, Landfill, Integrated waste management.

Hazardous Waste Management, Hazardous waste and their generation, Medical hazardous waste, Household waste, Transportation and treatment of hazardous waste : Incinerators, Inorganic waste treatment, Treatment systems for hazardous waste, handling of treatment plant residue.

Industrial Air Emission Control :

Characterization of air stream, Equipment selection, Equipment design, Special Methods: Flue gas desulphurization, NOx removal, Fugitive emissions.

Module – IV (8 hours)

Waste Minimization : Concept, Life Cycle Assessment, Elements of waste minimization strategy, Benefits of waste minimization, Elements of waste minimization programme, Waste reduction techniques.

Environment impact Assessment, Origin and procedure of EIA, Project Screening for EIA, Scope studies, Preparation and review of EIS.

Reference

1. Environmental Engineering Irwin/ McGraw Hill International Edition, 1997, G. Kiely,
2. Principles of Environmental Engineering and Science, M. L. Davis and S. J. Masen, McGraw Hill International Edition, 2004
3. Environmental Science, Curringham & Saigo, TMH,
4. Principles of Environmental Science, Curringhum
5. Introduction to Environmental Science, Y. Anjaneyalu, B. S. Publication.

CPEC 5403 VLSI DESIGN (3-0-0)

Module - I (10 hours)

Introduction, Historical perspective, VLSI Design methodologies, VLSI Design Flow, Design Hierarchy, Design Styles, CAD Technology . Fabrication of MOSFETS, Fabrication processes, NMOS Fabrication, CMOS n-well process, Layout Design rules, Stick Diagrams, Full Custom Mark Layout Design, MOS Transistor, Review of structure and operation of MOSFET (n-MOS enhancement type), CMOS, MOSFET v-I characteristics , MOSFET scaling and small geometry effects, MOSFET capacitances, Modeling of MOS Transistors- Basic concept the SPICE level-1 models, the level –2 and level –3 model equations.

Module - II (10 hours)

MOS Inverters : Basic NMOS inverters, characteristics , inverters with resistive load and with n-type MOSFET load, CMOS inverter and characteristics .

MOS inverters : Switching characteristics and interconnect effects: Delay time definitions and calculation, inverter design with delay constraints , estimation of parasitics switching power dissipation of CMOS inverters.

Module - III (10 hours)

Combinational MOS logic circuits, CMOS logic circuits, state style, complex logic circuits, pass transistor logic, sequential logic circuit – introduction, SR latch, clocked latch & flip-flop circuits, CMOS D latch and edge triggered flip-flop.

Dynamics logic circuits : Dynamic logic, basic principles, high performance dynamics CMOS circuits, Dynamic Ram, SRAM, flash memory.

Module - IV (12 hours)

Systems Design method, design strategies, concept of FPGA, standard cell based design, design capture tools, hardware definition languages such as VHDL and packages. Xlinx (introduction), introduction to IRSIM and GOSPL (open source packages), design verification and testing, simulation at various levels including timing verification, faults models. Design strategies for testing chip level and system level test techniques.

Text Books :

1. CMOS Digital integrated Circuits – Analysis & Design – Sung Mo-Kang & Yussuf Leblebici, TMH.
2. VHDL Programming by example –Perry TMH.

Reference Books :

1. Digital Integrated Circuits : A Design Perspective – Rabey et.al. Pearson Education.
2. VLSI design Techniques for analog and digital circuits – Geiger et. Al. McGraw Hill.

CPBM 8401 BIOMEDICAL ELECTRONICS AND INSTRUMENTATION (3-1-0)

BIO-ELECTRIC SIGNALS & ELECTRONICS

(1.1) Origin of bio-electric signals,(1.2) Recording Electrodes, (1.3) Skin –contact impedance (1.4) Electrodes for ECG, (1.5) Electrodes for EEG, (1.6) Electrodes for EMG, (1.7) Micro-electrodes (4).

PHYSIOLOGICAL TRANSDUCERS

2.1 Pressure transducers, (2.2) Transducers for body temperature measurement, (2.3) Pulse sensors, (2.4) Respiration Sensors (4).

BIOMEDICAL RECORDERS :

(3.1) Electrocardiograph, (3.2) Phonocardiograph, (3.3) Electroencaphalograph (EEG), (3.4) Electromayograph (4).

PATIENT MONITORING SYSTEM

(4.1) System Concepts, (4.2) Measurement of heart rate, (4.3) Blood Pressure measurement , (4.4) Measurement of temperature , (4.5) Measurement of respiration rate , (4.6) Apnoza detectors (4).

BLOOD FLOW METERS :

(5.1) Electromagnetic blood flow meter, (5.2) Ultrasonic blood flow meter, (5.3) NMR blood flow meter, (5.4) Laser Doppler flow meter (4).

BLOOD GAS ANALYZERS :

(6.1) Blood pH Measurement , (6.2) Measurement of blood PCO2 measurement (4).

BLOOD CELL COUNTERS :

(7.1) Method of cell counting, (7.2) Coulter Counters, (7.3), Automatic recognition and differential counting of cells (5).

PATIENT SAFETY :

(8.1) Electric Shock hazards, (8.2) Leakage currents(8.3) Test Instruments for checking safety parameters of biomedical equipments (5).

Text Book :

1. R. S. Khandpur Handbook of Biomedical Instrumentation, Tata Mc. Graw Hill, New Delhi, 1991.

Additional Reading :

2. Biomedical Instrumentation and Measurements, 2nd Edition, by L. Cromwell , F. J. Weibell and E. A Pfeiffer, Pearson Education.
3. Introduction of Biomedical Equipment Technology , 4th Edition, by Joseph J. Carr and John M. Brown, Pearson Education.
4. Bioinstrumentation by John . Webster edition, John Willey student Edition .

PECS 3401 SOFT COMPUTING (3-0-0)

Module – I (6 hours)

Basic tools of soft Computing – Fuzzy logic, Neural Networks and Evolutionary Computing , Approximations of Multivariate functions, Non – linear Error surface and optimization.

Module – II (10 hours)

Fuzzy Logic Systems : Basics of fuzzy logic theory, Crisp and fuzzy sets. Basic set operations. Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference. Defuzzificaiton. Fuzzy logic control: Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

Module – III (16 hours)

Neural networks : Single layer networks, Perceptron. Activation functions. Adalinc: its training and capabilities, weights learning, Multilayer perceptrons : error back propagation, generalized delta rule. Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks. Recurrent neural networks, Simulated annealing neural networks. Adaptive neuro-fuzzy information ;systems (ANFIS), Applications to control and pattern recognition.

Module — IV (08 hours)

Evolutionary Computing : Genetic algorithms : Basic concepts, encoding , fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic programming concepts Applications.

Books :

1. V. Keeman, "Learning and Soft computing", Pearson Education, India.
2. J.S.R. Jang. C.T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd. , New Delhi.
3. Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
4. S. Haykins, "Neural networks : a comprehensive foundation". Pearson Education , India.

CPEC 5308 COMMUNICATION ENGINEERING (3-0-0)

Module - I (12 hours)

Elements of Communication System – Analogue System, Digital System, Distinguishing features. Electromagnetic Spectrum. Bandwidth. Comparision between Analogue & Digital Communication Systems.

Baseband Signals

Analogue Signal, Digital Signal. Converting an analogue signal to Digital Signal: Sampling, Nyquist Criteria. Information and Sampled value. Quantization and Binary Coding of sampled values . Transformation of Base band signal from Time domain to Frequency domain and Vice-versa. F . T. of few simple baseband signals.

Time Division Multiplexing (TDM), Frequency Division Multiplexing (FDM). Inter Symbol Interference and Crosstalk. Digital Baseband Signal Formats – Unipolar, Bipolar, NRZ and RZ. Pulse Code Modulation, Quantization error. Companding –Pre-emphasis and De-emphasis. TDM of 8-bit PCM Signal. Digital Baseband Reception. Conceptual definition of Matched Filter. Binary Matched Filter Detector.

Module - II (12 hours)

Modulation Techniques :

Need for Modulation, Analogue Modulation Techniques : Amplitude Modulation (AM), Depth of Modulation, Modulated Waveform, Powers in Carrier, and Sidebands. Generation of DSBC and SSB, Balanced Modulator, AM Demodulators. Frequency Modulation (FM) – Frequency Deviation , Frequency Modulated Waveform, Spectrum. Narrow Band FM and Wideband FM. Generation of FM; Narrow Band FM Modulator, Wideband FM Modulator, FM Discriminator.

Digital Modulation Techniques

Phase Shift Keying (PSK), Frequency Shift Keying (FSK) – their Basic Principle, Waveform , Generation and Detection. Ideal low pass, Bandpass and Band rejection filters – their impulse response (no mathematical derivation).

Module – III ***(11 hours)***

Noises in Communication Systems : Sources of Noise, White noise, Narrow Band Noise. Spectral Density Function of Noise (no derivation explaining its utility in noise performance evaluation of a Communication System). Performance of Communication Systems in the Presence of noise: SNR of AM, FM. PSK-PCM-Simple derivation and or Interpretation of Standard SNR expressions in each case.

Noise bandwidth, Available Power, Noise temperature Two port noise Bandwidth, Input Noise Temperature , Noise Figure, Equivalent noise temperature of a cascade. An example of a receiving system.

Antennas and Propagation of Radio Waves :

Dipole Antenna and Parabolic Reflector Antenna- their Principle of Operation, Radiation Pattern and Gain Propagation of Radio wave over ground and through ionosphere . Line of Sight Propagation of Microwave Signal.

Module – IV (10 hours)

Modern Communication Systems:

Brief description of fiber optic communication System : Block Diagram, Range of operating Wavelength , Optical Fiber, Optical Sources - LEO & LASER, Optical detectors; Concept of GH2 - km Bandwidth . Advantages of fiber optic system,

Brief description of Satellite Communication Systems : Block diagram. Frequency bands of operation, uplink and down link frequencies, Transponder , earth stations, Types of Antenn mounted on satellites. Services available through satellite.

Mobile Communication

Cellular Communication System : Block Schamic description , Cellular frequency bands, digital Technology , Cellular Concept, Capacities, Roaming facilities . Received Signal, Fading concept of diversity reception. Multiple access facilities.

Text Books :

1. Analog and Digital Communication Systems 5th Edition by Martin S. Roden. SPD Publisher Selected portion from Ch. 1,2, 3,4 and 5.
2. Principle of Communication System by H. Tanb and D. L. Shilling .
3. Communication Systems by R.P. Singh and S. D. Sapre. TMH.

Additional Reading :

1. Communication Electronics - Principles and Applications, 3rd Edition by Louis E. Freuzel. (For topics 6,7, and 8)

BCSE 3306 COMPUTER NETWORKS (3-0-0)

Module – I 10 hours

Overview of Data Communications and Networking.

Physical Layer : Analog and Digital, Analog Signals, Digital Signals, Analog versus Digital, Data Rate Limits, Transmission Impairment, More about signals.

Digital Transmission : Line coding, Block coding, Sampling, Transmission mode.

Analog Transmission: Modulation of Digital Data; Telephone modems, modulation of Analog signals.

Multiplexing : FDM 150, WDM 155, TDM 157,

Transmission Media : Guided Media, Unguided media (wireless)

Circuit switching and Telephone Network : Circuit switching, Telephone network.

Module –II 12 hours

Data Link Layer

Error Detection and correction : Type of Errors, Detection, Error Correction

Data Link Control and Protocols:

Flow and error Control, Stop-and-wait ARQ. Go- Back. N ARQ, Selective Repeat ARQ, HDLC.

Point-to – Point Access : PPP

Point –to- Point Protocol, PPP Stack,

Multiple Access :

Random Access, Controlled Access, Channelization.

Local area Network : Ethernet.

Traditional Ethernet, Fast Ethernet, Gigabit Ethernet.

Wireless LANs: IEEE 802.11, Bluetooth virtual circuits: Frame Relay and ATM.

Module – III 10 hours

Network Layer : Host to Host Delivery: Internetworking, addressing and Routing

Network Layer Protocols: ARP, IPVA, ICMP, IPV6 ad ICMPR6

Transport Layer : Process to Process Delivery : UDP; TCP congestion control and Quality of service.

Module –IV 8 hours

Application Layer :

Client Server Model, Socket Interface Domain Name System (DNS):

Electronic Mail (SMTP) and file transfer (FTP) HTTP and WWW.

Security :

Cryptography, Message security, User Authentication.

Text Book :

Data Communications and Networking : Third Edition. Behrouz A. Forouzan

Tata Mc Graw-Hill Publishing company Limited.

Reference Book :

1. Computer Networks : Third Edition, A system Approach, Larry L/ Peterson and Bruce S. Davie ELSEVIER

2. Computer Networks, A. S. Tannenbaum PHI.

BCSE 3401 COMPUTER GRAPHICS AND MULTIMEDIA (3-0-0)

Module –I (10 hours)

A survey of Computer Graphics Applications e.g.: CAD, Presentation Graphics, Art, Entertainment, Education and Training, Visualization, GUI.

Overview of Graphics Systems : Video display Devices, Raster-Scan and Random Scan Systems, Input Devices, Hard copy Devices, Graphics Software.

Output Primitives :- Points and Lines, Breshenham's line Algorithm, Midpoint Circle algorithm, Filled Area Primitives

Attributes of output primitives : Line, Curve, Area fill and character generation, Bundled attributes, antialiasing. Two Dimensional Geometric Transformation.

Module –II (10 hours)

Two Dimensional Viewing : the viewing Pipeline Viewing coordinate Reference frame, Window-to-viewport coordinate Transformation. Line Clipping (Cohen-Sutherland Algorithm) and polygon Clipping (Stherland-Hodgeman algorithm) Three dimensional Object Representation : Polygon Surface, quadratic Surface, Spline Representation, Bezier Curves and Surfaces B-Spline Curves and surfaces.

Module –III (10 hours)

Three Dimensional Geometric and Modeling Transformations : Translation,Rotation, Scaling, Reflections, shear, composite Transformation, Modeling and Coordinate Transformation

Three Dimensional Viewing : Viewing Pipeline, Viewing coordinates, Projections (Parallel and Prospective) Clipping

Visible Surface Detection Method : Backface Detection, Depth Buffer, A Buffer, Scan line and Depth sorting

Illumination Models : Basic Models, Displaying Light Intensities, Halftone Pattern and Dithering Techniques.

Surface Rendering Methods : Polygon Rendering Methods, Gouraud and Phone Shading

Module –IV (10 hours)

Multimedia Systems : Medium, Main Properties of a Multimedia System, Sound & Audio, Image and Graphics, video and animation, Data compression : JPEG and MPEG,DVI Multimedia Applications, Future Directions.

Text Books

1. Computer Graphics : D.Hearn and M.P. Baker (C version) PHI
2. Multimedia Computing Communications And Applications : Ralf Steinmetz And Klara Nahrstedt – Pearson Education .

Reference :

1. Computer Graphics Principles & Practice , J.D Foley, A. Dam,S.K.Feiner – Addison Wesley
2. Multimedia Communication Systems – K.R.Rao, Zoran S Bojkovic, Dragorad A. Milovanovic - PHI

PEEC 5402 ADAPTIVE SIGNAL PROCESSING (3-0-0)

ADAPTIVE SYSTEMS & APPLICATION:

Application of Adaptive filters to system identification, Adaptive channel equalization, Echo cancellation in Data Transmission, Adaptive Noise Cancellation. Adaptive Line Enhancement (ALE), LPC of speech signal, Adaptive Arrays.

ADAPTIVE ALGORITHMS

The Widrow-Hoff Least Mean Square Algorithm, The RLS Algorithm, The fast RLS Algorithms, Transform domain LMS Algorithm, Power Normalization, Gradient Lattice- Ladder Algorithm.

ADAPTIVE FILTER STRUCTURES :

Tapped Delay Adaptive filter, Transform Domain Adaptive Filter, Block LMS Filters Algorithms and Structures, Adaptive Equalizer and DE-convolution, Adaptive Line Enhancement, Adaptive System Identification.

HIGHER ORDER SPECTRA

Properties, Application to Blind De-convolution, Channel Equalization and Image Processing.

Text Book :

Introduction to Digital Signal Processing - J. G. Proakais & D. G. Manolakis, Macmillan, Publishing Co., 1989. Chapters – 2,4,5,6,7, 8,9 & 11.

Adaptive Signal Processing by B. Widrow & S. D Stearns , Prentice hall, Inc. Englewood Cliffs; NJ, 1985 , Chapter 1,2,6,8,9,& 10.

PEBM 8401 BIO-MEDICAL INSTRUMENTATION AND MEASUREMENT (3-0-0)

Module - I (11 hours)

Biokmetrics, Man-Instrument System, Problems encountered in measuring a living system.

Review of Transducers. Transducers for Biomedical applications

Sources of Bioelectric Potentials - Resting and Action Potentials. Propagation of action Potential. Bioelectrical Potentials - Electrocardiagram. Typical human electro encephalogram, electromyogram.

Electrodes : Electrode Theory, Biopotential Electrodes, Microelectrodes, Body surface electrodes . Bio chemical Transducers – the pH electrodes, Blood Gas Electrodes.

Module - II (10 hours)

Cardiovascular Measurements:

Electrocardiography; Measurement of Blood Pressure – Programmed electrosphygm Manometer. Measurement of Blood flow and Cardiac output. Measurement of Heart Sounds Frequency Spectrum of heart.

Module - III (10 hours)

Measurements on Nervous System

Psychophysiological Measurement – Polygraph , EEG, Brain Imaging –X-Ray, Computed Tomography (CT), MRI. Eye-Electrorefinogram (ERG), Opthalmoscopy, Audiometry,

Electromyography (EMG).

Measurement in Respiratory System: Pulmonary Volume and its measurement-spirometer. Pneumotachometer. Kidney Imaging: Pyelogram. Hemodialysis, Peritonal Dialysis. Skin: Water loss, Flow Hygrometry. Colour Dermaspectrometer

(6 hours)

Module – IV (9 hours)

Non-invasive Diagnostic Measurements.

Body Temperature Measurement : Electronics Thermo meter. Skin Temperature Measurement- Thermography. Principle of Ultrasonic measurement - Ultrasound, Modes of Transmission , Ultrasonic imaging, Ultrasonic Diagnosis.

Computers in Biomedical Instrumentation. Computer Analysis of ElectroCardio-gram, Patient Monitoring, Computerized Axial Tomography (CAT) Scanner and other applications.

Text Books:

1. Biomedical Instrumentation and Measurements, 2nd Edition, by L. Cromwell, F. J. Weibell and E. A. Pfeiffer. Pearson Education.
2. Bioinstrumentation by John. Webster – editor, John Willey students' Edition.

Additional Readings :

1. Introducation to Biomedical Equipment Technology, 4th Edition by Joseph J. Carr and John M. Brown, Pearson Education.
2. Biomedical Digital Signal Processing – By Willis J. Tompkins – Editor, Prentice Hall of India .

PRACTICALS
CPEC 9408 COMMUNICATION ENGG. LAB. (0-0-3)

(All eight experiments are compulsory)

1. Generation of AM-Balanced Modulator Demodulation of AM signal .
2. Generation of FM Signal.
3. Demodulation of frequency modulated signal .
4. Generation and Detection of BPSK signal.
5. Measurement of Noise figure of an amplifier.
6. Measurement of Radiation pattern of an Yagi antenna .
7. Establishing a Fibre optic communication link
8. Study of a practical satellite Communication system.

   OR

   Multiple Access facilities in Mobile communication systems

CPEC 9403 VLSI LAB (0-0-3)

(All are compulsory)

1. Characteristics of NMOS .
2. Characteristics of CMOS
3. Stick diagram , introduction to l rules .
4. Implementation of inverter, NAND and NOR gate
5. Design of Half Adder
6. Design of Full Adder
7. Design of a multiplexer
8. Design of decoder circuits
9. Design of Latch, S-R flip-flop, D flip –flop
10. Design of Memory circuits.

N. B.

a) Lab. '1' through '4' can be done using Tanner Spice/magic tools

b) Lab '5' through '10' should be done suing Xilnx or IRSIM or any other open source tools. (GPSPL).

8th Semester

HSSM 4404 MARKETING MANAGEMENT (3-0-0)

Objective of the Course : The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (9 hours)

Marketing Management : Concept, Process, Functions and relevance in the current context.

Marketing Environment : Socio-economic forces. Competition : national and global, Technology, Government Policy, Suppliers, Buyers, Consumer Resistance considerations. Environment scanning tools and techniques

Competition Analysis : Factors contributing to competition, Competition analysis tools, Competitive arena mapping, Segmentation matrix.

Market Planning : Exploring Opportunity, Product –market selection, Approaches to Market Planning, Market Planning Process.

Module II (10 hours)

Market Research and Information Systems : Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research, Competitive Intelligence.

Consumer Behaviour : Importance of buyer and his/ her role in purchasing. Influence of buyer behaviour, Buyer behaviour study tools. Organizational buying behaviour.

Market Segmentation, Targeting and Positioning : Definition, Bases and Methods of segmenting consumer and Industrial markets. Target Market strategies: Domestic and global perspective. Market Positioning.

Market Demand Forecasting : Key Terms, Forecasting Tools : Short term tools : Moving average and Exponential smoothing methods, Long-term forecasting Tools : Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques.

Module – III (11 hours)

Product Planning : Product Life Cycle, Locating products in PLC, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Product-Mix strategies, Planned Obsolescence.

Pricing Decision : Objectives and Factors influencing pricing, Cost-Plus Pricing, Breakeven Analysis, Price Based on Marginal Analysis, Price Elasticity of Demand, Operating statement, Markups Analysis Ratios, Pricing Strategies : Market-Entry, Discounts and allowances, Geographic Pricing, Special Pricing.

Promotion Decisions : Marketing Communication and Promotion Process, Promotion Mix, Advertising : Media and Media selection process. Organising for advertising, sales promotion.

Module -IV (10 hours)

Channels of Distributions : Designing Distribution Channels, Wholesaling and Physical Distribution, Retailing. Supply Chain Management (Basic only). Personal selling, Direct Marketing, Managing Sales Force.

Trends in Marketing : Global Marketing, Customer Services, Customer Relationship Management, Rural Marketing and Service Marketing.

References :

1. M. J. Etazel , B. J. Walker and W. J. Stanton, Marketing, Tata McGraw Hill, 13th Edition, 2004.
2. R. Saxena, “Marketing Management” Tata McGraw Hill, second Edition, 2003.

CPEN 5401 PROCESS CONTROL INSTRUMENTATION (3-1-0)

Module – I

Introduction to Process Control – The Block Diagram, the Principle, Control System Evaluation, the Analogue and Digital Processing, ON/ OFF Control, the Programmable Logic Controllers.

(2 Lectures)

Final Control Operations :

Signal Conversions. Industrial Electronics – SCR, DIAC, TRIAC. Actuators: Electrical Actuators – dc Motors, ac Motor, Stepping Motor. Pneumatic Actuators. Control Elements: Mechanical type, Electrical type, Control valves.

(8 Lectures)

Module – II

Discrete-State Process Control :

Definition, Characteristics of the System . Discrete State variables. Process specification. Event sequence Description. Relay Controllers and Ladder Diagrams. Ladder diagram elements. Application of Ladder diagram. Programmable Logic Controllers (PLCS). PLC Design. PLC Operation, PLC Programming.

(10 Lectures)

Module – III

Controller Principles :

Process Characteristics, Process Load, Controller System Parameters. Controller Modes. Discontinuous Controller Modes. Continuous Controller Modes. Composite Control Modes.

(6 Lectures)

Implementation of Controller Modes :

Various Analogue Electronics Controllers using OpAmps. Direct implementation of Proportional, Integral and Derivative Response (PID) Controller.

(4 Lectures)

Module – IV

Digital Control:

Two-Position Controller using Comparators and FFS. Multivariable Alarms. Computer in Process Industries: Programmable Logic Controllers. Flow chart for Set Point changes in a supervisory Control System. Computer Based Controller. Smart Sensors. Personal Computer Process Controller. Process Control Networks.

(8 Lectures)

Process Control –Loop Characteristics

Settings up a Process Control Loop System and tuning the System for Optimum performance . Control System configurations. Control System Quality. Stability. Bode Plot . Process Loop turning.

(6 Lectures)

Test Book :

1. Process Control Instrumentation Technology , Seventh Edition by Curtis D. John Son. Persona Education. Selected portion form Chapter 1,7,8,9,10, 11 and 12.

Additional Reading :

2. Industrial Control and Instrumentation by W. Bolton, University Press.

PEEN 5401 MODERN RADAR TECHNIQUES (3-0-0)

Module – I (10 hours)

Prediction of Radar Range: Radar Range Equation. Minimum detectable signal, System Noise temperature. RCS. Pattern Propagation factor. Transmitter Power, PRF, Antenna Gain. Loss factors , Jamming and clutter. Accuracy of prediction.

Automatic Detection, tracking and Sensor Integration: Optimal detector, Target Resolution. Automatic Tracking .Track-while-scan System. Maximum likelihood approaches. Multisensor integration .

Module – II (12 hours)

Electronics Scanning Radar :

Principle of Electronic Scanning by Phase, Frequency and Switching techniques. Linear array and beam steering. Planar arrays and beam steering. General idea on aperture matching, feed Network, Thinning of array elements; Generalized performance of a phase array antenna system. Brief description of Phased Array Radar System.

Pulse Compression Technique : Pulse compression system. Linear FM. Non Linear FM. Digital Pulse compression. Phase Coded Waveforms Optimal Binary Sequence. Time –frequency. Coded waveform . Weighting and Equalization.

Module – III (10 hours)

Electronics Counter - Countermeasures : Electronics Warfare Support Measures. Electronics Countermeasures. ECCM Techniques: Antenna - Related ECCM. Transmitter –related ECCM. Receiver-related ECCM. Signal - Processing–related ECCM. Application of ECCM Technique. ECCM and ECM Efficay.

Module – IV (8 hours)

Radar Guidance of Missiles : Semi-active CW Systems . Doppler frequency relationship, Clutter and feed through. Guidance fundamentals. Basic Semi-active seeker. Active Seekers. Passive Seekers. System Functional Operation. Reference Channel Operation , Target Signal Detection. Target Signal Tracking . Performance limitation subsystems and integration.

Text Book :

1. Radar Hand book : by Merrill Skolhik , selected topic .

Additional Reading :

1. Introduction to Radar System by Merril Skolhik.

PEEN 5402 INDUSTRIAL INSTRUMENTATION (3-0-0)

PART – A: INSTRUMENTATION IN PETROCHEMICAL INDUSTRIES.

(1.1) Instrumentation and Control in reactors and distillation column , (1.2) Temperature and pressure control , Optimization (1.3) Elementary idea of batch reactors , (1.4) Measurement and control of column pressure (1.5) Control of feed, re-boiler, Reflux rates , (1.6) Optimization of distillation columns.

(2.1) Instrumentation and Control in dryers, (2.2) Batch and continuous dryers.

(3.1) Instrumentation and Control in evaporators, (3.2) Types of evaporates, (3.3) Measurement and control of pressure, density, conductivity , differential pressure.

PART – B: POWER PLANT INSTRUMENTATION.

(4.1) Instrumentation for thermal power plants- testing, monitoring and control instrumentation coal handling/ crushing units, boiler, turbines, condensers, generators and auxiliary systems.

(5.1) Nuclear reactor instrumentation, Diffusion , Moderation, Absorption and delay processes , Neutron flux measurement, Control rod calibration, Nuclear fuel inspection and testing including poisoning, Radiation energy measurement , Remote control Instrumentation, Nuclear Instrumentation, Maintenance.

PART – C: MEASUREMENT OF CHEMICAL COMPOSITION

Chemical Analysis : Introduction, Spectroscopy - X-Ray, Photo acoustic, Microwave, Mass spectrometers Electrochemical Techniques – Conductivity, P. H. Potentiometry etc.

Gas Analysis : Chromatography Moisture Measurement

Text Books :

Part – A :

Bela G. Liptakt Instrumentation in the processing Industries , Chillon Book Company, 1973.

M. Douglan Constidine and S.P. Ross: Handbook of Applied Instrumentation, M. C Graw Hill 1964.

Part – B:

CEGB: Modern Power Station Practices : V-6 and V-8, Pergaman, Process, 1971

H. V. Morse : Nuclear Power –Cambridge University press.

PART –C

Jones : Instrument Technology ; Vol : 2 Butterworths.

PEEC 5411 ADVANCED COMMUNICATION SYSTEMS (3-0-0)

Module - I

1. Review of Fundamental Concepts of Data Communication. (2 hours)
2. Data-Link Protocol and Data Communications Networks. (10 hours)

Data-link Protocol Function, Character and bit Oriented Data Link Protocols. Asynchronous Data Link Protocols, Synchronous Data-Link Protocols, Synchronous Data –Link Control, High-Level Data Link Control, Public Switched Data Networks, CCITTX. 25, User-to-Network Interface Protocol. Integrated Services Digital Network (ISDN) . Asynchronous Transfer Mode (ATM). Local Area Networks. Ethernet.

Module - II (12 hours)

Digital T-Carriers and Multiplexing .

Time-Division Multiplexing (TDM); T1 Digital Carrier. North American Digital Hierarchy. Digital Carrier Line Encoding. T Carrier Systems, Digital Carrier Frame Synchronization. Bit Vrs Word Interleaving. Statistical TDM. Codecs and Combo Chips. FDM. AT & T's FDM Hierarchy. Composite Base band Signal . Formation of Master group. Wavelength Division Multiplexing (WDM).

Module – III (10 hours)

Digital Cellular Telephone – Time Division Multiple Access (TDMA), Control Channel, Voice Channel, Speech Coding, Digital Modulation Scheme. Interim Standard 95 (IS-95) –CDMA. Global System for Mobile Communication (GSM). Personal Satellite Communications System (PCSS). Iridium Satellite System .

Scdule - IV

Microwave Radio Communications : (10 hours)

Microwave Radio Frequency assignments. Advantages and Disadvantages of Microwave Radio. FM Microwave Radio System. Diversity. Protection Switching arrangements. Repeater Station. LOS Characteristics Microwave Radio System Gain.

Satellite Multiple Accessing Arrangements. FDM/FM Satellite Systems. FDMA, TDMA, CDMA. Global Positioning Systems (GPS).

Text Books:

1. Advanced Electronic Communication Systems Sixth Edition by Wayne Tomasi , Pearson Education. Selected Education from 4,5,7,12 and 15.

Additional Reading :

2. Wideband Wireless Digital Communication by Andreas F. Molisch-Editor, Pearson Education.

PECS 3408 IMAGE PROCESSING (3-0-0)

Module- I (8 hours)

Digital Image Representation, Digital Image Processing System, Visual Perception, Sampling and Quantization, relationship between Pixels, Fourier Transforms, Walsh, Hadamard and Discrete Cosine Transforms.

Module – II (8 hours)

Spatial and Frequency domain methods, Enhancement by point Processing, Spatial Filtering, Enhancement in the Frequency Domain, Generation of Spatial Masks from Frequency Domain Specifications, Colour Image Processing.

Module- III (8 hours)

Image Restoration

Degradation Model, Diagonalization of Circulant and Block Circulant of Matrices. Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filter, Constrained Least squares restoration, Iterative Restoration, Restoration in the Spatial Domain.

Module – IV (16 hours)

Image Compression

Fundamentals, Image Compression Models, Elements of Information Theory, Error-Free Compression, Image Compression Standards.

Image Segmentation

Detection of Discontinuity, Edge linking and Boundary Detection, Thresholding, Region-Oriented Segmentation , The use of Motion in Segmentation.

Text Books

1. Digital Image Processing, R.C. Gonzalez & R.E Wood, Addison Wesley

Reference Book

1. Digital Image Processing and Analysis, B. Channda & D. Dutta, Prentice Hall
2. Fundamentals of Digital Image Processing, Anil Ku Jain, PHI
3. Fundamental of Electronic Image Processing, Arther R. Weeks Jr. PHI

PECS 3414 COMPUTER ORGANIZATION (3-0-0)

Module- I

Basic Structure of Computers: Functional units, Operational concepts, Bus structures, software , Performance, Multiprocessors and multicomputers. Machine instruction and programmes: Memory location and addresses, Memory Operations, Instructions and instruction Sequencing, Addressing modes, Assembly Languages, Basic Input/Output operations, subroutine, additional instructions.

Module II

8085 Microprocessor Architecture: Instruction Sets, Addressing modes, Memory interfacing. Assembly Language Programming.

Module III

Arithmetic : Addition and subtraction of signed Number, Design of Fast Adders, Multiplication of positive Numbers, Signed -operand multiplication, Fast multiplication, Integer Division, Floating-point Numbers, (IEEE754 s…) and operations.

Module IV

Basic Processing units : Fundamental concepts, execution of complete Instructions, Multibus organization, Hardwired control, Micro programmed control.

Memory System : Basic Concepts, cache Memory, performance consideration, Virtual memories, Memory Management requirement , secondary storage.

Text Book :

1. Computer Organisation - Carl Hamacher, Zvonkovranesic, Safwat Zaky, Mc Graw Hill.
2. Computer organization & Architecture - Design & performance - William Stalling (ch. 3,4,5,6,9,10,11,12,16 &17) 6th Edition PHI.
3. Microprocessor Architecture ,Programming and application with 8085, R. S Gaonkar.

Reference:

1. Computer Organization & Design Hardware /Software interface : David A Patterson, John L. Hennessy ELSEVIER.
2. Computer Architecture and organization , Design principles and Application B. Govinda Rajula, Tata McGraw –Hill publishing company Ltd.
3. Computer System Architecture : Morris M. Mano PHI New Delhi .
4. Computer Architecture & Organization .John P. Hayes, McGraw Hill International .
5. Structured Computer Organization A. S Tanenbum, PHI.

BCSE 3305 OPERATING SYSTEMS (3-0-0)

Module-I

Introduction: What is an Operating System.

Simple Batch System, Multiprogramming and Time Sharing Systems, Personal Computer Systems, Parallel Systems, Distributed Systems and Real Time Systems.

Operating system structures: System components, protection system, O.S. services, system calls.

Process Management: Process concept, Process Scheduling, Operation on processes, Cooperating Processes, Interprocess communication, Threads CPU Scheduling: Basic concepts, scheduling criteria, scheduling algorithms.

Module-II

Deadlocks: System model, Deadlock characterization methods for handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock detection, recovery from Deadlock.

Memory Management: Background, Logical versus physical address space, swapping, contiguous Allocation, Paging Segmentation.

Virtual Memory: Background, Demand paging, performance of Demand paging, Page Replacement, Page Replacement Algorithms, Allocation of frames, Trashing.

Module-III

File-system Interface: File concept, Access Methods, Allocation Methods, Directory implementation, Recovery.

Module-IV

I/O Systems: Overview, I/O Hardware, Application of I/O interface, Kernel I/O – subsystem Transforming I/O requests to Hardware Operations. Secondary storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap space Management, Disk Reliability, Case Studies LINMUX, WINDOW NT.

Text Book

1. Operating System Concepts: Abraham Silberschatz and Peter Bear Galvin, Addison Wesley. Chapter-1, Chapter-3 (3.1,3.2,3.3), Chapter-4, Chapter-5 (5.1,5.2,5.3), Chapter-7 (7.1,7.7), Chapter-8, Chapter-9, Chapter-10, Chapter-11, Chapter-12 (12.1-12.5), Chapter-13 (13.1-13.5)

Reference Book :

1. Operating System, McGraw Hill, Madnik & Donovan
2. Operating System and System Programming, SCITECH, P.Blkeiahn Prasad
3. Morden O.S. – PHI, Andrew, S. Tannenbaum

PRACTICALS

CPEN 9405 PROCESS CONTROL LAB. (0-0-3)

(Five of the six experiment must be done)

1. Studies and experimental determination of characteristics of SCR, DIAC, and TRIAC. (6hrs)
2. Experimental studies on closed loop and open loop control systems. (6 hrs)
3. Programmable Logic Controller – Design operation and programming. (6 hrs)
4. Analogue Electronics PID controller.
   a) Proportional Controller
   b) Integral Controller
   c) Derivative Controller

   Experimental studies on a 3 positions Analogue controller using comparators , summing amplifier and Inverters.

   (6 hrs)
5. Two –position / Three-position Digital Controllers using comparators and Flip-flops. (6 hrs)
6. Study of Process Control-loop characteristics. (6 hrs)

REFERENCE :

1. Process Control Instrumentation technology , 7th Edition B. C. D Thomson, Pearson / PHI.
2. Industrial control & Instrumentation by W. Bolton, University Press.

CPEN 9406 ENTREPRENEURSHIP PROJECT (0-0-3)

1. The project will be for 2 credits and 3 periods per week is to be devoted for the project.
2. The teacher has to give elementary idea about entrepreneurship through classroom teaching before a project report is prepared by the student.
3. The teacher will first cover the following topics through lecturer and exercises on motivation and games.
   - Entrepreneurship concept, EDP in India, Indian middle class value.
   - Entrepreneurial qualities, motivation perception, risk taking etc.
   - Market survey, Business opportunity guidance
   - Role of DIC, SFC, Bank etc.
   - Working capital assessment, Balance Sheet, Costing, Book keeping.
   - Decision making, Leadership, Communication skill
   - Preliminary Project Report, preparation for a specific product and submission of the report.
4. Evaluation

(a) The teacher has to conduct tests/ motivational exercises to assess entrepreneurial capability of the student (20%)

(b) The teacher has to test the knowledge of the student on the above topic through a written test. (20%)

(c) The teacher has to evaluate the report submitted by the student (i.e. Project report within 50 pages) (60%).

Reference Books :

1. Entrepreneurship of Small Industries, M. V. Deshpande, Deep and Deep Publication
2. Management of Small Scale Industry, Vasant Desai, Himalaya Pub. House