SEMESTER I

ENGINEERING PHYSICS

EL-101

Unit I
WAVE OPTICS

Unit II
QUANTUM PHYSICS
Matter waves, group and particle velocity, uncertainty principle, Schrödinger wave equation and its application. Characteristic and back ground X-rays, Duan Hunt Limit, Moseley’s law. Bragg’s diffraction and bragg’s spectrometer, compton effect. Stimulated and spontaneous emission, principles of laser action. Properties of solid state(Ruby & Nd YAG) and gas (He-Ne & CO2) type lasers and their engineering applications. Fundamental ideas about fibre optics

Unit III
NUCLEAR PHYSICS

Unit IV
SEMICONDUCTOR PHYSICS

Unit V
DIELECTRIC MATERIALS

Suggested text books:-
5. Optics by Ajoy Ghatak.
ENGINEERING MATHEMATICS-1
EL-102

Unit I
Maclaurin’s and Taylor theorem, roll’s theorem, applications to rates, small increments, approximations and errors.

Unit II
Tangents and sub tangents, normals and subnormal differential coefficients of length in Cartesian, Polar and parametric coordinates, Curvature definition formula in intrinsic, Cartesian and polar coordinates, radius of curvature and center of curvature.

Unit III
Asymptotes Envelopes, evolutes, indeterminate forma, partial differentiation, Euler’s theorem, application of partial differentiation on approximation and errors of Taylor’s series of two variables maxima and minima of function of one two variables.

Unit IV
Definite integrals and their properties, integral as the limit of a sum application to summation of series area, length, of curves, volume and surface of solids of revolutions.

Unit V
Beta and gamma function multiple integral, double integral and triple integral application to problem in area., volume center of gravity, moment on inertia and enter of pressure.

Suggested text books:-
2. Integral calculus By M. Ray, H.S. Sharma & S.S.Seth.
FUNDAMENTALS OF COMPUTER AND PROGRAMMING
EL-103

Unit-I
General organizations of typical computer, classification of computers, generation of computer. Input-output devices. Storage devices. System software like assemblers, Compliers

Unit-II

Unit-III

Unit-IV

Unit-V
Structures, Pointers, Files handling using intel86() function, union enumerated data type command line argument, working with user defined header file.

Suggested text books:-
1. Unix by Summitabha Das
2. “C” Programming by E Balaguruswamy
3. Complete reference of “C”
4. Fundamental of computer by V Rajaraman.
BASIC ELECTRONICS
EL-104

Unit-
Semiconductor Theory & Diodes
Energy band theory of crystals, Insulators, Semiconductors 7 Metals. Intrinsic & Extrinsic semiconductors Theory of P-N Junction, Ideal & Practical diode, Transistor Characteristics & Operation, Temperature and breakdown characteristics, Junction Capacitances, piece wise liner DC model of diode, Zener diode, Design of Zener regulator, Varactor diode, Point-Contact diode tunnel diode, schottky- Barrier diode Light emitting diode 7 Power rating of diodes

Unit-II
APPLICATIONS OF DIODE & WAVE SHAPING CKTS
Half wave & Full wave Rectifiers with& without Filter, Clippers & Clampers, Voltage Multipliers RC Integrators & Differentiator

Unit-III
BJT-FET
Input & output Characteristics od all configuration, biasing & Thermal Stabilization, AC & DC Load line, Compensation techniques, Thermal runway, Eber’s Molls equation & Early effect, FET Characteristics & Applications of JFET & MOSFET.

Unit-IV
Amplifier
Parameters, Caluation of gain & impedances, FET equivalent CKT, Hybrid π model, Millers effect, Transister as an Amplifier. Frequency Response of Amplifiers, Classifications of Amplifiers-Voltage & Current Amplifiers, Coupled Amplifiers, Multistage Amplifiers.

Unit-V
CRO & Multilayer Devices.

Suggested text books:-
1. Integrated Electronics by Millman & Halkias
2. Electronics Devices and circuit Theory by Boyelasted an Nashlsky.
3. Electronics Instrumentation by copper & Halfrick.
COMMUNICATION SKILLS
EL-105

Unit-I
Languages as a skill of communication linguistic techniques modern usage & style comprehension skills, English phonetic symbols, oral presentation audition.

Unit-II
Application of linguistic ability writing of definitions of engineering terms, objects, processes and principles.

Unit-III
Letter writing Application, Enquiry, calling quotations, Tenders order & complaint, company structure and systems.

Unit-IV
Precise writing noting & drafting technical descriptions of simple engineering objects & processes, slogan writing, advertising, book review.

Unit-V
Writing technical reports of the type of observation report, survey report, report of trouble, laboratory report and project report on the subjects of engineering, debates, speech discussion.

Suggested text books:-

2. Communication in English fir Technical Students by Ray Williams, Rabindrnath Ray and John Swales- Orient Longman.
4. Essentials of communication Techniques by Dr. Ravi S. Verma, H.S. Satsangi- Career Publication
SEMESTER – II

BASIC ELECTRICAL ENGINEERING
EL-201

Unit-I
Introduction to electrical Engg. Generation, transmission, distribution and utilization.
DC circuits: Maxwell’s loop & node equations. Source conversion, Network theorems
Superposition theorem, Maximum power transfer theorem, Millman theorem,
Reciprocity theorem, Star/Delta transformation.

Unit-II
Magnetic ckt & electrostatics: fundamental definitions, Ampere’s law lenz’s law,
calculation of mmf, electric field, electrostatic potential energy stored in electric and
magnetic field, statically & dynamically induced emfs, self & mutual induction,
coefficient of coupling, rise & decay of current in inductive ckt.

Unit-III
Single phase AC. Circuits: Average value, RMS value, Form factor, Alternating
waves, power & Power factor, single phase series-parallel ckt, resonance, phase
diagram.
Poly phase AC circuits: Phase sequence, Concept of line & phase quantities,
star/Delta Connections, Three phase power & Power management.

Unit-IV
Transformer: Construction, classification, principle of operation, phasor diagram on
no-load and on load condition, equivalent ckt, efficiency, regulation, all day
efficiency, OC & SC test, auto transformer.

Unit-V
DC machine – Generator – types, principle of operation, emf equation, magnetic
characteristics, motor- back emf, torque equation, mechanical characteristics,
commutation armature reaction, interpoles, starting & speed control, applications.

Suggested Text Books & References:-

1. Electrical Engg. Fundamentals - V.Deltoro
2. Electrical Machines - Nagrath Kothari
3. Electrical Machines - P.S. Bimbhra.
5. DC machines & Transformers - K. Murugesh Kumar.
Unit-I

Unit-II
Fuels.
Classification of fuels and their comparison, calorific values, fuel resources in India, analysis of coal clinker formation. Pulverized coal as fuel, methods of manufacture of coke and uses, petroleum distillation. Cracking cracked gasoline. Varieties of fuel oils, their properties and uses, knocking, anti knocking compounds. Problems based on combustion.

Unit-III
Materials
Composition engineering properties and uses of alloys of Al. Fe. Ni Cu and Zn. Refractories: definition. Classification, properties and uses: Types of Cements, manufacture. properties and uses of Portland Cement, Chemistry of setting hardening of Cement.


Unit-IV
Lubricants
Types and classification of lubricants, mechanism of lubrication, physical and Chemical properties testing of lubricants types of greases, application of lubricants. Corrosion and corrosion reaction, types and theories of corrosion, factors affecting the rate of corrosion, protection of metal from corrosion by various measures, important inorganic metallic and non metallic coatings and organic coating.

Unit-V
Basic environmental chemistry and Instrumental techniques in chemical analysis.
   A. Pollution, cause of pollution, air pollution and its types, green house effect, importance of ozone layer, control of air pollution, water pollution, sources, methods of prevention, sewage and its treatment, soil and land pollution and its control, radio active pollution and its control.
   B. Introduction, infrared, UV,NMR, spectrophotometry, chromatograph, gaschromatography, colorimetry, Lamberts and beer’s law.

Suggested Text Books:-
Barkatullah University Institute of Technology, B.U., Bhopal


BASIC MECHANICAL ENGG.
EL-203

Unit-I
Boilers- Names and function of principal parts, Cochran, Locomotive, Babcock and Wilcox boilers, boiler mountings and accessories. Steam Sensible heat, Latent heat, super heat, internal energy, dryness fraction and its determination processes constant pressure, constant volume, hyperbolic and throttling.

Unit-II
IC Engines:
Classification of I.C. Engines, description and working of four stroke cycle petrol and diesel engines, two stroke cycle petrol engine and their working cycles, indicated power, brake power and efficiencies.
Thermodynamics – system properties and processes, Zero, first second and third law of thermodynamics.

Unit-III
Modes and application of heat transfer unidirectional steady state heat conduction, heat transfer through composite slab, Air conditioning- need and application, description of summer and winter air conditioning.
Workshop Technology.

Unit-IV
Introduction to materials machine tool and metrology:
Engineering materials: Classification, composition, mechanical properties and uses of cast iron, mild steel, high carbon steel and high speed steel.
Machine tool: introduction, specification construction and uses of lathe, drilling, shapes milling and grinding machines.
Measurement: construction and uses of measuring tools and gauges, surface plate, dial gauge, sine bar, caliper, micrometer, comparators.

Unit-V
Foundry and Fabrication:
Foundry: Basic steps involved in foundry. Introduction to patterns, types material allowances, mould making, composition of molding sand i.e. green sand, dry and loam sand,
Fabrication: Welding and types of weld ability of material. Introduction to gas and arc welding- TIG,MIG and submerged, resistance welding, soldering and brazing & related process.

Suggested Text Books:-
ENGG.MECHANICS
EL-204

Unit- I
Co-plainer Forces, free body diagrams, Varignon’s Theorem, Condition of Equilibrium, force polygon and funicular polygon of forces and equivalent force system, Analysis of forces in the members of a truss, method of joins, Method of section.

Unit-II
Centroid and mount of Inertia of plane areas, perpendicular Axis and theorems, product of Inertia, Radius of gyration, Principal Axes and principal Mount of Inertia, Mass Mount of Inertia.

Unit-III
Friction on inclined plane, screw & nut friction, ladder wedge friction, Transmission of power through belt, and rope, gear Trains, simple, compound and Epicyclic.

Unit-IV
Kinematics and kinetics of particle, motion under constant force, Super elevation of rails, Momentum and Impulse, D’ Alembert’s Principal, Work energy principle, Collision of elastics bodies, rigid body dynamics, Kinematics and Kinetics of rigid body, Flywheel,

Unit-V
Shear force & bending moment diagram in cantilever & simply supported beam with concentrated, distributed load, and couple, overhanging beams, pint of contra-flexure, relationship between load, bending moment & shear force.

Suggested Text Books:-

DATA STRUCTURE AND ALGORITHMS
EL-205

Unit-I
Introduction to Algorithms, concept of time and space complexity of algorithms to recursion, running time calculation of algorithms. Introduction to data structure, arrays, representation and manipulation of multidimensional arrays.

Unit-II
Introduction to linked lists, doubly linked lists, stacks queues implementation and manipulation of these data structures.

Unit-III
Trees- Basic terminology and representation, Binary trees, Binary tree traversal, Binary search tree, applications of trees.

Unit-IV
Graphs- Basic terminology and representation, graph traversal connected compound and spanning trees, shortest path- Dijkstra’s algorithm.

Unit-V
Study and analysis of various internal sorting techniques- Insertion sort, quick sort, merge sort, heap sort. Introduction to external sorting- need and techniques.

Suggested Text Books:-

1. Fundamental of Data Structures by Horowitz & Sahani.
SEMESTER-III

ENGG.MATHEMATICS-II
EL-301

Unit-I
Differential equation of first order and first degree liner and exact differential equation. First order and higher degree differential equations and soluble for P,X, and Y including clarausts form.

Unit-II
Second and higher order differential equation. Simultaneous differential equations of both types second order differential equation with variable coefficients.

Unit-III
Solution by series mentod with emphasis to legender’s and bessel’s equation and properties of legender’s and bessel’s function.

Unit-IV
Laplace transformation of elementary functions unit step function, dirac-delta function, properties, inverse transformation. Solution of order diff. equations using laplace transformation.

Unit-V
Fourier series including half range series. Harmonic analysis, P.D.E. of first order. Liner and non liner, liner p.d.e of second and higher orders boundary value problems separation of variables, methods, application to heat transfer and vibration in one and two dimensions.

Suggested text books:-

ELECTROMECHANICAL ENERGY CONVERSION
EL-302

Unit-I
Electrical Energy conversion principle-energy balance, energy in singly excited and multiply excited magnetic systems, basic definitions of rotating machines. Rotating magnetic field.

Unit-II
3Φ Induction motors- construction, principle, types, equivalent ckt, torque equation, slip-torque characteristics, starting & speed control.

Unit-III
Special machines- 1 Φ Induction motors, principle, construction, starting, torque characteristics, applications, construction, principle & analysis of stepper motor, liner induction motor, hysteresis motor, universal motor, servo motor.

Unit-IV
Synchronous machines- Generator, construction, emf equation, OC and SC Characteristics, synchronous impedance, method of calculating regulation, motor characteristics, V & inverted V curve salient & non salient pole machines, vector diagram, power angle characteristics.

Unit-V
Transmission & distribution- Transmission of power by different systems, influence of voltage on cost & efficiency, short & medium line- parameter, representation vector diagram, introduction of portative devices.

Suggested text books:-
1. Electrical Machines by P.S. Bhimbra.
UNIT I
Circuit elements energy sewers, loop & node analysis kinehoff’s current & voltage laws, Analysis of magnetically coupled ckt. Dot convention, cramers rule, dual network, voltage & current source, controlled sources. Networks theorems. Thevenin’s & norton’s theorem, superposition, reciprocity, compensation, max power transfer & Millman’s theorem.

UNIT II
Transient & steady state analysis transients in ROL, RC, RLC circuits, Initial conditions, time constants, circuit driver by constant, sinusoidal & other driving sources & their solutions. Network topology: graph, trees, branches & links, impedance matrix, cut set, & tie set matrices.

UNIT III

UNIT IV
Network function concept of complex frequency, impedance 7 admittance function for two port network, Two port-Network parameter’s & relationship between parameters, interconnection of two port networks, poles & zeros in the S-plane for a driving point finite & transform functions, RLC circuits series & parallel resonance, band width Q factor & pole zero considerations.

UNIT V
Positive real function IC, RL,RC,7 RLC network synthesis, foster & cauer network, minimum positive real functions, broune’s method. Bott- Duffin method. Insertion loss synthesis- coefficient matching techniques.
DIGITAL ELECTRONICS
EL-304

Unit-I
Number system & Boolean algebra, number systems: Binary, Arithmetic, octal, hexadecimal 7 radix conversion.
Binary codes: BCD, excess three code, gray code display code ASCII, EBCDIC, parity check codes code conversion, Boolean algebra; theorems, Introduction to logic gates, NAND, NOR realization, Boolean laws & theorems.

Unit-II
Simplification of Boolean expression, sum of product & product of sum forms, concept of min terms & max terms, minimization techniques, Karnaugh’s map method, Tabulation method. (Quine-MC-clusky method)

Unit-III
Combinational circuits & flip flops half adder, substructure, BCD adder- excess-3 adder multiplexer & demultiplexer, encoder & decoder ckt. FLIP-FLOPS: RS, clocked RS, T, D, JK, master slave JKFF and latches.

Unit-IV
Sequential ckt, elements of sequential switching ckt, synchronous 7 asynchronous systems, binary ripple, counter, BCD counter, UP-Down counter, Shift requesters, serial and parallel shift registers shift left & shift right operation, Johnson & Ring counter.

Unit-V
Design of sequential ckt. State table, state assignment, characterizing equation & definition of synchronous sequential machines. Mealy & more model machines, state table & transition diagram, Introduction to logic families, RTL, DTL, all types of TIL, ECL, NMOS, CMOS logic.
Suggested text books:-

1. Digital logic and Computer Design by Moris Mano.
2. Digital Principles and applications by Malvino & Leach.
3. Digital Fundamental by Floyd.

ELECTRONICS CIRCUITS
EL-305

Unit-I
Power Amplifiers & Regulators:
Power Amplifiers:- Class A, Class- B and AB Amplifiers, Push pull Amplifier
Driver stage Design, Compound states, complementary symmetry circuits stability
and thermal consideration, Class C Amplifier large signal power & Audio
amplifier, tuned amplifiers.
Regulators:-Regulated Power Supply, Shunt & Series regulators, Current 7
Voltage regulator, Current limiting Protections Ckts.

Unit-II
Feedback Amplifiers, Negative & Positive feedback.
Feedback general theory, Effect of Feedback on gain, sensitivity, input & output
impedances bandwidth & Noise types of feedback, Current & Voltage feedback
Multistage feedback.

Unit-III
Waveform Generator
Conditions for Oscillators, types of Oscillators, phase shift Oscillators, Wein
Bridge Oscillators , L-C Oscillators Colpitts & Hartley Oscillators, Crystal
Oscillators, Negative resistance Oscillators, switching characteristics of transistor
multivibrator designing & application of bistable monostable and astable
multivibrator, 555 timer and its applications.

Unit-IV
Differential Amplifier
Barkatullah University Institute of Technology, B.U., Bhopal

Direct Coupled amplifiers using BJT & FET, drift Problems, Darlington configuration, bootstrap, NPN-PNP Combination, Differential Amplifier, Common mode rejection ration, cascaded Amplifier, series & shunt Choppers, inverted mode Choppers, balanced Choppers.

**Unit-V**
Operational Amplifiers (op-Amps)

**Suggested text books:-**
1. Integrated Electronics by Milliman & Hailias.
3. Opamp by Gaikwad.

**ELECTROMECHANICAL ENERGY CONVERSION LAB**
**EL-306**

**List of Experiments;**

A. Study of various parts & working of a synchronous machines.
B. Study of various starting methods of an induction motor.
C. Study of special machine like, liner IM, stepper motor, hysteresis motor.

1. To verfy the voltage & current relations star & delta connected 3 phase system.
2. Measurement of power in a three phase balanced circuit by two wattmeter method.
3. No load & block rotor test on 3Φ induction motor.
4. Load test on 3Φ-slip ring induction motor.
5. N load & block rotor test on 1Φ IM.
6. Speed control of 3Φ induction motor by cascadig.
7. To find voltage regulation of on alternator using synchronous impedance method.
8. To find voltage regulation by alternator using direct loading method.
10. To find voltage regulation of an alternator using zero power factor method.

**NETWORK ANALYSIS & SYNTHESIS LAB**
**EL-307**

Study of verification of Kirchoff’s laws.

Study and verification of various theorems- Thevenin’s, Norton, Superposition, Max. Power Transfer, Reciprocity, Millman’s theorems.

Measurement of two port parameters & network function of a given circuit.

Computer based simulation of different networks.

**DIGITAL ELECTRONICS LAB**
**EL-308**

Verification of truth table of various logic gates.

Design and implementation of half and full adder, Subtractor.
Barkatullah University Institute of Technology, B.U., Bhopal

Design and implementation of code converters, realization of multiplexers and demultiplexers, flipflops, counters and shift registers.

**ELECTRONICS CIRCUITS LAB**

**EL-309**

Frequency response of an amplifier with and without feedback.
Designing of differential amplifier and determining the different parameters of differential amplifier.
Operational amplifier – Inverting and non inverting configurations application of Op- Amp as summer, comparator, integrator differentiator etc.
555 timer ad its applications astable, monostable & bistable multivibrator.
NUMERICAL ANALYSIS
EL-401

Unit-I
Algorithm and its basic properties like effectiveness and efficiency. Examples of polynomial evaluation, searching largest number in a set etc. interactive and recursive loops in flow chat errors and approximations. Types of errors, sources of errors, problem in computational safeguards against errors.

Unit-II
Solution of equation Newton deflected Newton rap son methods. Bairstow’s method of complex roots. Efficiency of these methods.

Unit-III
Interpolation forward backward, central and divided difference formula legrangian interpolation, inverse inter potation. Numerical interpolation: Newton cote’s formula Weddle’s 3/8th rule Simpson’s as a special case of Newton cote’s gauss legendre open quadrature.

Unit-IV
Ordinary differential equation modification euler,picard and taylor series method, runga kutta 3th and 4th order, predictor and corrector method.

Unit-V
Linear simultaneous equation: partial and complete pivoting triangularization. Gauss reduction, jacobi, Gauss siedel iteration methods. Relaxation methods.

Suggested text books:-
2. numerical Algorithm by E.V. Krishnamurthy & S.K. Sen.
ENVIRONMENTAL ENGG.
EL-402

Unit-I
Environmental problem and issues Ecosystem, global warming, Green House effect, Depletion of ozone layer, Human activity and meteorology. Genetic and plant biodiversity, EL-Nino phenomenon and its effects. Explosion of environmental issues, land and soil pollution.

Unit-II
Air pollution
Introduction, structure of the atmosphere, chemical and photochemical reactions in the atmosphere, effects of air, pollution sources & classification of air pollutions harmful effects of \( \text{CO}, \text{CO}_2, \text{CH}_4, \text{SO}_x, \text{NO}_x, \text{H}_2 \text{S} \), Ozone & particulate, Basic concept for air sampling techniques, photochemical Smog, Acid Rain.

Unit IV
A. Noise pollution and radioactive pollution Noise pollution- general introduction of noise pollution and its effects, sound unwanted from of noise changers, traffic noise prediction and control, radioactive waste sources characteristics and disposal.
B. Solid and Hazardous waste management sources types and composition of solid waste physical, chemical Biological characteristics, disposal of solid waste.

Unit-V
Collection of base line Data, Introduction and concepts of initial environmental examination (IEE), Environmental Impact Assessment (EIA), Environmental Impact statement (EIS), environmental Audit EA Risk Assessment (RA) etc.

Regulatory Responses:-
Review of national and international developments related environmental issues, laws and legislation.

Reference books:-
1. Chemistry in Engineering & technology vol-II Tate MC Graw.
4. “Environmental pollution monition and conform khopkar S.M. New age international pub.
5. S.R. Khirsagar Sewage and Sewage treatment
ANALOG COMMUNICATION
EL-403

Unit-I
Signal Analysis: Review of fourier Transform, convolution signal transmission and its properties, through linear systems, signal distortion in transmission, paley-wiener criteria, bandwidth and rise time, energy and power density and parseval’s theorem for energy and power signals, convolution & correlation.

Unit-II
Linear Modulation: necessity of modulation principle of amplitude modulation, generation and detection of AM-SC, SSB-SC and VSB, comparison of various Am systems, FDM.

Unit-III
Exponential modulation: Definitions and relationship between PM and FM frequency deviation, bessel’s function, spectrum and transmission BW of FM, WBFM, phaser diagram of FM signal, multitone FM. Generation and detection of FM Non linear effects in FM systems, comparison of AM and FM systems.

Unit-IV
Radio Transmitter and Receivers: different types of AM and FM transmitters and receivers, AM and FM standard broadcast transmitter and receivers, image rejection, mixers, noise sources, calculation of noise for single and cascaded stages.

Unit-V
Noise performance of Analog communication systems SNR Noise figure, noise temperature, noise calculation for cascaded stages, noise figure of merit, of SSB, DSB, AM, FM systems, noise threshold effect, threshold improvement in FM systems: FMFB PLL, preemphasis and De-emphasis and other threshold improvement circuits.

Suggested text books and References:

MICROPROCESSOR AND MICROCONTROLLER
EL-404

Unit-I
Microprocessor (8085):- internal architecture, instruction set and classification, Interrupts and data transfer schemes, memory-mapping and its interfacing, assembly level programming.

Unit-II
Microprocessor (8086):- organization, Architecture, addressing modes, instruction set, assembly language programming, memory management, real & protected mode.

Unit-III
Salient features of advanced Microprocessor, RISC and CISC processors, Review of evolution of advanced Microprocessor: 8086,8088,80-186/286/386/486/ Pentium, super scalar architecture of Pentium, Alpha AXP and Ultras arc processors.

Unit-IV
Introduction of various Interfacing chips like 8212, 8155,8255,8755, and its interfacing keyboards, printers, LRDS, motors, ADC,DAC, and stepper motor and introduction to programmable keyboard/display interface, general-purpose programmable peripheral devices (8253)8254 programmable interval timer, 8259A programmable interrupt controller & 8257 DMA controllers. Serial I/O & data communication: use RS 232C, modern etc and various bus standards, 8251.

Unit-V
Introduction to microcontroller (8051):- its architecture, pin description, I/O configuration, interrupts, addressing modes, an overview of 8051 instruction sets.

Suggested text books:-
1. B.B. Brey Person The Intel Microprocessors, Architecture, Programming and Interfacing.
COMMUNICATION NETWORK & TRANSMISSION LINES
EL-405

Unit-I
Lattice and bridged – T networks, image impedance, iterative impedance characteristic impedance, attenuators and their design.
Law pass, high pass, band pass and band elimination filters, m-derived filters, composite filters, frequency transformation.

Unit-II
Low pass, high pass band pass and elimination filters, prototype and m-derived filters composite filters, frequency transformation.

Unit-III
Filter specifications, Introduction to Butter worth, chebysher inverse chebyshev, and elliptical filters and their comparison, first and second order low pass, band pass and band stop filter design.

Unit-IV
Construction and design of two wire line and coaxial cable. Voltage and current on a transmission line, infinite, line characteristic impedance and propagation constant, wave from distortion, attenuation and phase equalizers. Distortion less line, loading, linear reflection on a line, reflection coefficient, input and transfer impedances, open circuit and short circuit line, reflection factors, reflection factors, reflection loss, T and II equivalents of a line, location of line fault.

Unit-V
Line at radio frequencies, parameters of line and coaxial cable at radio frequencies, dissipation less line, voltage and current on a dissipation less line, standing waves, standing wave radio, input impedance of open circuit and short circuit, power and impedance measurement on line, eightwave quarter wave and half wave line, circle diagram smith chart, solution of problems using Smith chart, single and double stub matching.

Suggested text books:-
Barkatullah University Institute of Technology, B.U., Bhopal

1. Network and Transmission Lines By J.D. Ryder
2. Network and Transmission Lines By G.K. Mithal

ANALOG COMMUNICATION LAB
EL-406

Amplitude modulation and demodulation
Generation and Detection of DSB-SC,SSB,VSB
Frequency modulation and demodulation
Radio transmitter and Receiver
Noise performance pf AM & FM systems

MICROPROCESSOR AND MICRONTRROLLER LAB
EL-407

Introduction to 8085 & 8086 kit
Assembly language programming in 8085 and 8086.
Verification of different inter cards- 8155,8255,ADC,DAC,8212 etc.
Programming in 8051 microcontroller.
COMMUNICATION NETWORKS TRANSMISSION LINES
EL-408
Design and Testing of low pass, high pass, m-derived filters.
Design and Testing pf low pass, high pass, band pass, band eliminated transmission line.
Single stub matching on transmission line.

ELECTRINICS WORKSHOP
EL-409
Study of Following Components:-

Resistors:-
Carbon, Wire wound and Metal Film Resistors, Potentiometers, Ratings, Codes etc.
Capacitors:-
Electrolytic, Ceramic Mica, Silver, Polystyrene Metallized polystyrene & Tantalum,
Inductors:-
Types of Inductors & Transformers
Active devices:-
Transistors Diodes & ICs
Special Components:-
Thermistors Varistors ferretes & Piezoelectric Components.

Electronic Circuit Layout:-
Conventions, preparing the layout for the printed Circuit boards. Mini project based on Discrete Components and ICs.
SEMESTER – V

INDUSTRIAL ECONOMICS & BUSINESS ORGANIZATIONS - EL-501

Unit-I
INTRODUCTION TO ECONOMICS
Introduction to economics, its importance, approaches and uses of study, engineering and economics. Economic problems. Economic good and Wealth, Demand and supply. Competition, Monopoly, Theory of firm, Money and its function, theory of money and choice, bank and its functions, employment and income, gross national product, net national product- consumption, savings and investment.

Unit-II
FEATURES OF INDIAN ECONOMY
Broad features of Indian economy, Natural resources and economic development, infrastructure in the Indian economy, Agriculture development, Green revolution, Population, Population theories, Unemployment, Poverty, and balance regional development. Economic growth and economic development, Indian Industries, Industrial policy, Industrialization in India, Role, Plan and pattern of industrialization, Public Vs private Sectors, Economic reforms in India, India’s five year plans.

Unit-III
INDIAN ECONOMY & GLOBAL TRANSACTIONS
The indigenous and modern banking system in India, Reserve Bank of India, Monetary and Fiscal policies, Financial Institutions and SEBI, Free Trade and protection, Indi’s Foreign Trade and WTO, balance of payments. India currency systems and foreign exchange, Foreign Capital Investment, Foreign aid and FEMA.

Unit-IV
INTRODUCTION TO BUSINESS ORGANIZATION
Concept nature and scope of business, business and its environment, economic, legal social and political environment of business, business ethics.
Forms of business organization- Types and their functions, roles and responsibilities, HUF, Partnership, Joint Stock Companies, Private and Public Limited companies, Cooperatives, Joint stock and public sector, Entrepreneurship, promoters and financial institutions, concept of business growth, profit maximization Vs social responsibility, role and problems of small business, Joint Ventures, multinationals.

Unit-V
INTRODUCTION TO MANAGEMENT
DIGITAL COMMUNICATION
EL-502

Unit-I
Type of signals, sampling theorem, pulse modulation techniques, PAM, Natural and flat-top sampling, equalizer, detection of PAM signals, bandwidth of PAM, S/N ratio in PAM, cross-Talk, PWM and PPM, methods of generation and detection synchronous and asynchronous time division multiplexing, synchronization techniques.
Marginal joint and conditional probability, random signal, random variable, random process, probability density function and probability distribution function, Binomial, Poisson and Normal distribution.

Unit-II
Quantization of signals, PCM, Quantization error, compounding, intersymbol interference, eye patterns, multiplexin of PCM signals, bandwidth of PCM, output S/N ratio in PCM, delta modulation, adaptive delta modulation, bandwidth of DM, output S/N ratio in DM differential PCM, M’ary System.

Unit-III
ASK, OOK, BFSK, M’ary FSK, BPSK, DPSK, QPSK, M’ary PSK, QAM, MSK, baseband signal receiver, probability of error, optimum filter, matched filter, correlator, coherent and noncoherent detection.
Introduction to spread spectrum, D-S and F-H spread spectrum, principle of CDMA, Applications of spread spectrum.

Unit-IV
Unit of information, entropy, entropy maximization, information rate, Joint and conditional entropy, mutual information, channel capacity of various channels, Shannon’s theorem, Shannon-Hartley theorem, BW-S/N ratio trade-off, Shannon limit.

Unit-V
Source coding prefix property, coding efficiency, data compression codes, Shannon-Fano code, Huffman code.
Channel coding, Hamming distance, Minimum Distance, error detection and correction, ARQ and FEC, party check code liner block code, Hamming’s single error correction code, convolutional code, cyclic code.

Suggested Text books and references:-
INTEGRATED ELECTRONICS
EL-503

Unit-I
Introduction to micro-electronics, advantages and limitation of integrated ckt.
Monolithic Ics-Planner process, basic setps required in the fabrication of monolithic IC.
Monolithic integrated devices: NPN transistor, punch- through transistors, lateral and substrate PNP transistor, monolithic diodes, schottkey diodes, schottkey transistor, super beta transistor, high frequency transistor, JEFTs,MOSFETs, diffused resisters epitaxial resistors, junction capacitor.

Unit-II
DTL and TTL logic: Basic DTL inverter, modified DTL,DTL Nand gate fanout power dissipation, spice simulation.
Basic TTL inverter, stored change removed from DTL and TTL, basic TTL Basic TTL inverter, stored change removed from DTL and TTL, Basic TTL NAND gate and multiple, emitter, BJT, voltage transfer characteristics, TTL fanout, power dissipation LTTL (low power) HTTL (high speed), spice simulation. STTL, ECL, ECL fanout, III, ECL gate versatility.

Unit-III
MOS and CMOS logic: introduction to MOS in digital circuit, MOS inverter, VTC, power dissipation, MOS logic gats (NOR,NAND,OR, X-OR, ) NMOS Schmitt triggers and transmission gate. CMOS technology, CMOS device molding, CMOS inverter, CMOS gates, COMS tristate gates. CMOS Schmitt trigger gates, CMOS driver, dynamic CMOS, comparison and interfacing of logic families, BICMOS. CMOS amplifiers, Analog integrated circuit design.

Unit-IV
Semiconductor memories: Diode Rom, BJT, ROM, Bioplar Rom Line amplifier NMOS,ROM,NMOS, NAND ROM, CMOS pre-charging and discharging of a load capacitance, CMOS ROM, semiconductor static RAM-static Ram cell with transmission gates, MOSFET static Ram cell technologies, BJT RAM Cell, gate arrays PLA, Digital to analog and analog to digital converters.

Unit-V
Basic regulator circuits: Monolithic voltage regulator, regulator circuits using type 78xx series, 79xx series and 723 series etc. principle of phase locked loops, PLL building blocks, study of PLL, application of PLL, Fm and Am modulation frequency synthesis, translation and multiplication.

Suggested Text books:-

1. Analysis and design of digital Intergrated circuits- David A hodGES.
2. Digital intergrated circuits – Thomesa De Massa Zack Eiecone, John Willey and Sons.
CONTROL SYSTEMS
EL-504

Unit-I
Control system Components & transfer function : system concept, open loop and closed loop systems, introduction to feedback concepts, mathematical modeling of physical systems, transfer function of linear system, block diagram and its reduction procedure, signal flow graph, mason gain formula. System components, potentiometer, a.c. synchronous tachometers, a.c. and d.c. servo motors, servo amplifiers, selsyns, amplifying.

Unit-II
Time Response: Time Response of first, second and higher order systems to various test input signals. Types of systems, steady state error and constants, basic control action and automatic controllers, effects of proportional, integral, derivative and PID controllers on system performance.

Unit-III
Stability: concept of stability, necessary conditions for stability, absolute and relative stability rough Hurwitz criterion, Nyquist criterion, construction of root loci ad application.

Unit-IV
Frequency Domain analysis & compensation techniques Co-relation between time and frequency response, frequency, domain analysis, bode plots, gain phase margin, effect of feedback on frequency domain analysis, design consideration for control system, phase lead, phase lag lead compensation, choice of compensating network using bode plots.

Unit-V
Sate space analysis and sampled data system: state space representation of systems, state models and transfer functions, state transition matrix, controllability and operability, introduction to discrete time system, analysis of sampling process, the Z-transform and inverse Z-transformation.

Suggested Text books:-

2. Linear control system- B.S. Manke, Khana Pub. 5th edition.
UNIT-I
Introduction to computer organizations and architecture, compute system components, bus organized computer, memory address register, data program counter, accumulator, instruction register. Instructions fetch, Decoding and execution. Instruction formats and addressing modes, instruction set design issues, micro operation. Register transfer language.

UNIT-II
Control unit organization. Instruction sequencing, interpretation. Hardwired control and micro programmed control organization, control memory, address sequencing, microinstruction formats, micro program sequencer, microprogramming, microinstruction encoding, horizontal and vertical micro instructing.

UNIT-III
Introduction to Operating Systems, Operating system services, multiprogramming, time-sharing system, storage structures, system call, multiprocessor system. Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling I/O devices organization, I/O devices organization, I/O devices organization, I/O buffering.

UNIT-IV
Process concept, process scheduling, operations on processes, threads, interprocess communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling.

UNIT-V
Concept of memory management, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, and paging combined with segmentation. Concept of virtual memory, demand paging page replacement algorithms, allocation of frames, thrashing demand segmentation, Cache memory.

Suggested Text books:-
4. Modern operating system by Tanenbaum.

**DIGITAL COMMUNICATION LAB**

**EL-506**

Sampling Theorem and data reconstruction
Generation and detection of PAM, PWM,PCM,PTM.
Delta modulation, ADM,
Generation and detection of ASK,PSK,DPSK,FSK,QAM.

**INTEGRATED ELECTRONICS LAB**

**EL-507**

Fanout calculation close loop system
Transfer of characteristic curve of RTL,DTL,TTL & CMOS.
Design of voltage and current regulator using IC7805,7812.
CMOS, TTL interface.

**CONTROL SYSTEMS LAB**

**EL-508**

Open loop and close loop system.
Time response of I\(^{\text{st}}\) order and II\(^{\text{nd}}\) order system.
Error coefficient and steady state error calculation for type-0,1.2 system.
Bode plot
Compensation network.
PI,PD and PID controller.

**COMPUTER ENGG.LAB**

**EL-509**

- PC hardware study.
- Programming in assembly language.
- Study of RAM/ROM operations.
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- Study of various operating system like DOS, WINDOWS, UNIX and LINUX with following.
  - Memory management.
  - File management.
  - Scheduling methods.
  - Protection security.

- Implementation of Bankers algorithms for deadlock avoidance.
- Implementation of Semaphores.

SEMESTER – VI

ELECTROMAGNETIC FIELDS AND WAVES EL-601

Unit-I
Cartesian, cylindrical and spherical co-ordinate systems, scalar and vector fields gradient, divergence and curl of a vector fields. Divergence theorem and stokes theorem.

Unit-II
Electric field, coulomb’s law electric field due to several charges viz: line charge, sheet charge, field due to continuous volume.
Gauss’s law- electric field due to simple charge bodies, equipotential surfaces, Poisson’s equation and laplace’s equation, capacitance, energy, stored and electric field, conservative and non-conservative field, solution of two dimensional laplace’s equation, finite difference method, method of moments.

Unit-III
Magnetic field, magnetic flux density, magnetic intensity, magneto motive force, energy stored in magnetic field. Apere’s law vector magnetic potential, amperes circuital law, lorentx force equation.

Unit-IV
Derivation of Maxwell’s equations in differential and intergral form for static and time varying field, boundary conditions for conductor and dielectric.

Unit-V
Wave equations for free space, uniform plane wave, liner elliptical and circular polarization, wave equations for conducting medium, wave propagation on conductors and dietaries depth of pentration, reflection and refraction of plane wave by conductor and dielectrics, poyenting vector and flow of power, wave between parallel planes, concept of TE, TM & TEM waves.

Suggested text Books:-
2. Engineering Electromagnetic- W.Hay
3. Introduction to Electrodynamic - David J Griffithe.
ADVANCED COMMUNICATION
EL-602

Unit-I
Optical Fiber communication, Types of Fiber Spectrum, SI & GI Fiber, FO Transmission NA, Models in of refractive index profiles, Signal Degradation in optical Fiber, attenuation absorption, Scattering losses, banding losses dispersion, group delay.

Unit-II
Optical sources LED & lasers structure, Principle, material, Modulation Response & Transmit Response, efficiency Optical detector basic Concept, photo diode, PIN & APD, noise performance, link design power & noise tune budget.

Unit-III
Satellite Communication: Introduction to satellite Communication ctive/passive synchronous/ None Synchronous, bit, Satellite altitude, transmission path, pathless noise consideration, link analysis Satellite systems, effective, isotopic radiated power, multiple access methods, earth stations, tracking and servo systems, up-down converters, example of satellite systems.

Unit-IV
Digital switching systems, Introductive to Electronics & digital exchanges, Hierarchy of switching offices, common control push button Dialing systems, switching matrix multiple stape switching TDM, Time slot Interchange, Comparison of digital signal, Combined space & Time switching.

Unit-V
Introduction to spread spectrum modulation, Direct sequence (DS) spread spectrum spread spectrum with spread spectrum, PN sequence generation, acquisition and tracking of FH signal and DS signal.

Mobile communication- Introduction to cellular mobile communication, elements of cellular system, cell design, hand off techniques, frequency management.
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Suggested text Books:-

1. Digital switching systems by Thygrajan Vishwanathan.
2. Cellular and mobile communication by Lee.
3. Optical fiber communication by G. Keiser.
4. Satellite communication by

DIGITAL SIGNAL PROCESSING
EL-603

Unit-I
Signals and Systems:-
Representation and analysis of discrete signal and systems. Analysis of discrete
time linear time- invariant systems and test for causal, static, Time-invariant and
stable system, properties of convolution and interconnection of LTI system.
Unit-II
Z transform:-
Z transform and inverse, Z transform. Properties of Z- transform, Rational Z
transform, stability, poles and zeros of Z transform.
Unit-III
Recursive and non- recursive systems:-
Representation and block- diagram representation of recursive and None-recursive
systems. LTI systems characterized by constant coefficient difference equations.
Realization of LTI systems. Structures of finite- Impulse and Infinite impulse
response systems.
Unit-IV
Discrete Fourier transform:-
Discrete Fourier transform and inverse DFT to other transforms properties of
DFT, linear and circular convolution. Fast Fourier transform direct computation of
DFT and FFT algorithm. Radix-2 and Radix-4 FFT algorithm. Intro. To wavelet
transform, relation between wavelet transform and DFT.
Unit-V
Design of Digital Filters:-
Design of FIR filters, using windows and linear phase frequency sampling
method. Design of IIR filters using impulse- invariant and bilinear transformation
method.
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Multirate signal processing, Application of MATLAB for filter design.

Suggested text Books:-
2. Introduction to digital Signal Processing Prockis.
VLSI Design
EL-604

Unit-I
Review of Logic design fundamentals: combinational logic, k-maps, designing with NOR and NAND gates, hazards in combinational networks. Mealy sequential network design, Moore sequential network design, synchronous design, machine design.
Introduction to VHDL: VHDL description and combinational network, modeling flip-flops multiplexes using VHDL processes, complications and simulations of VHDL code, modeling a sequential machine, variable, signal, and constants, arrays, VHDL operators functions and procedures, packages and libraries.

Unit-II
Attributes, multi-valued logic and signal resolutions. IEEE 1164 standard logic, generics, generate statement, synthesis of VHDL code, synthesis examples, files and TEXTIO.

Unit-III
Designing with programmable logic devices ROM, PLA’S PAL’S PLD’S designing with programmable gate arrays, FPGA’S, CPLD’S (complex programmable logic device).
Floating point arithmetic multiplication and other operations.

Unit-IV
Hardware testing and design: Combinational logic testing sequential logic testing, scan testing boundary scan, built-in self test.

Unit-V
Design examples and case studies: USART design, micro controller design, design of microcomputer CPU, filter design etc.

Suggested text Books:-
1. VHDL primer’ by Bhaskar.
2. Digital system design using VHDL’ by Charles Roth.
3. Modern VLSI design(system of silicon)’ by Wayne Walf.
Unit-I
Study of the function of OSI and TCP/IP reference in computer networks, circuit, message, packet and hybrid switching broadband ISDN and ATM, poling techniques, multiplexing an concentration, transmission media used in physical layer, X.25 networks.
Unit-II
Queuing theory, introduction LAN, MAN and WAN, various types f ALOHA’s LAN protocols, IEEE standards for LAN and MAN.
Data link layer protocols, error detection and correction codes in data link layer, protocol performance evaluation, protocol specification and verification, data link layer switching.
Unit-III
Network layer design issue, introduction to routing and congestion in network layer, routing and congestion control algorithms, inter networking, network layer in internet.
Unit-IV
The transport service, Elements of transport protocols, protocols of transport layer, internet transport protocol (TCP&UDP).
Unit-V
Data security and cryptography techniques, access management in application layer, world wide web(www), electronic mail(E-mail), concept of virtual terminals.
Study of common types of network like ARPANET, USENET etc.

Suggested text Books:-

2. Data communication and Network- W. Stallings.
ADVANCED COMMUNICATION LAB
EL-606

Setting up fiber optic analog and digital links.
Propagation and bending losses, numerical aperture measurements
PEM, PPM modulation and demodulation, PC to PC communication using optical
digital link.
Satellite communication-Transmission and Reception.

DIGITAL SIGNAL PROCESSING LAB
EL-607

Implementation of FIR/IIR Filters.
MATLAB-
Butterworth digital and analog filter design
Digital signal processing Tool Box.
Signal generation and convolution

VLSI Design Lab
EL-608

Programming using VHDL- Logic gates, combinational circuits, memory,
FIFO, ALU etc.
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SEMESTER – VII

ELECTRONICS MEASUREMENT AND INSTRUMENTATION- EL-701

Unit-I
Measurement and error, accuracy and precision, significant figures, sensitivity, resolution type of error.
Cathode Ray Oscilloscope (CRO): free running and triggered CROs, dual trace and dual beam CROS, delayed mode facility, CRO probes, multichannel CRO, Storage sampling and digital read-out CRO, Z-modulation.

Unit-II
Measurement of voltage, current, impedance and power.
Electronics voltmeter: D.C. Voltmeter with direct coupled and chopper amplifiers, a.c. voltmeter using rectifiers and amplifiers combinations, true rms responding voltmeters, electronics millimeter, differential voltmeter,(Q-meter, RLC-Q data bridge, AC bridges), Wagner earthing, vector impedance meter, vector volt meter, measurement of power by bolometer and calorimeter.

Unit-III
Waveform analyzers: Harmonic distortion analyzers, wave analyzer, spectrum analyzer heterodyne frequency meter, frequency, phase and pulse measurement by CRO, Signal function generator, function generator, sweep frequency generator, arbitrary wave from generator.
Amplifier Measurement: Input and output impedance measurement, signal to noise ratio and noise figure measurements, square wave testing of an amplifier, swept frequency measurements.

Unit-IV
Measurement of None-electrical quantities: classification of transducers strain gauges, displacement transducers, LVDT, Photo electric transducers, temperature measurements, thermistor, photosensitive devices, nuclear radiation detection instruments (speed measurement)

Unit-V
Digital measurement: Advantages of digital instruments, A-D & D-A, conversion, principles of digital voltmeters, ramp type DVM, integrating DVM, successive approximation DVM, frequency counters, display (LED, LCD, Seven Segment, Fourteen Segment etc.)

Suggested Text books and references:-
2. Electronics Measurement and Instrumentation by W.D. Cooper, PHI.
3. Electronics Measurement and Instrumentation by Kalsi, PHI.
Unit-I
Radiation retarded potential, radiation field from current element antenna, radiation power and radiation resistance of short dipole and half dipole antenna, field and phase patterns of point sources, directivity and gain, directivity and gain calculation of short dipole and half wave antenna.

Unit-II
Introduction to antenna, the antenna as an aperture, effective length, resonant and traveling wave antenna for different wave lengths. Antenna arrays of point sources, two elements arrays, end fire and broad side arrays, uniform linear arrays of N elements, linear arrays with non-uniform amplitude distribution binomial distribution and Dolph chebychev optimum distribution.

Unit-III
Effect of earth on vertical pattern, image antenna, network theorems applied to antennas, self and mutual impedance of antenna, future of antenna impedance, patterns and principal of pattern multiplication, polarization broadest antenna, long wave medium wave and short wave antenna loop and helical antennas.
Arrays of two driven half wave length elements,(broad side and end fire case) arrays with parasitic elements Yogi-Uda antenna, folded dipole, turnstile, batwing and long wore antenna rhombic antenna.

Unit-IV
Far field approximate radiation from aperture, Huyggen’s principle, Bavinet’s principles & complimentary antennas, horn antennas, plane sheet reflector, corner reflector, parabolic reflector antennas, log periodic antenna (introduction only), slot antenna.
Pattern measurement, phase measurement, measurement of radiation resistance by reflector method. Polarization measurements field strength measurement. Feeders for exciting resonant antennas, center fed and end fed, matching network.

Unit-V
Ground wave propagation, surface wave propagation, space wave propagation, reflection of wave by earth’s surface, reflection coefficient of vertically and horizontally polarized wave, space wave propagation, range of propagation, propagation beyond the line of sight, diffraction, normal reflection, radio horizon radius of curvature of bending wave modification in earth’s curvature, abnormal reflection, standard atmosphere, modified atmosphere, modified atmosphere, dust propagation. Troposphere, scatter, field strength of tropospheric wave Ionosphere, virtual heights, critical frequencies, refractive index of ionized region. Reflection and refraction of radio waves in ionosphere, influence of earth’s magnetic field, loss of energy in ionosphere, skip distance and maximum usable frequency (MUF), single hop and multiple hop transmission, optimum frequency, abnormal atmospheric behavior, ionospheric storms, radio fade out, Dellinger’s effect of solar eclipse, scattering of radio waves, Luxemburg effect.

Suggested Text books:-
1. Antennas By Krauss.
Unit-I
Characteristic, features and application of microwaves, Rectangular and circular waveguide resonators, plain and choke flanges bends. T-junction, magic tee, waveguide irises, posts, matched loads, attenuators, directional couplers.
Scattering matrix representation of microwave network, properties of scattering matrices, S-matrices, for typical networks such as section of uniform transmission line, 3-port networks (reciprocal and nonreciprocal), directional coupler, magic tee, ferrite devices, permeability, isolator, circulators, YIG resonators.
Unit-II
Generation of microwave by tubes, limitations of conventional tubes, klystron amplifiers reflex klystron oscillator, magnetrons, traveling wave tube (TWT), Backward wave oscillator (BWO).
Unit-III
High frequency limitations of transistors, microwave transistors, varactors, manely rowe relations, parametric amplifier and frequency multipliers, tunnel diodes. Gun effect, gun diode oscillators. A valanche effect, IMPATT & TRAPATT diodes, PIN diodes and their applications. Schttky barrier and backward diodes.
Unit-IV
Planer transmission lines such as stripling Micro strip line, slot line etc. technology of hybrid MICs, advantages of MICs. Stimulated emission of devices such as MASERS and LASERs, holography. VSWR measurement, microwaves power measurement, impedance measurement, network analyzer, frequency measurement, swept frequency measurement.
Unit-V
Microwave link, line of sight, troposcatter and diffraction links, frequency allocation, block diagram of microwave links, microwave modulation and demodulation, microwave repeater station, design consideration of microwave links, principles of microwave digital communication.

Suggested Text books and references:-

1. Microwave Engineering and Applications- Om.P. Gandhi.
DIGITAL IMAGE PROCESSING
EL-704
Elective-I

Unit-I

Unit-II
Manipulation on images
Images transformation: Introduction to fast Fourier transformation, Walsh transformation, hadmard transformation, Hotelling transformation, Hough transformation method, Histogram, modification
Image smoothing: Neighborhood averaging, Median filtering, low pass filters. Average of multiple images, image sharpening by differentiation technique. High pass filtering.

Unit-III
Image Restoration
Degradation model for continuous function effect of digitalization on degradation models, algebraic approach to restoration, east mean square filter interactive restoration, grey level interpolation.

Unit-IV
Image Encoding & Segmentation:
Encoding: Mapping Quantizer, Coder.
Segmentation: detection of discontinuation by point detection, line detection. Edge detection. Edge linking & Boundary detection: Local analysis, Global by Hough transform & Global by graph theoretic techniques. Thresholding: Definition, Global Thresholding,
Filtering: Median, Gradient.

Unit-V
Simple methods of Representation
Signatures, Boundary segments, skeleton of region Polynomial approximation,
Application of Image processing tool box of MATLAB.

Suggested Text books and references:-

3. Digital Image Processing & analysis by Chanda and Majumdar.
ADVANCED COMPUTER ARCHITECTURE
EL-704
Elective-I

Unit-I
Evolution of computer architecture, introduction to multi-process and multi-computers, taxonomy and models of computer/super computers. Condition of parallelism, partitioning and scheduling of program.

Unit-II
Advance processor technology Design space of processors, instruction set architecture, CISC, RISC Processors, Superscalar, VLIW architecture, case studies, Virtual memory technology, TLB paging an segmentation.

Unit-III
Cache memory organization, cache performance, shared memory organization, interleaved memory, bandwidth and fault tolerance, memory allocation schemes.

Unit-IV
Pipeline and super scalar techniques: Linear pipeline processor, nonlinear pipeline processor, instruction pipeline design, arithmetic pipeline design, superscalar and super pipeline design.

Unit-V
Multiprocessors and multicomputers Multiprocessor system interconnect, cache coherence and synchronization, massage passing mechanisms.

Suggested Text books and references:-

2. M.J. Flynn.
3. Compute Architecture & Organization.
ADVANCED CONTROL SYSTEM
EL-704
Elective-I

Unit-I
Design and Compensation:-
Design consideration of control system, lead lag lead-lag compensation, design of compensating network using bode plots and root locus, MATLAB simulation.

Unit-II
State space analysis:-
State space representation of systems, phase variable representation, canonical variable representation, diagonalisation, canonical variable representation, controllability and absorbability, pole placement design using state variable feedback.

Unit-III
Non Linear systems:-
Non Linear systems, common, physical non linearities, phase plane method-basic concepts, construction of phase trajectories, singular points, describing function method-basic concepts, deviation of describing function, stability analysis by describing function method.

Unit-IV
Stability of Non Linear Systems:-
Liapunov function for non-linear systems, Krasovski’s method, variable gradient method, Popov’s stability criterion.

Unit-V
Digital Control System:-
Introduction to discrete time system, z-transform, inverse z-transform. Pulse transfer function, time response of sampled data system, stability on z-plane, stability criterion, methods of stability analysis, bilinear transformation, stability analysis using Nyquist criterion and root locus, state space representation of
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discrete system, state transition matrix controllability and absorbability of discrete
time system, MATLAB simulation.

References books:-
3. Modern control system - Nagarth Gopal.
4. Linear Control System - Prof.B.S. Manke
5. Elements of control system - Gupta.

PROJECT MANAGEMENT
EL-704 Elective-I

Unit-I
Management Fundamental of Organizational Planning:- Strategic Policies and
Planning premises; managerial Decision Making; Strategic Organizational Design;
Effective Organizing and Organizational Culture; Staffing Leadership Controlling.
Finance:-
Indian financial system and financial institution; Valuation of securities; Financial
statement analysis; Financial forecasting; Sources of long term finance; Cost of capital
and capital structure theorems; Estimating working capital needs; Capital expenditure
decision.
Unit-II
Project file cycle: an overview, Project planning; project execution; Project closure;
Project initiation and resource allocation; Market and demand analysis; Technical
analysis; Financial projections; Appraisal criteria.
Risk analysis in capital investment decisions; Social cost benefit analysis; Multiple
project and constraint.
Unit-III
Human resource management and project management; Interfacing with major stake
holder; Issues in project organizational design; Designing a project organizational
structure; Matrix structure and Making it work;
Communication: A key to project success
Motivation in a project environment; Understanding conflicts; Managing and
resolving in a project environment; Negotiations; Managing stress; leadership in
project management; Power influence and politics in project management.
Unit-IV
Procurement planning; Solicitation planning; Solicitation; Source selection Contract
administration, Contract closeout, Quality planning, Quality assurance.
Quality control, Risk management planning, Risk identification, Qualitative risk
analysis.
Quantitative risk analysis, Risk response planning, Risk monitoring control.
MIS for project management.
Unit-V
Project Management through Network Analysis: Work Break Down structure, Gantt
chart etc. PERT; Activity Average Time variance and project completion time by
Normal Distribution CPM; Critical path, floats and their Interpretation Event
Occurrence time, Net slacks Q storable and Non-storable Resource allocation,
Crashing of Network, Time cost trade-off, Monitoring and Control: Features of
SATELLITE COMMUNICATION
EL-705
Elective-II

Unit-I
Evaluation of satellite technology communication satellite, system elements, orbit configurations, coverage frequency bands, different types.

Unit-II
Microwave Link, power balanced 7 pathloss, attenuation factors, downlink & uplink budget, overall link, sources of noise and interference.

Unit-III
FDMA, TDMA, CDMA, Systems, DS-CDMA and frequency hopped CDMA.

Unit-IV
Digital processing spatial compression, temporal compression, motion compensation, hybrid coding, digital video broadcasting standard, requirements and organization, convolution code convolution interleaving.

Unit-V
Direct to home TV, down frequency, channel spacing, scrambling, conditional access system, medium and high power DTH systems, VSAT network design, mobile satellite services.

Suggested Text books:-
1. The satellite communication hand book-Bruce R. Elbert
2. Introduction to satellite communication- Bruce R. Elbert.
7. Satellite Communication- Dennis Reddy.
NEURAL NETWORKS
Elective-II

Unit-I
Introduction: Artificial neuron, Single layer artificial neural network, Multilayer, Training of artificial neural network, biological model for artificial neural network.

Unit-II
Perception & back propagation; Perception representation, linear separability, Perception learning & training algorithm, back propagation training algorithm.

Unit-III
Counter propagation network & statistical method; Introduction network structure, Training of the Kohonen layer & application Boltzmann training Cauchy training, Artificial specific heat method statistical Hopfield network, Hopfield nets & Boltmann method.

Unit-IV
Adaptive resonance theory: ART architecture, ART classification operation, ART implementation, ART training.

Unit-V
Optical neural network, Electro optical matrix multiplier, Holographic correlators, Optical neurons, Introduction to cognitron & neo cognitron.

Suggested Text books:-

1. Neural Network Design by Hagan, Dernuth & beale
2. Neural computing by Philip D. Wasserman.
BIOMEDICAL INSTRUMENTATIONAL
EL-705
Elective-II

Unit-I
General aspect of biomedical instrumentation, system approach to bio-medicine connect of modeling and block diagram simulation components of the man instrument system, interaction of radiation with matter, various types of electrodes, biopotential amplifier.

Unit-II
Transducer for biomedical application, principles, types, biomedical amplifier, electronics instruments for affecting the human body, phonon and paramagnetic resonance phenomenon, molecular beam, masers, gas lasers, spectroscopy of solid state meter material, solid state lasers.

Unit-III
Analysis of biomedical signal, EGG, EMG, EEG, Biotelemetry, physiological parameters adaptable for telemetry, block diagram & application electrical safety of patient, shock hazards.

Unit-IV
Cardio-vascular measurements- the heart blood pressure blood-flow measurement, blood ph measurement, blood-gas-analyzer, respirator, ventilators phono-cardiograph, einthoven triangle heart sound, the pacemaker, its types & properties.

Unit-V
Non-invasive diagnostic instrumentation techniques for diagnosis, introduction to medical imaging, X-ray, CAT scanners, ultra-sonography nuclear magnetic resonance imaging (MRI) thermographs, electro surgical units & laser surgery techniques.

Suggested Text books and references:-
1. Biomedical insemination-Khandpur
2. Biomedical instrumentation- Cromwell.

INTELLECTUAL PROPERTY RIGHTS FOR ENGINEERS
EL-705 Elective-II


Unit-II-Law of Patents

Unit-III-Law of Copyrights and Trademarks
Introduction to copyrights, Copyrights-forms of Intellectual Property, Copyrights Law in India (Copyrights Act of 1957)- meaning, Form of Copyright and Ownership Assignment/License, Registration and terms of Copyright, Copyright infringement Offences, Remedies and Enforcement, broad casting Organization and performers Copyright- International Law, Introduction to trademarks,
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Suggested Text books and references:-
Law and practice of Intellectual property in India by Vikas Vashishth.
Intellectual property by A.A.Kalan.
Intellectual property—patents, copyrights, trade marks and allied rights. By Cornish w,r.
Patents, copyrights, trade markd and design by B.I Wadhera.
Intellectual property law by P.Narayana.
Patents, copyrights, trade marks and design by Rajeev Jain.

ELECTRONICS MEASUREMENT AND INSTRUMENTATION LAB
EL-706

Measurements using A.C. bridges, LVDT, RTD, Strain Gauge Z modulation using CRO, V-F, F-V converters

ANTENNA LAB
EL-707

Radiation of various Antennas like dipole, yagiuda helix, horn etc. VSWR vs Frequency analysis. Measurements of sidelob level, angular position and polar plots of arrays.

MICROWAVE ENGINEERING LAB
EL-708

Characteristics of klystron and gun diode
Measurements of VSWR
Directivity and coupling factor of directional coupler.
Components of a microwave link.
1. Introduction to Electronics Commerce.
   Defining electronics commerce, forces fueling E-Commerce Industry framework, types of E-Commerce.

2. World Wide Web and its applications.
   Brief history and introductions of WWW, the web and the Electronics commerce, key concepts behind Web, Web and Database Integration, Web software developments tools (HTML, XML, UML, Java script, VB Script, ASP JSP, Multimedia Web extensions (VRML, Real Audio, Internet and Web based Technology) Directories and search engines.

   Introduction to farewells and network security (types, policies and management)
   Transaction security, Encryption and transaction security, The comparison of encryption methods, security in WWW (Netscape’s Secure socket layer, security and online web based banking)

4. Electronics Payment Systems.
   Overview of the Electronics payment technology, Electronics cash, Electronics checks, online credit cards based system, other emerging financial instruments.

5. Electronics Commerce and Banking.
   Home banking, Banking via the PC using internet/ Internet, banking via online services, banking via Web.

6. Electronics Commerce and Retailing
   Changing retail industry dynamics and technology improvements in Electronics retailing, Mercantile models from consumers perpective.

7. Supply chain management
   Fundamental and management of supply chains, supply chain application software and its future.

8. Roadmap to E-business
   Challenges and strategy creation, Roadmap to e-business.

9. Translating E-business strategy into action
   Beginning of a virtual factor, E-business blueprint creation, E-Business project planning checklist, an execution blueprint, failures of E-business Initiatives.

Reference:
1. E-Business-Roadmap for success by Dr Ravi Kalkota pub. By Addison Wesley (Pearson Edu.Asia)
3. Electronics commerce by Dr Ravi Kalkota and Andrew B. Whinston pub. By Addison Wesley.
TELEVISION AND RADAR
EL-802

Unit-I
Elements of system of television, scanning sequence, interlacing determination of bandwidth synchronizing pulses, equalizing pulse, composite video signal, television camera tubes, monochrome picture tube.

Unit-II
Television transmitter, block diagram of T.V receiver, video detector design and operation of sound signal, transmitting and receiving antennas.

Unit-III
Basic principle of colour T.V, three colour theory, colour mixing, chromaticity chart, colour picture tube, delta gun, PIL and Trinitron picture tube, PAL, SECAM and NTSE ystems, brief introduction of VCP and VCR, introduction of HDTV.

Unit-IV
Introduction to radar, radar frequencies, radar block diagram, radar equation and its performance factors such as cross section and its fluctuation, transmitter power, pulse repetition frequency. Antenna parameters, system losses and propagation effect.

Unit-V
Doppler effect, CW radar, frequency modulated and multiple Doppler frequency radar, oving target indication radar, delay line canceller blind speed, duplexer, scanning and racking radar, lobe switching, monopoles, conical scan,Adcock antenna, instrument ending system (ILS) ground controlled approach(CG) kit port surveillance radar (PSR), precision approach radar(PAR).

Suggested Text Books:-
1. Television Monochrome & Colour –Gulati
2. Television Engineering -Grobs.
3. Introduction to radar Engineering- Skolynik.
TELECOM SWITCHING SYSEMS
EL-803
Elective III

Unit-I
Electronic Space division switching:
stored program control, switching matrices, multistage switching, enhance services
photonic switching.
Unit-II
Time division switching:
Time division space& time switching, multiplexed switching, N-stage combination
switching, PBX switching, PBX networking, digital PBX.
Unit-III
Traffic Engineering:
Traffic load, grade of service, Erlang’s formulas, blocking modeling switching
systems, blocking model. Subscriber loop, dialing systems. Local access techniques:
digital subscriber lines, DSL, ADSL etc. WLL, FIL, wireless for local telephone
services.
Unit-IV
Mobile communication:
Cellular communication fundamental. Cellular systems, geometry of a hexagonal cell,
design aspects of cellular system, cell splitting frequency and spectrum management
and handoffs access techniques.
Unit-V
Mobile satellite communication:
GEO, LEO, MEO, terrestrial mobile system GSM architecture and interfaces. Radio
link design, receiver sensitivity and link budget data services in GSM, GSM GPRS,
privacy and Security in GSM.

Suggested Text Books:-

1. Telecom. Switching system and network Tharigrajan.
ARTIFICIAL INTELLIGENCE & FUZZY LOGIC
EL-803
Elective-III

Unit-I
Meaning and definition of artificial intelligence various types of production systems, characteristics of production systems, study and comparison of breadth first search and depth first search techniques, other search techniques like hill climbing, best first search, A* algorithm, AO* algorithm etc. and various types of control strategies.

Unit-II
Knowledge representation, problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, resolution, refutation, deduction, theorem proving, inferencing, monotonic and non-monotonic reasoning.

Unit-III
Probabilistic reasoning, Bayer’s theorem, semantic networks, scripts, schemas, frames, conceptual dependency, fuzzy logic, forward and backward reasoning. Game playing techniques like minimax procedure, alpha-data cut-off etc.

Unit-IV
Planning study of block word problem in robotics, understanding and understanding and natural language processing. Introduction to learning, various techniques used in learning and natural networks, applications of neural networks, common sense, reasoning and expert systems.

Unit-V

Suggested Text Books and References:-
E. Charniak and D. McDermott. Introduction to Artificial Intelligence, Addison-Wesley, 1985
POWER ELECTRONICS
EL-803
Elective-III

Unit-I
Rectifiers:
Review of uncontrolled rectification an its limitations, controlled rectifiers, half wave, full wave, configurations, power supplies, spice thruster model.

Unit-II
AC to DC converter
Analysis of fully controlled converter for continues & discontinuous conduction mode, harmonic factor, problems & solution of input current harmonics & poor p.f. dual converter.

Unit-III
AC to AC converter
Analysis 1Φcontroller, 3Φ half wave & full wave controllers & effect of sources & load inductance. 3Φ to 1Φ phase cycle converters. 3Φ to 3Φ cycles converters.

Unit-IV
Inverters
Current source investor, 1Φ, principle of operation of PWN inverter. Voltage controlled & Harmonic reduction in inverter, 1Φ bridge inverter, 3Φ inverter, 180°, 120° conduction.

Unit-V
Industrial applications.
Thyristorized AC,DC drive UPS, Inverters, SMPS, Electronics timer, battery, Charger, electronic regulator, application in industrial process control.

Suggested Text Books and References:-

1. Power controller by Debey, Deradia, Joshi & Sinha.
2. Power controller by P>S. Hhimbra
3. Power Electronics by Rashid
4. Power Electronics by C.Y Lander
5. Power Electronics converter & applications & Design-Need Mohan Et al.
NEW VENTURE CREATIONS
EL-803
Elective-III

Unit-I
The Entrepreneurial Perspective
1. The nature and Importance of Entrepreneurs
2. The Entrepreneurial and Entrepreneurial Mind
3. The Individual Entrepreneurship Opportunities

Unit-II
Creating and Starting the Venture
1. Creativity and the Business Idea
2. Legal Issues for the Entrepreneur
3. The Business Plan: Creating and Starting
4. The Marketing Plan
5. The Financing Plan
6. The Organizational Plan
7. The Production plan- Plant location/ layout, Inventory, production systems, Techniques & Planning.

Unit-III
1. Sources of Capital- Indian/ Global, Short/ Long term.
2. Informal Risk Capital and Venture Capital.

Unit-IV
Managing, Growing, and Ending The new venture
2. Managing Early Growth of the venture
3. New Venture Expansion Strategies and Issues
4. Going Public
5. Ending the venture

Unit-V
EMBEDDED SYSTEMS
EL-804
Elective-IV

Unit-I
Hardware fundamentals:-
Gates, timing, diagram, memory, microprocessor, buses, DMA.
Interrupts:- Microprocessor architecture, interrupt basics, interrupt latency, shared
data problem.
System partitioning, building the architectural modal, Input and output processing
Hardware and software partitioning. Timing requirements.

Unit-II
Microprocessor selection. Microprocessor versus Micro-Controller analysis CISC
versus RISC study of major embedded processor architecture memory system
design. System optimization. Architecture for embedded software:- round robin,
found robin with interrupts. Function-queue-scheduling and real time operating
system.

Unit-III
Real time operating system:- Tasks and task states, task and data, semaphores and
shared data. Operating system services:- inter task communication, timer services,
memory management, events and interaction between interrupt routines and real
time operating system. Software selection issues. Selecting an RTOS,RTOS
performance metrics, RTOS scalability and tool support. Compiler Selection.

Unit-IV
Embedded system design using real time operating system: encapsulating
semaphores and queues, hard real time scheduling
Consideration saving memory space.

Unit-V
Development tools and debugging:-Host and target machines. Linker/ location,
target system testing, instruction set, asset macro. Establishing a software
development environment C runtime environments Embedded debuggers Cross-
development methods Embedded file formats, readers. Creating object files-the
build process loading software In to remote targets.

Books:-
1. An Embedded Software Primer by David E. Simon ISBN.
WEB TECHNOLOGY
EL-804
Elective-IV

Unit-I
Internet Concept, Architecture and Protocols. IP addressing scheme-subnetting supernetting and classless addressing, Routing of IP packets, Binding protocol address(ARP and RARP), IP Datagrams and Datagram forwarding, IP encapsulation, Fragmentation and reassemble, IPv6- motivation, frame format and addressing.

Unit-II
Startup procedure- BOOTP and DHCP
Internet Control Message Protocol: Introduction and usage for testing reachability, rout tracking, MTU determination, message format, error reporting, query, and checksum.

Unit-III
User Datagram protocol(UDP): Format of UDP message, headers, UDP encapsulation and protocol layering, checksum computation, multiplexing and demultiplexing in UDP, port number and socket address, Use of UDP.
Transmission Control Protocol: Properties of reliable delivery sliding window concept architecture of TCP frame, header checksum, Connection establish and release, TCP timers, Congestion control, TCP operation, Interior and exterior routing- RIP, OSPF and BGP.

Unit-IV
Domain name system: Introduction, DNS client server Model, Server hierarchy, server architectures, optimization of DNS performance, DNS entry types, message format.
World Wide Web: Introduction, HTML format, Client server interaction, Browser architecture, CGI, JAVA techniques for Dynamic Web Documents, Socket Interfaces.

Unit-V
Web applications: Remote login, tenet, FTP,NFS,TFTP, electronics mail (SMTP,MIME) Internet Management (SNMP) and NMS.
ROBOTICS
EL-804
Elective-IV

Unit-I

Unit-II
Kinematics for manipulators, homogeneous transformations, solution of kinematics equation, Lagrangian equation, and manipulator dynamics, iterative Newton- Euler dynamics formations.

Unit-III
Position planning, position velocity and force control, controller design, digital simulation.

Unit-IV
Sensing system: types of sensors, Robot sensing technology and sensing system design, machine vision, artificial intelligence, control technique.

Unit-V
Programming language for robots, applications of computer controlled robots in manufacturing and programmable automation.

Reference:
Introduction to Robotics: John J Craig.
ENERGY CONSERVATION & MANAGEMENT
EL-804
Elective-IV

Unit-I

Unit-II
Maintenance engineering, friction, lubrication, predictive & preventive maintenance, Energy audits.

Unit-III
b. Industrial heating & energy conservation in electric & oil fired furnace.
c. Measures for reduction of losses in transmission & distribution system.

Unit-IV
Energy efficient drives, energy efficient motors, VSD, P.F. improvement in power system, energy conservation in transportation system especially electric vehicles.

Unit-V
Energy conversation by using renewable technologies, Solar, wind, small hydro, Biomass, tidal, geothermal, animal & human energy, Appropriate energy technology for rural development.

Books:
Barkatullah University Institute of Technology, B.U., Bhopal

TV & RADAR LAB
EL-806

Monochrome and Color television- fault generation and troubleshooting
Different sections of Television receiver system.