COURSE STRUCTURE

&

SYLLABUS
(3rd – 8th SEMESTER)

FOR B.TECH PROGRAMME
IN
ELECTRICAL & ELECTRONICS ENGINEERING

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY ORISSA,
ROURKELA

2007 - 2008

COURSE STRUCTURE
SECOND YEAR B.TECH PROGRAMME
ELECTRICAL & ELECTRONICS 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
CPES 5201	Network Theory	3-1-0	4	BENG 1208	Fluid Mechanics & Hydraulic Machines		
	or				or		
BENG 1208	Fluid Mechanics & Hydraulic Machines			CPES 5201	Network Theory	3-1-0	4
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		
CPEC 5202	Analog Electronics Circuit	3-1-0	4	CPEC 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				or		
CPES 9201	Network & Devices Laboratory			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

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

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 (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 : Produce gas, Water gas, LPG & CNG.

   Combustion 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.

CPEC 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 CIRCUIT 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 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

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

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.

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)

CPEC 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 CIRCUITS 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
ELECTRICAL AND ELECTRONICS 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 5301	Electrical Machine - I	3-1-0	4	CPEE 5306	Power Electronics	3-1-0	4
CPEE 5302	Control System Engineering	3-1-0	4	CPEC 5302	Digital Signal Processing	3-1-0	4
CPEC 5305	Mircoprocessors & Microcontrollers	3-0-0	3	CPEE 5304	Electrical Machines-II	3-1-0	4
CPEN 5306	Instrumentation & Measurements	3-0-0	3	CPEE 5307	Electromagnetic Theory	3-0-0	3
CPEE 5303	Transmission & Distribution	3-0-0	3	CPEE 5305	Advanced Control System Engineering	3-0-0	3
	Total		**20**		**Total**		**20**
Practicals/Sessionals		*Contact Hrs.*	*Credit*	*Practicals/Sessionals*		*Contact Hrs.*	*Credit*
CPEC 9304	Microprocessor & Microcontroller Lab.	0-0-3	2	CPEE 9305	Power Electronics Lab.	0-0-3	2
CPEE 9301	Control & Instrumentation Lab.	0-0-3	2	CPEC 9302	Digital Signal Processing Lab.	0-0-3	2
CPEE 9302	Electrical Machine Lab - I	0-0-3	2	CPEC 9305	Control & Simulation using Metlab Lab.	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 5301 ELECTRICAL MACHINE - I (3-1-0)

MODULE – 1 (10 hours)

1. Basic Principles of production of torque and generation of emf; Generalised equations of torque and voltage DC Machine: Construction; outline of simplex lap and wave Winding; elementary idea about multiplex winding; EMF equation as a generator and torque equation as a motor; Armature reaction and its effects; commutation, brush shift; interpoles; compensating winding. Methods of excitation.

2. D.C. Generator: No load characteristics; conditions for self excitation - Critical resistance and speed; operation of separately excited, shunt excited, series excited and compound excited generators under load conditions; parallel operation.

MODULE – 2 (8 hours)

3. D.C. Motor: Back EMF; speed equation; speed torque, speed current and torque current characteristics of shunt, series and compound motors; speed control by variation of flux, by variation of armature resistance, by variation of voltage. Use of variable voltage rectifier and chopper for controlling speed (only Block diagram to be given). D.C. Motor starting and starters; losses and efficiency; Swinburn's test, brake test and Hopkinson's test

MODULE – 3 (8 hours)

4. Single phase transformers: Construction; EMF equation; ideal transformer; voltage and current ratio, development of equivalent circuit of an actual transformer, phaser diagram, voltage regulation; losses and efficiency; condition of maximum efficiency; All day efficiency; determination of parameters from OC & SC tests; back to back test; per unit representation; parallel operation and load sharing.

5. Single phase auto transformer: Construction; principles of operation; equivalent circuit, rating, comparison with 2 winding transformer
(4 hours)

6. Three phase synchronous machine: Construction of cylindrical rotor and salient pole machines; advantages of rotating poles type; Air gap flux density and mmf; poly phase armature winding, induced EMF; winding factors; harmonics in EMF and its elimination

MODULE – 4 (10 hours)

7. Armature resistance and leakage reactance; Armature reaction at various pf. Loads; rotating magnetic field;

8. Cylindrical rotor type synchronous generator: phasor diagram; armature reaction reactance; synchronous reactance and impedance, OC & short circuit tests; determination of synchronous reactance; short circuit ratio, ZPF characteristics; Potier reactance; Calculation of regulation by synchronous impedance method, ZPF method, mmf method; modified mmf method, Power angle equation and power angle characteristics.

Text Books :

1) Electrical Machines by P.K. Mukherjee & S. Chakravorty (Dhanpat Rai)
2) Electrical Machines, S. Ghosh, Pearson

References:

1. Electrical Machine by Nagrath & Kothari

CPEE 5302 CONTROL SYSTEM ENGINEERING (3-1-0)

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

CPEC 5305 MICROPROCESSOR & MICRO CONTROLLER (3-0-0)

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.

CPEN 5306 INSTRUMENTATION & MEASUREMENTS (3-0-0)

MODULE – I (12 hours)

Measuring Instruments

Classification, Absolute and secondary instruments, indicating instruments, control, balancing and damping, constructional details, characteristics, errors in measurement

Wattmeters

Electrodynamometer type, induction type, single phase and three phase wattmeters, compensation.

Energymeters

AC. Induction type siqgle phase and three phase energy meter, compensation,... creep, error, testing

Frequency Meters

Vibrating reed type, electrical resonance type

MODULE – II (10 hours)

Instrument Transformers

Potential and current transformers, ratio and phase angle errors, phasor diagram, methods of minimizing errors; testing and applications .

Galvanometers

General principle and performance equations of 0' Arsonval Galvanometers, Vibration Galvanometer and Ballistic Galvanomeer; undamped, underdamped and overdamped motion of galvanometer. Measurement of charge and flux by Ballistic Galvanometer.

Potentionmeters

D.C. Potentiometer-Crompton potentiometer, construction, standardization, application. AC. Potentionmeter-Drysdale polar potentiometer; Gall Tinsley coordinate type potentiometer, standardization, application.

MODULE –III (9 hours)

DCI AC Bridges

General equations for bridge balance, measurement of self inductance by Mazwell's bridge (with variable inductance & variable capacitance), Hay's bridge, Owan's bridge, measurement of capacitance by Schearing bridge, errors, Wagner's earthing device, Kelvin's double bridge.

Transducer

Strain Gauges, Thermistors, Thermocouples, Linear Variable Differential Transformer (LVDT) Capacitive Transducers, Peizo-Electric transducers, Optical Transducer, Torque meters, inductive torque transducers, electric tachometers, photo-electric tachometers.

MODULE – IV (9 hours)

Electronics Instruments

CRG: Block diagram, Sweep generation, vertical amplifiers, use of CRG in measurement of frequency, phase, Amplitude and rise time of a pulse.

Digital Multimeter : Block diagram, principle of operation, Accuracy of measurement.

Electronic Voltmeter : Transistor Voltmeter, Block diagram, principle of operation, Accuracy of measurement-.:netering amplifier.

Electronic voltmeter: Transistor Voltmeter, Block diagram, principle of Qperation, accuracy of measurement.

Digital Frequency meter: Block diagram, principle of operation, typical features accuracy of measurement

Reference Books :

1) A Course in Elec. & Electronics Measurements & Instrumentation: A K. Sawhney
2) Electronic Instrumentation and Measurement techniques: W.O. Cooper
3) Electronic Measurement & Instrumentation Systems: Larry Jones & A Foster Chin
4) Electrical Measurement and Measuring Instruments - Golding & Waddis

CPEE 5303 TRANSMISSION & DISTRIBUTION (3-0-0)

MODULE –I (12 hours)

General Introduction to power transmission by D.C. and A.C. overhead lines.

Lines Constants Resistance, inductance and capacitance of single and three phase lines with symmetrical and unsymmetrical spacing transposition, charging current, skin effect and proximity effect

Performance of transmission Lines

Analysis of short, medium and long lines, equivalent circuit, representation of the lines and calculation of transmission parameters, use of static or synchronous condensers for improvement of regulation.

MODULE –II (9 hours)

Corona

Power loss due to corona, practical importance of corona, and inductive interference with neighbouring communication lines, use of bundled conductors in e.h.v. transmission lines and its advantages

Overhead line Insulators

Voltage distribution in suspension type insulators, method of equalizing, voltage distribution, economic use of insulators.

Mechanical Design of Overhead Transmission Line

Sag and stress calculation, tension and sag at erection, effect of ice and wind, vibration dampers

MODULE –III (9 hours)

Under Ground Cables

Type and construction, grading of cables, capacitance in 3 core cables and dialectic loss

Distribution System

Effect of System voltage on transmission efficiency.. Economic choice of conductor size, Kelvin's Law, types of distributors and feeders (radial & ring), voltage drop and load calculation for concentrated and distributed loads.

Substation & Earthing

Types of substations, arrangement of busbars and control equipments, solid earthing, resistance earthing and Peterson coil

MODULE – IV (6 hours)

E.H.V. (AC.) & H.V. (D.C.) Transmission

Introduction, advantages and disadvantages of E.H.V. (AC.) H.V. (D.C.) Transmission

Symmetrical components:

Symmetrical Components and their applications in analysis of unbalanced faults.

Text Books

1) Electric Power Generation, Transmission and Distribution, S.N. Singh (PHI)

2) Principles of Power Systems, W.K. Meheta, R. Meheta

3) A Course in Electric Power: Soni, Gupta & Bhatnagar

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

CPEE 9301 CONTROL AND INSTRUMENTATION LAB. (0-0-3)

CONTROL: (Any five)

1. Study of a DC Speed control system and determination of transfer function of a permanent magnet dc motor.
2. Study of a two-phase AC servomotor and its tranfer function parameters.
3. Find the frequency response of a Lag and Lead compensator.
4. To observe the time response of a second order process with P, P+I, P+I+D control and apply PID control to a DC servomotor.
5. To study the characteristic of a relay and analyze the relay control system (Phase Plane).
6. Study of a DC position control system
7. Study of a linear system simulator

INSTRUMENTATION: (Any five)

1. Measurements of unknown resistance, inductance, and capacitance using Bridges.
2. To plot the displacement –voltage characteristics of the given LVDT.
3. Measurement of temperature-voltage characteristics of J-type thermocouple.
4. Use a strain gauge to plot the curve between strain applied to a beam and the output voltage.
5. Study of resistance-voltage characteristics of Thermistors
6. Measurement of angle using Capacitor type transducers.
7. Plot the output characteristics of a torque transducer
8. Study of a Data Acquisition System

CPEE 9302 ELECTRICAL MACHINE LAB. - I (0-0-3)

1. O.C and S.C Test on single phase transformer
2. Parallel operation of two single phase transformers
3. Back-to-back test of single phase transformer
4. Transformer connections : Y to Y, Y to, Scott Connection, 3 phase to 6 phase, ZIGZAG connections YD1, YD11.
5. No load and load characteristics of DC shunt generator
6. Speed control of DC motor by armature voltage and field excitation control
7. Open circuit and short-circuit tests of an Alternator
8. Synchronizing of an alternator to infinite bus
9. No load and blocked rotor test of an induction motor
10. Load characteristics of a 3 phase induction motor.

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.

CPEE 5306 POWER ELECTRONICS (3-1-0)

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: (4 hours)

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).

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 factor 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: (10 hours)

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 – M.H. Rashid, Pearson

Reference Book :

1. Power Electronics – P. C. Sen TMH.

CPEC 5302 DIGITAL SIGNAL PROCESSING (3-1-0)

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 :

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

CPEE 5304 ELECTRICAL MACHINE- II (3-1-0)

Module – I (12 hours)

Operation of salient pole synchronous alternator :

Two reaction theory, phasor diagram, direct and quadrature axis reactances, voltage regulation, power angle equation and characteristics; slip test.

Synchronization of alternators; synchronizing power and torque; parallel operation; load sharing, operation of alternators connected to infinite bus bar.

3 phase synchronous motor connected to infinite bus bar; principles of torque production; torque and power expressions in cylindrical rotor and salient pole rotors, approximate relation with armature resistance neglected; power-angle characteristics for both type of motors; v-curves; starting of synchronous motor. Hunting and its remedy; use as a synchronous condenser and other uses.

Module – II (9 ours)

3 phase transformer :- Construction of core type and shell type transformers, Three single phase transformers connected as a bank of 3 phase transformer;

Transformer connection - YY, Y_, _*Y,* M, _ig zag,Y zig zag. Phase displacement of primary and secondary voltages for different connections, vector groups.Two single phase transformers connected as open delta. Rating of such transformers;Phase conversion :- 3 phase to 6 phase; 3 phase to 12 phase; T connection of 2 single phase transformers to have 3 phase to 3 phase; 3 phase to 2 phase and vice versa. Parallel operation of 3 phase transformers, 3 winding transformer and its equivalent circuit, Time harmonics in single phase and 3 phase transformers; causes and remedy; floating neutral; switching in transients.

Module – III (10 hours)

Poly phase induction motor' construction - cage & wound rotor type; principle of operation, speed and slip; equivalent circuit and phasor diagram; power and torque expressions, slip torque characteristics and effect of rotor resistance on it; no load and blocked rotor test; determination of parameters, circle diagram and determination of performances curves

Starting of both types of motors; Speed control by change of voltage, rotor resistance, no. of poles and frequency. Speed control by slip power recovery method and voltage injection method, casc_ding

Cogging & Crawling - Causes & remedy Principle of induction generator

Module – II (09 hours)

Single phase induction motor. Double revolving theory, torque-slip characteristics, starting methods: Split phase starting - Use of resistance or capacitance, shaded pole starting, starting as an repulsion motor.

A.C. Series motor - Construction and operation; plain and compensated series motor; problems in commutation and their remedy; phasor diagram; universal motor. _

Repulsion motor - Construction and principles of operation, repulsion induction motor.

Special machines, their construction and principles of operation :

Reluctance motor, hysteresis motor; stepper motor, AC servomotor, linear motor Single and three phase induction regulator

Text Books :

1. Electrical Machines, S. Ghosh, Pearson Publication
2. Electrical Machines by P.K. Mukhe_ee & S. Chakravorty (Dhanpat Rai)
3. Theory and Performance of AC Machines - (M.G. Say)

References :

1. Electrical Machines, Charles Hubert, Pearson
2. The Performance & Design of A.C. Commutator motors by E.G. Taylor

CPEE 5307 ELECTROMAGNETIC THEORY (3-0-0)

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 (10 hours)

Antennas

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 5305 ADVANCE CONTROL SYSTEM ENGINEERING (3-0-0)

Module –I (10 hours)

Mathematical modeling of dynamic systems in state space, State space representation of Mechanical and electrical systems, State space representation of transfer functions, relations between state equation and transfer functions, Characteristics equation, egenvalue and eigenvector of state matrix, Solution of time-invariant state equation, determination of State Transition Matrix, Use of Cayley – Hamilton Theorem, Minimal Polynomial, Sylvester's interpolations, Controllability, Observability.

Module –II (8 hours)

Introduction to design of control systems in state space, design of phase lead and phase lag controllers in time and frequency domain, Pole placement design, State observers.

Module –III (14 hours)

Sampling and signal reconstruction: Defination and Evaluation of Z-Transform, Properties of Z-Transform, Inverse Z-Transform, Mapping between S-plane and Z-plane, System descriptions by difference equations.

Sampled Data Control Systems: Transfer Function f discrete data systems, Pulse and Z-transform Functions, Transfer Function of discrete data systems with Cascade elements, Transfer Function of Zero- Order and 1st – Order Holds, Transfer Function of Closed Loop discrete data systems, State equations of discrete data systems, Solutions of discrete state equations, discrete state transition equations, Z-Transform solutions of discrete equations, Transfer Function Matrix and the Characteristic equation, Stability Tests of discrete state equations, Bilinear Transformation Method, Direct Stability Tests.

Module – IV (10 hours)

Nonlinear Systems: Common Physical nonlinearities, The Phase-Plane Method, Basic concepts, singular Points, Stability of nonlinear systems, Construction of Phase trajectories, Construction by analytical and graphical methods, System analysis by Phase Plane Method, The Describing function Method: Basic concepts, derivation of describing functions for common nonlinearities, Stability analysis by Describing Function approach, jump resonance, Lyapunov Stability Criterion, Popov's Stability Criterion.

Text Books

1. Modern Control Engineering, K. Ogata (PHI)
2. Automatic Control System, B.C. Kuo (PHI)
3. Digital Control of Dynamic Systems, G. Franklin, J.D Powell, M. Workman (Pearson)

PRACTICALS

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

(Any 10)

1. V-I Characteristic of SCR
2. Different methods of triggering of SCR
   - (a) Phase controlled method
   - (b) UJT triggering method
   - (c) Cosine controlled 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 full 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 qurdant chopper drive for D.C motor
11. Three phases IGBT based four quadrant chopper drive for induction motor
12. Study of 1 phase cyclo converter

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 hrs)
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 hrs)
4. i) Finding Auto correlation of a sequence
   ii) Finding cross correlation of 2 sequences .
   iii) Finding power spectral density of a sequence .
   (3 hrs)
5. Finding the convolution of periodic sequence using DFT and IDFT.
   (3 hrs)
6. Implementation of FFT (Fast Fourier Transform) algorithm
   i) Decimation in Tane (DIT)
   ii) Decemation in Frequency (DIF)
   (6 hrs)
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)

CPEC 9305 CONTROL AND SIMULATION LAB USING METLAB LAB. (0-0-3)

1. Control system simulation using SIMULINK and METLAB
2. Study of a PID controller using simulink for 1^{st} order and 2^{nd} order control system.
3. Simulation of a power generation and transmission network and study of its performance under load condition.
4. Circuit simulation of a 3-phase SCR based converter system and study of its output waveform
5. Numerical solutions of algebric and differential equation and their applications to electric circuits.

COURSE STRUCTURE

FOURTH YEAR B.TECH PROGRAMME

ELECTRICAL AND ELECTRONICS ENGINEERING

7th Semester				8th Semester			
Theory		*ContactHrs.*	*Credit*	*Theory*		*ContactHrs.*	*Credit*
		L-T-P				**L-T-P**	
HSSM 4403	Environmental Engineering	3-0-0	3	HSSM 4404	Marketing Mgmt.	3-0-0	3
CPEE 5401	Power System Operation & Control	3-1-0	4	CPEC 5404	Mobile Communication	3-1-0	4
CPEC 5308	Communication Engineering	3-1-0	4		**Electives** (***Any two***)	6-0-0	6
CPEE 5404	Power System Protection	3-0-0	3	PEEE 5405	Electrical Power Quality		
CPEN 5305	Advanced Electronics Circuits	3-0-0	3	PECS 3408	Image Processing		
				CPEN 5301	Sensors & Signals		
				BCSE 3306	Computer Networks		
				PECS 3415	Internet & Web Technology		
				PEEC 5411	Advanced Communication Systems		
	Electives (***Any one***)	3-0-0	3				
PEEE 5403	Power Stations Engineering						
PEEE 5404	Electrical Drives						
CPEC 5403	VLSI Design						
PECS 3401	Soft Computing						
PEEC 5402	Adaptive Signal Processing						
	Total		**21**		**Total**		**13**
Practicals/Sessionals		*Contact Hrs.*	*Credit*	*Practicals/Sessionals*		*ContactHrs.*	*Credit*
CPEE 9301	Project		3	CPEE 9401	Project		7
CPEC 9408	Communication Engg. Lab.	0-0-3	2	CPEE 9403	Seminar	0-0-2	1
CPEC 9403	VLSI Lab.	0-0-3	2	CPEE 9406	Entrepreneurship Project	0-0-3	2
CPEE 9303	Seminar		1	CPEE 9407	Comprehensive Viva Voce		2
			8				**12**
	Total		**29**		**Total**		**25**

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.

CPEE 5401 POWER SYSTEM OPERATION AND CONTROL (3-1-0)

Module – I (10 hrs)

Fundamental of power System : concepts or real and reactive powers, Complex power per unit representation of power system. Transmission capacity, series and shunt compensation, Load characteristics, Real power balance and its effect on system frequency, Load frequency mechanism, reactive power balance and its effect on system voltage, on load tap changing transformer and regulating of transformer, Introduction to FACT devices.

Module – II (6 hrs)

Load Flow Analysis : System model : The static load flow equation (SLFE), Definition of the load flow problem, Network model formulation, A load flow sample study, Computational aspects of the load flow problem, effect of regulation transformers.

Module – III (10 hrs)

Load frequency Control : Dynamic incremental state variable, PF versus QV control MW frequency of an individual generator, modeling of speed governing system, Turbine, Division of power system into control areas, P-F control of single control area and two are control, Economic dispatch controller.

Module – IV (14 hrs)

Economics Operation of Power System : Distortion of load between units within a plant, Transmission losses as function of plant generation, Calculation of loss coefficients, Distribution of loads between plants with special reference to steam and hydel plants, Automatic load dispatching, Unit commitment, Power System Stability : Steady state stability, transient stability, Swing equation, Equal area criterion for stability, Methods of improvement of transient stability, Stability analysis of multimachine power systems.

1. Power System Analysis, Hadi Saadat, TMH
2. Power System Analysis and Design, B. R. Gupta, S. Chand
3. An introduction to electric Energy System Theory, O.I. Elgerd, TMH
4. Elements of Power System Analysis, W.D. Stevenson, TMH

CPEC 5308 COMMUNICATION ENGINEERING (3-1-0)

Module I (2 hours)

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

2. **Baseband Signals** (4 hours)

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.

(6 hours)

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

3. **Modulation Techniques :** (7 hours)

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 (5 hours)

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 (4 hours)

4. **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.

5. **Antennas and Propagation of Radio Waves :** (3 hours)

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

6. **Modern Communication Systems:** (3 hours)

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,

7. Brief description of Satellite Communication Systems : (3 hours)

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

8. Mobile Communication (4 hours)

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* :**

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

CPEE 5404 POWER SYSTEM PROTECTION (3-0-0)

Module –I (10 hrs)

Faults on power system and their classification, evolution of a power system, protection system attributes, system transducer, principles of power system protection, over current protection : over current relay, IDMT and DTOC relays, Directional over current relays, Feeder protection.

Module – II (10 hrs)

Different Protection : Simple differential protection, Zone of protection, percentage differential relay, Earth Leakage protection

Transformer Protection : Over current protection, Differential protection of single and three phase transformers, Star-delta and Delta star connections, Harmonic restraint for magnetizing inrush.

Interturn and incipient faults in transformers, Busbar protection.

Module –III (12 hrs)

Distance relaying : Introduction, impedance, Reactance, and MHO relays, Three stepped distance protection, Carrier added protection of transmission lines.

Generators protection : Stator and rotor faults, Abnormal operating conditions, Generator, differential protection, earth fault relays.

Module – IV (10 hrs)

Static comparators as relays, Amplitude and phase comparators, Synthesis of distance relaying using static comparators, electronic circuits for Static relays.

Microprocessor based numerical protection, Digital filtering, Numerical overcurrent, differential, and distance protection, effect of CT and PT saturation's on Numerical relays.

Books

1. Fundamental of Power System Protection, Y.G. Paithankar, S.R. Bhide (PHI)

2. Power System Protection and Switchgear, Badriram, D.N. Viswakarma, TMH

3. Power System Protection, S.P. Patra, S.K. Basu, S. Chowdhury, Oxford Publication

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. Cathodecoupled 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 controlled 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).

PEEE 5403 POWER STATION ENGINEERING (3-0-0)

Module- I (10 hours)

1. Introduction to .different sources of energy and general discussion on their application to generation.

2. Hydel power.

Hydrology:- Catchment area of a reservoir and estimation of amount of water collected due to annual rainfall, flow curve and flow duration curve of a rive and estimation of amount stored in a reservoir formed by a dam across the river, elementary idea about Earthen and Concrete dam ,

Turbines:- Operational principle of Kaplan. & francis turbine and pelton wheel, specific speed, workdone and efficiency.

Hydroplant:- head gate, perstock , surge tank, scroll case, draft tube and tailrace, classification .of plants, turbines for different heads, plant capacity as a base load and peakload station, plant auxiliaries.

Module II (10 hours)

3. Thermal Power**.**
   Overall plant components in Block dams indicating the air, circuit, coal and ash circuit, water and steam circuit, cooling water circuit; various types of steam turbines, ash and coal handling system, elementary idea about a water tube boiler_ , super heater, reheaters, economiser air preheater_ dust collection, draft fans and chimney;condensers, feed water heaters, evaporate¥. and makeup water, bleeding of steam; cooling water system; Governors, plant layout and station auxiliaries.

Module –III (9 hours)

4. **Nuclear power**
   Introduction to fission & fusion, reactor construction, controlled chain reaction, operational control of reactors, Brief study of various types of reactors (Boiling water, pressurised water, sodium graphite, breeder) layout ofnuc1ear power plant
5. **Electrical System.**
   Different types of alternators, methods of cooling
   Excitation system:- Shaft mounted D. C. generator, elements of static and brush less excitation, field flashing,
   AV.R. : - magnetic amplifier and thyrister convertor types.
   Main transformer, unit transformer and station reserve transformer. Commissioning tests of alternators and transformers.

Model-IV (7 hours)

6. Choice of size and number of generating units:- Review of the terms maximum demand, load factor, diversity factor, plant capacity and use factor, load & load duration curve and their effect on the generating capacity. Reserve units (hot,
   cold and spinning_reserve) Effect of powerfactor on the generating capacity and economy. Different types of power tariffs.
   Brief idea about national grid and its operational problems.

Reference Books :

1. Elements of electrical power system design by M.V Despande (A. H. Wheler) 2. Power station engg. & economy by SKrotizki & Vopat (Tata M. H)

PEEE 5404 ELECTRICAL DRIVES (3-0-0)

Module –I (10 hrs)

Requirements, AC and DC drives, modern trends in drives technology, Characteristics of DC, Induction and Synchronous motor drives, Braking and starting, Classification , Dynamic and stability consideration of electric drives.

Module –II (14 hrs)

Converter for feeding electric motors, Phase controlled and line commuted converters, DC Choppers, inverters, Cycloconverter and AC voltage controller for Drive systems, Controller for drive systems, Control of DC, Induction, and Synchronous motor drives.

Module – III (10 hrs)

Control Techniques for electric drives, Block diagram representation, transfer functions transient response, frequency response and stability, compensating techniques.

Module –IV (8 hrs)

Rating and heating of electric drives, power loss, Heating and Cooling of motors, Classes and duty and selection of motors, Drives for specific application like steel, paper, machine tools, cement and sugar mills, Microprocessor for control of electric drives, microprocessor hardware and software for drive system.

Text Books

1. Electric drives, V. Subrahmanyam, TMH
2. Power Electronics and Drives, M.H. Rashid, PHI
3. Modern Power Electronics and AC Drives, B.K. Bose, (Pearson)

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.

PECS 3401 SOFT COMPUTING (3-0-0)

Module – 1 (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 – 2 (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 – 3 (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—4 (8 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.

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.

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.

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)

1. Characteristics of NMOS .
2. Characteristics of CMOS
3. Stick diagram , introduction to λ 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.

CPEC 5404 MOBILE COMMUNICATION (3-1-0)

Module – I (12 hours)

A brief introduction to Mobile Telephony, Technologies and Choices.

Cellular Concept – System Design: Fundamentals: Frequency reuse, Channel Assignment, Handoff Strategies, Interferences and System Capacity, Trunking and Grade of Service; Improving coverage and capacity in Cellular Systems – Cell Splitting, Sectoring, Repeaters and Range Extension, Microcell & Picocell Zone Concept. Antennas for Base Station and hand held Cellular phone.

Module- II (10 hours)

Mobile Radio Propagation : Large –Scale path loss, Ground Reflection Model , Diffraction, Scattering. Outdoor propagation Model – Okumura Model; Indoor Propagation Model: Partition loses, Log distance Path loss Model.

Small Scale Fading and Multipath, Dopper Shift . Types of Small Scale Fading and their effect on received signal.

Modulation Techniques:

FM for Analogue . FM Detection Techniques – PLL and Quadrature Detection. Digital Modulation: π / 4 QPSK and MSK, GMSK.

Module – III (4 hours)

Spread Spectrum Techniques – DS-SS and FH- SS.

Performances of FM, π /4 QPSK & MSK in Fading and Interference .

Fundamentals of Equalization – adaptive Equilizer. Diversity Techniques – Space, frequency Polarization and Time Diversity.

Access Techniques : (4 hours)

Frequency Division Multiple Access (FDMA) , Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access– Frequency Hopped Multiple Access (FHMA), Code Division Multiple Access (CDMA). Frequency and Channel specification for CDMA Digital Cellular Standard (IS-95) .

Module - IV

Wireless Networking (4 hours)

Various Generations of Wireless Networks, Fixed Network Transmission Hierarchy, Traffic Routing in Wireless Networks – Circuit Switching, Packet Switching. The X . 25 Protocol.

Global System for Mobile (GSM): features, architecture, channel types, Frame Structure in GSM. Signal processing in GSM.

(3 hours)

Text Books :

1. Wireless Communication, 2nd Edition by Theodore S. Rappaport, Pearson Publication.

Additional Books :

2. Mobile Communication Engg., 2nd Edition by William C. Y. Lee Mc Graw Hill International Edition.
3. Mobile Cellular Communications, 2nd Edition by William C. Y. Lee Mc Graw Hill International Edition.
4. Mobile Communication, 2nd Edition by Jocken Schiller, Pearson Education.

5. Wideband Wireless Digital Communication by Andreas F. Molisch Editor Pearson Education.

PEEE 5405 ELECTRICAL POWER QUALITY (E & E) (3-0-0)

Module-1 (10 Hours)

Introduction: Definitions of Power quality, Power quality indices and standards, Classification of power quality disturbances, Waveform distortions, voltage sags, swells. Transients due to capacitor switching and lightning, unbalances, voltage fluctuations, flicker, Harmonics and Interharmonics. Effects of voltage sags, swells, and capacitor switching transients on adjustable speed drives, Methods to reduce sags, swells, and transients on distribution systems.

Module-2 (12 Hours)

Waveform Processing techniques: Fourier analysis and Discrete Fourier transforms of distorted signals, Time-varying signal processing using DFT, FFT, Short-Time Fourier Transform,

Fourier linear combiners, Kalman filters. Wavelet transform, multiresolution analysis and filter banks

Applications to Harmonic analysis in single-phase and three-phase circuits, Total Harmonic Distortion, effects of harmonics on transformers, and adjustable speed drives, Harmonic reduction methods, Interharmonics.

Module-3 (10 Hours)

Power quality monitoring: Use of CT and PTs for measurements and the errors, Analog devices for power quality measurements, Digital measurement of voltage, current, power , THD, Power quality disturbance classification using Fourier linear combiners, Wavelet transform and multiresolution analysis, Artificial Neural Networks for disturbance detection.

Module-4 (10 Hours)

Improvement of Power quality: Protection against voltage sags and swells , use of UPS, Ferro-resonant transformers, Superconducting magnetic storage devices, series and shunt voltage source inverters.

Harmonic cancellation using passive, active, and hybrid filters, performance and control of active filters for power quality improvement

Books:

1. Power Quality Assessment by J. Arrillaga, N.R.Watson, S. Chen, Wiley
2. Electric Power System Quality by R.C. Dugan, M.F. McGranaghan, H.W. Beaty, Mc-GrawHill

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

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

Module – I

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 .

(15 hours)

Module – II

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.

(12 hours)

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 :

4. Elements of Electronics Instrumentation and Measurement , 3rd Edition by Joseph J. Carr, Pearson Education.

5. Sensors and Transducers by D. Patranabis Wheeler publishing.

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.

PECS 3415 INTERNET AND WEB TECHNOLOGY (3-0-0)

The Internet and WWW

Understanding the WWW and the Internet, Web Architecture, Major issues in web solution development, Web servers (details of Apache Web Server), Web Browsers (Microsoft Internet Explorer and Netscape Navigated)

HTML

Planning of Web page, Model and structure for a Website, designing Web pages, Basic HTML using images links, HTTP methods and forms, Tables, Multimedia content (Audio and Video) Frames

CGI Basics

Introduction to CGI, CGI building blocks, CGI Scripting in C, CGI Security

JAVA Script

Programmng Fundamentals, built in object, Form object and elemnt, Adavnce Java Script objects, Working with data, Flow Control Structures, Operator, Custom function and Object, Data entry and Validation, Tables and Forms, Security Issues

VB Scripts

VB Script functionality, Active X controls, Active Server Pages, Error Handling, VB Script Controls, Web Based application

Textbooks

There are large numbers of good books available in each topic. Instructor are advised to use their library resources.

Reference Books :

1. Internet Read-Map, Benett Falk, BPB Publication
2. HTML complete reference, Powell, TMH
3. Rese Colderun, Teach yourself CGI Programming in 7 days, Tech Media 1998
4. Danni Goodman, Java Script Bible, 2nd Ed. Comdex Computer Pub.1997
5. Professional ASP 3.0, Alles Homer & David Susmen, SPD Publication

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

Module I (2 hours)

1. Review of Fundamental Concepts of Data Communication.
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)

3. 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)

4. 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 .

Module IV (6 hours)

5. Microwave Radio Communications :

   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.

   (4 hours)

6. 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. Ideband Wireless Digital Communication by Andreas F. Molisch-Editor, Pearson Education.

CPEE 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