

Engineering and Management Institute of India

Diploma in Engineering

Electronic Communication Engineering Syllabus

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Department of Electronic Communication Engineering

Vision:-

To strengthen the region through imparting superior quality technical education and research; which enables the fulfillment of industrial challenge and establish itself as a Centre of Excellence in the field of Electronic Communication Engineering.

Analog Electronics (ECE-2.1)**UNIT-I**

Semiconductors and Diodes:- Electrons- free and valence. Conductors, Insulators, and Semiconductors- definition & energy band diagrams. Properties of semiconductors. Meaning of Hole current, electron-hole pairs, recombination, doping, acceptor and donor impurities. Intrinsic and Extrinsic, N and P type semiconductors. Diode- formation, depletion region, VI Characteristics, ratings, types and applications. Zener diode- reverse bias characteristics, voltage regulation, shunt voltage regulator, and applications. Varistor and Thermistor working and applications.

UNIT –II

Transistors and MOSFETs:- Transistors- definition, terminals, types, symbols, formation of NPN and PNP, ratings. Transistor biasing- definition, importance, list types, stabilisation, thermal runaway, heat sink, and voltage divider method. List configurations and applications. Alpha and Beta- definitions, relation. CE input and output characteristics- cut off, saturation, and active regions. Transistor as a switch. List applications. FET- definition, types. MOSFET- definition, types, symbols. N type enhancement mode- construction, working, characteristics, switch. List applications and ratings. Differentiate BJT and MOSFET.

UNIT – III

OP-AMP and Timers:- OPAMP- definition, block diagram, operation, characteristics, applications, μA 741 pin diagram. Definitions of virtual ground, CMRR and Slew rate. OPAMP applications- inverting, integrator, differentiator, summer, voltage follower, and comparator. Filters- definition, Working- low pass, high pass passive and active filters, applications. Timers- block diagram, pin diagram of 555, duty cycle, time constant, applications. Multi-vibrators- Astable and monostable using 555.

UNIT – IV

Rectifiers, filters and regulators:- Regulated power supply- block diagram and applications. Rectifiers- definition, half wave, centre tapped and bridge full wave rectifier, efficiency, ripple factor, PIV, ratings. Filters- definition, necessity, C and PI filters, Regulator- definition, working of 7805, operating voltages- 7809, 7812, 7905, 7912.

Optoelectronic devices:- Electron emission- types, applications. Symbols, working and applications of- photo diode, opto isolator, photo voltaic cell, LED, LDR, LCD, opto coupler.

UNIT –V

Amplifiers and Oscillators:- Amplifier- definition, faithful amplification, classification based on configuration, power, and frequency. Transistor CE amplifier with biasing. Working of class A, B, C, and Push pull amplifier. Two stage RC coupled amplifier working, gain in dB, frequency response. Feed back- definition, types, advantages and disadvantages, applications. Oscillators- definition, classification, LC tank circuit, criteria. RC phase shift and crystal oscillator- working, applications. CRT- construction, working and applications.

Reference Book :-

1. Electronics Principles and applications by Charles A Schuler and Roger L Tokhiem,
2. Electronics Analog and Digital by I. J. Nagrath,

Electrical Measurement & Measuring Instrument (ECE-2.2)**UNIT-I**

Fundamentals of Measurement & Instrumentation:- Methods of Measurement – Direct Method & Indirect Method, Types of Instruments, Damping Torque, Deflecting and Controlling Torque, Different values of Measurements, Accuracy, Precision, Sensitivity and other terms related to Measurement, Types and Source of Errors.

UNIT –II

Electro-Mechanical Instruments: - Moving Iron Instruments, PMMC Instruments, Electrodynamometer type Meter, Induction type Energy Meter, Frequency Meter, Extension of Range using Shunt Multiplier, Extension of Range of Meter using Instrument like CT and PT.

UNIT – III

Measurement of R, L and C:- Different methods of measuring low, medium and high resistances, Wheatstone Bridge, Measurement of inductance & capacitance with the help of AC Bridges (Hays Bridge, Schering Bridge, Maxwell bridge, Anderson Bridge), LCR meter -working principle with block diagram.

UNIT – IV

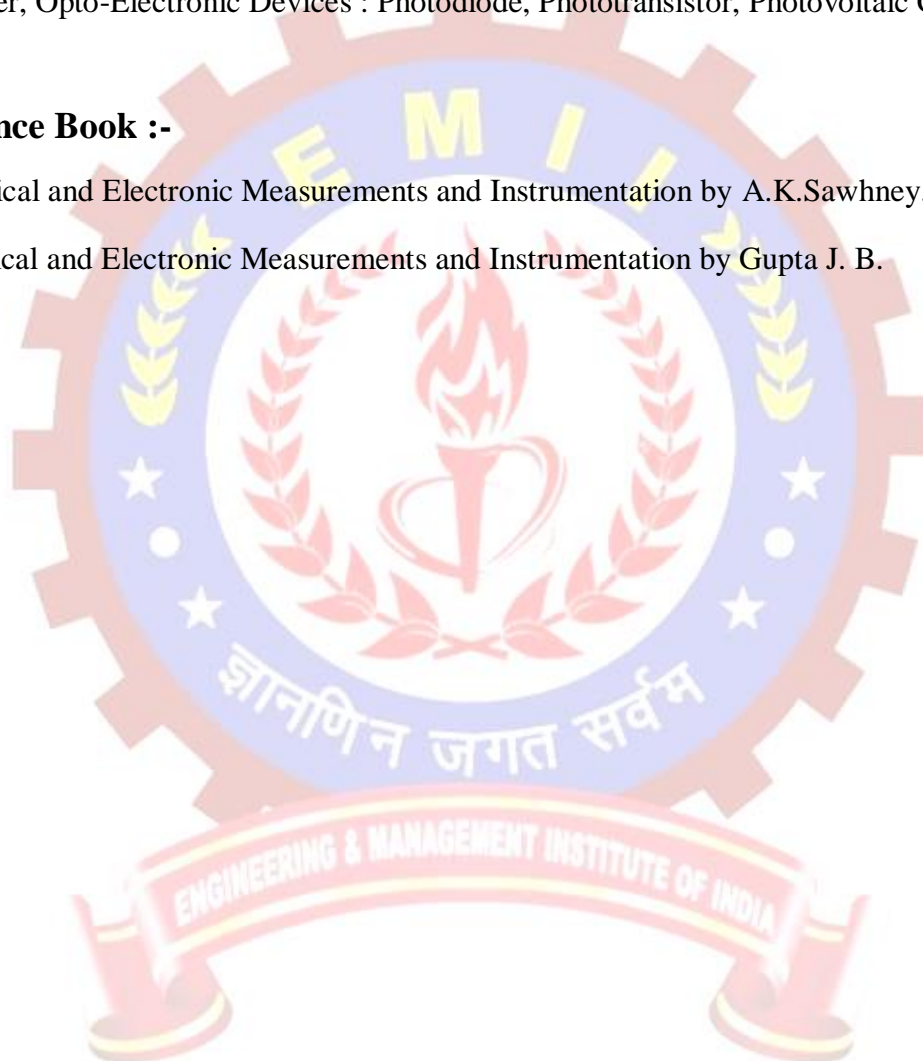
Display Devices:- CRO, Digital Recorder, Digital Storage Oscilloscope- Block Diagram, theory and application, Power scope, Function generator, Digital Multi meter, Clamp on meter, Megger.

UNIT -V

Transducers and Sensors:- Definition, different types of transducers, criteria for selection, general characteristics and dynamic characteristics, transducers for measurement of temperature ((Thermocouple and RTD),transducers for measurement of pressure, strain, transducers for measurement of displacement, speed, torque, Hall Effect transducer, Opto-Electronic Devices : Photodiode, Phototransistor, Photovoltaic Cell.

Reference Book :-

1. Electrical and Electronic Measurements and Instrumentation by A.K.Sawhney.
2. Electrical and Electronic Measurements and Instrumentation by Gupta J. B.



Principle of Communication Engineering (ECE-2.3)**UNIT-I**

Introduction:- Need for modulation frequency translation and demodulation in communication systems, Basic scheme of a modern communication system. Amplitude modulation: Derivation of expression for an amplitude modulated wave. Carrier and side band components. Modulation index. Spectrum and BW of AM Wave. Relative power distribution in carrier and side bands. Elementary idea of DSB-SC, SSB-SC, ISB and VSB modulations, their comparison, and areas of applications.

UNIT –II

AM/FM Transmitters:- Classification of transmitters on the basis of modulation, service, frequency and power, Block diagram of AM transmitters and working of each modulation, service, stage, Block diagram and working principles of reactance FET and Armstrong FM transmitters. AM/FM Radio Receivers: Principle and working with block diagram of super heterodyne of AM receiver. Function of each block and typical waveforms at input and output of each block, Performance characteristics of a radio receiver sensitivity, selectivity, fidelity S/N ratio, image rejection ratio and their measurement procedure. ISI standards on radio receivers (brief Idea), Selection criteria for intermediate frequency (IF). Concepts of simple and delayed AGC, Block diagram of an FM receiver, function of each block and waveforms at input and output of different blocks. Need for limiting and de-emphasis in FM reception. Block diagram of communication receivers, differences with respect to broadcast receivers.

UNIT – III

Frequency modulation:- Expression for frequency modulated wave and its frequency spectrum (without Proof and analysis of Bessel function) Modulation index, maximum frequency deviation and deviation ratio, BW and FM signals, Carson's rule. Effect of noise on FM carrier. Noise triangle, Role of limiter, Need for preemphasis and de-emphasis, capture effect. Comparison of FM and AM in communication systems Phase modulation: Derivation of expression for phase modulated wave, modulation index, comparison with frequency modulation.

UNIT – IV

Principles of Modulators: - Working principles and typical application as: Square Law Modulator-Switching Modulator-Collector modulator-Base Modulator-Balanced Modulator- Ring Modulator Principles of FM Modulators: Working principles and applications of reactance modulator, varactor diode modulator, VCO and Armstrong phase modulator. Stabilization of carrier for using AFC Block diagram approach).

UNIT –V

Demodulation of AM Waves: - Principles of demodulation of AM wave using diode detector circuit; concept of Clipping and formula for RC time constant for minimum distortion (no derivation), Principle of demodulation of AM Wave using synchronous detection. Demodulation of FM Waves: Basic principles of FM detection using slope detector, Principle of working of the following FM demodulators: Foster-Seeley discriminator Ratio detector -Quadrature detector-Phase locked Loop (PLL). FM demodulators.

Reference Book: -

1. Principles of Communication Engineering by Manoj Kumar.
2. Principles of Communication Engineering by Anokh Singh,

Digital Electronics-I (ECE-2.4)**UNIT-I**

Introduction of Number System & Codes:- Distinction between analog and digital signal. Applications and advantages of digital signals. Need and process of A/D and D/A conversion, Binary and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa. Binary addition, subtraction, multiplication and division including binary points. 1's and 2's complement method of addition/subtraction, sign magnitude method of representation, floating point representation, Concept of code, weighted and non-weighted codes, examples of 8421, BCD, excess-3 and Gray code. Concept of parity, single and double parity and error detection Alpha numeric codes: ASCII and EBCDIC.

UNIT-II

Logic Gates and Simplification:- Concept of negative and positive logic, Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates. Postulates of Boolean algebra, De Morgan's Theorems. Various identities. Formulation of truth table and Boolean equation for simple problem. Implementation of Boolean (logic) equation with gates, Karnaugh map (upto 4 variables) and simple application in developing combinational logic circuits Logic Families: Logic family classification: Definition of SSI, MSI, LSI, VLSI- TTL and C MOS families and their sub classification- Characteristics of TTL and C MOS digital gates. Delay, speed, noise margin, logic levels, power dissipation, fan-in, power supply requirement and comparison between TTL and C MOS families Logic Circuits:-Open collector, wired OR and totem pole output circuit operation (qualitative) for a TTL NAND gate- C MOS circuit operation for a standard gate (NOR).

UNIT – III

Arithmetic Circuits, Coders and Decoders:- Half adder and Full adder circuit, design and implementation. Half and Full subtracter circuit, design and implementation. 4 bit adder/subtracter. Adder and Subtract or IC (7484), Encoders and Decoders: Four bit decoder circuits for 7 segment display and decoder/driver ICs. Multiplexers and De-Multiplexers Basic functions and block diagram of MUX and DEMUX. Different types and ICs

UNIT – IV

Latches and flip flops and Counters:- Concept and types of latch with their working and applications, Operation using waveforms and truth tables of RS, T, D, JK, and Master/Slave JK flip flops. Difference between a latch and a flip flop, IC flip flops Counters: Binary counters, Divide by N ripple counters (including design), Decade counter. Pre settable and programmable counters, Down counter, up/down counter, Synchronous counters (only introduction). Difference between Asynchronous and Synchronous counters, Ring counter with timing diagram, Counter ICs.

UNIT – V

Shift Register and Memories:- Introduction and basic concepts including shift left and shift right. Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out. Universal shift register, Buffer register, Tristate Buffer register IC 7495. Memories: Basic RAM cell, $N \times M$ bit RAM, Expansion of word length and capacity, static and dynamic RAM, basic idea of ROM, PROM, EPROM and EEPROM.

Reference Book :-

1. Digital Electronics by RP Jain.
2. Digital Electronics by KS Jamwal.

Computer Programming & Applications (ECE-2.5)**UNIT-I**

Information Storage and Retrieval:- Need for information storage and retrieval, Creating data base file, Querying database file on single and multiple keys, ordering the data on a selected key, Programming a very simple application.

Typical Applications:- Use of various application software available in the field of Electronics Engineering

UNIT –II

Programming in C:- Basic structure of C programs. Executing a C program, Constants, variables, and data types, Operators and expressions, Managing Input-Output operations like reading a character, writing a character, formatted input, formatted output through print, scan, getch, putch statements etc.

UNIT – III

Decision making:- Decision making and branching using IF..... Else, switch, go to statements, Decision making and looping using do-while, and for statements, Arrays - one dimensional and two dimensional, Functions, Concept of pointers, structures and Files.

Computers Application Overview:- Commercial and business data processing application, Engineering computation, CAD, CAM, CAE, CAI

UNIT – IV

Word Processing:- Word processing concepts: saving, closing, Opening an existing document, Selecting, text, Editing text, Finding and replacing text, printing documents, Creating and Printing Merged Documents, Character and Paragraph Formatting, Page Design and Layout. Editing , and Profiling Tools: Checking and correcting spellings. Handling Graphics, Creating Tables and Charts, Document Templates and Wizards.

UNIT -V

Basic Computer Concept:- Computer Appreciation - Characteristics of Computers, Input, Output, Storage units, CPU, Computer System. Computer Organization Central Processing Unit - Processor Speed, Cache, Memory, RAM, ROM, Booting, Memory-Secondary Storage Devices: Floppy and Hard Disks, Optical Disks CD-ROM, DVD, Mass Storage Devices: USB thumb drive. Managing disk Partitions, File System Input Devices - Keyboard, Mouse, joystick, Scanner, web cam, Output Devices- Monitors, Printers – Dot matrix, inkjet, laser, Multimedia- What is Multimedia, Text, Graphics, Animation, Audio, Images, Video; Multimedia Application in Education, Entertainment, Marketing. Names of common multimedia file formats, Computer Software- Relationship between Hardware and Software; System Software, Application Software, Compiler, names of some high level languages, free domain software.

Reference Book :-

1. Computer programming and applications by Chandershekhar.
2. Programming in C by BP Mahapatra.

Electrical Machine-I (ECE-2.6)**UNIT-I**

Three phase Supply and Transformers:- Three Phase Supply, Advantage of three-phase system over single-phase system. Star Delta connections Relation between phase and line voltage and current in a three phase system, Power and power factor in three-phase system and their measurements by one, two and three Wattmeter methods. Principle of operation and constructional details of single phase and three-phase transformer, core type and shell type transformers, difference between single phase and three phase transformers, advantages and disadvantages. Voltage Regulation of a transformer (No Derivation), Losses in a transformer, Efficiency, condition for maximum efficiency and all day efficiency, Auto transformers and instrument transformer, CTs and PTs (Current transformer and potential transformer).

UNIT –II

Introduction to Rotating Electrical Machines:- M.F induced in a coil rotating in a magnetic field. Definition of motor and generator, Basic principle of a generator and a motor , Torque due to alignment of two magnetic fields and the concept of Torque angle, Basic Electromagnetic laws, Common features of rotating electrical machines.

UNIT – III

DC Machines:- Principle of working of d.c motors and d.c generator, their constructional details, Function of the commutator for motoring and generating action, Factors determining the speed of a DC, motor Different types of excitation, Characteristics of different types of DC machines, Starting of DC motors and starters. Application of DC machines.

UNIT – IV

A.C. Motors:- Revolving magnetic field produced by poly phase supply, Brief introduction about three phase induction motors, its principle of operation, Types of induction motors and constructional features of squirrel cage and slip-ring motors, Starting and speed control, Star Delta and DOL (Direct-on-line) starters. Reversal of direction of rotation of 3-phase induction motors, Applications of induction motors, Principle and Working of Synchronous Machines (only), Application of Synchronous Machines.

UNIT –V

Single Phase Fractional Kilowatt Motors:- Introduction , Principle of operation of single phase motors, Types of single phase induction motors and their constructional details (i.e. split phase, capacitor start, capacitor start and run, shaded pole and reluctance start) Single phase synchronous motors – reluctance motor (hysteresis motor), Commutator type singlephase motors – Repulsion Induction motor, shaded pole motors, AC series motor and universal motors, Introduction to servo- motors and stepper motors, Concept of micro-motors.

Reference Book :-

- 1 Electrical Machines by SK Sahdev.
2. Electrical Machine by SK Bhattacharya.

Communication System (ECE-2.7)

UNIT-I

AM/FM Transmitters:- Classification of transmitters on the basis of modulation, service, frequency and power, Block diagram of AM transmitters and working of each stage, Block diagram and working principles of reactance FET and armstrong FM transmitters.

UNIT –II

AM/FM Radio Receivers:- Principle and working with block diagram of super heterodyne AM receiver. Function of each block and typical waveforms at input and output of each block, Performance characteristics of a radio receiver: sensitivity, selectivity, fidelity, S/N ratio, image rejection ratio and their measurement procedure. ISI standards on radio receivers (brief Idea), Selection criteria for intermediate frequency (IF). Concepts of simple and delayed AGC, Block diagram of an FM receiver, function of each block and waveforms at input and output of different blocks. Need for limiting and de-emphasis in FM reception, Block diagram of communication receivers, differences with respect to broadcast receivers.

UNIT – III

Antennas:- Electromagnetic spectrum and its various ranges: VLF, LF, MF, HF, VHF, UHF, Microwave, Physical concept of radiation of electromagnetic energy from a dipole. Concept of polarization of EM Waves. Definition and physical concepts of the terms used with antennas like point source, gain directivity, aperture, effective area, radiation pattern, beam width and radiation resistance, loss resistance, Types of antennas-brief description, characteristics and typical applications of half wave dipole, medium wave (mast) antenna, folded dipole, turns tile, loop antenna, yagi and ferrite rod antenna (used in transistor receivers), Brief description of broad-side and end fire arrays, their radiation pattern and applications (without analysis); brief idea about Rhombic antenna and dish antenna.

UNIT – IV

Propagation:- Basic idea about different modes of wave propagation and typical areas of application. Ground wave propagation and its characteristics, summer field equation for field strength, Space wave communication – line of sight propagation, standard atmosphere, concept of effective earth radius range of space wave propagation standard atmosphere, Duct propagation : sky wave propagation - ionosphere and its layers. Explanation of terms - virtual height, critical frequency, skip distance, maximum usable frequency, multiple hop propagation.

UNIT –V

Fibre Optic Communications:- Advantages of Fibre Optic Communication, Block Principle of Light Penetration and Propagation, NA, Types of optical fibres and cables, Brief idea of Losses in Optical Fibres and Dispersion, Working principles and characteristics of optical light sources and light detectors, Block diagram of fibre optic communication link, Basic idea of fibre connection techniques - splicing and lensing Satellite Communications, Basic idea, passive and active satellites, Meaning of the terms; orbit, apogee, perigee, Geo-stationary satellite and its need. Block diagram and explanation of a satellite communication link.

Reference Book :-

1. Communication systems By A.K. Gautam.
2. Electronic communication sytesms By K.S. Jammal.

Electronic Instrumentation Engineering (ECE-2.8)**UNIT-I**

Data Transmission and Telemetry:- Data transmission systems, advantage and disadvantages of digital transmission, pulse modulation, digital modulation, and pulse code format, modems, IEEE-488 bus, RS-232 interface, opto-isolator.

UNIT –II

Data Acquisition Systems:- Sample-Hold circuits, multiplexing-time division and frequency division, demultiplexing, objective of a DAS, single-channel and multi-channel DAS and their configurations, Data Loggers- basic operation and block diagram.

UNIT – III

Miscellaneous Instruments:- Digital measurement of frequency (mains), digital measurement of high frequency, digital pH meter, digital capacitance meter, digital tachometer, measurement of power using Bolometer.

UNIT – IV

Display Device and Recorders:- LEDs, LCDs, seven segment and dot matrix displays, Electro luminescent, electrophoretic image and liquid vapour displays, printers-dot matrix, ink-jet, laser jet printer, recorders-Potentiometric, X-Y recorders.

UNIT -V

Signal Conditioning:- Signal conditioning- ac and dc signal conditioning, comparators, current-to-voltage and voltage-to-current converter, attenuators, A to D and D to A converters, instrumentation amplifiers(IA)-single op-amp and three op-amp configuration, IA specifications, application of instrumentation amplifier using transducer bridge as temp indicator.

Reference Book :-

1. Electronic Instrumentation by HS Kalsi.
2. Electronics Instrumentation by AK Sawhney.



Troubleshooting of Electrical Equipment (ECE-2.9)

UNIT-I

Repair, Servicing and Maintenance Concepts:- Introduction, Modern electronic equipment, Mean time between failures (MTBF), Mean time to repair (MTR), Maintenance policy, potential problems, preventive maintenance, corrective maintenance. Study of basic procedure of service and maintenance, Circuit tracing techniques, Concepts of shielding, grounding and power supply considerations in instruments.

UNIT –II

Fundamental Trouble Shooting Procedures:- Fault location, Fault finding aids, Service manuals, Test and measuring instruments, Special tools, Trouble Shooting Techniques, Functional Areas Approach, Split half method, Divergent, convergent and feedback path circuit analysis, Measurement techniques.

UNIT – III

Trouble shooting and maintenance of testing:- equipment like C.R.O , function generator, power supplies and other measuring devices, detailed discussion about trouble shooting of medical, electronic equipment like, ECG, EEG, Ultra sound. Repair and maintenance and exposure of medical electronics equipment through industrial visits.

Troubleshooting Digital Systems:- Typical faults in digital circuits. Use of logic clip, logic pulsar, IC tester

UNIT – IV

Mobile Phones:- Identification of various parts of mobile phones, Repair and maintenance of mobile phones, Software installation in mobile phones, Common faults. Analog and Digital sound recording, Requirement of bias, CD/DVD Player system.

UNIT –V

Microphones and Loudspeakers:- Introduction, Construction and working Principle of carbon microphone, Capacitance microphone, Moving coil Microphone, Piezo-electric microphone, Loudspeakers, Intensity and dynamic range, Construction and working principle of moving coil loudspeaker, Impedance and power level of loudspeaker, Frequency characteristics of practical loudspeaker, Loudspeaker enclosure.

Reference Book :-

1. Troubleshooting of Electrical Equipment by M.A. Caudhary.
2. Troubleshooting of Electrical Equipment by Mohammad Abdul Baseer.

Electronic Design & Fabrication Techniques (ECE-2.10)**UNIT-I**

Basic Electricals and Electronics Introduction:- Types of components: Active Components: Diode, Transistor, MOSFET, LED, SCR, Integrated Circuits (Ics), Passive Components: Resistor, Capacitor, Inductor, Transformer, and Speaker/Buzzer, Orientation marking on shell for nozzles. Reference line marking by dumpy level. Ovality measurement of shell and it's rectification by spiders, Profile checking by template. Circularity measurement by swing arm method. Offset rectification by wedge, Strip cladding and overlay, Need, precautions and safety norms during welding and fabrication process.

UNIT-II

Introduction to Electronics Designing Using SPICE and PSPICE:- Introduction to SPICE, Brief History, New Versions Representing Components, Understanding the SPICE Environment, Using Model Editor Designing a Circuit & doing Simulation.

Designing and Simulating PSPICE:- Understanding the PSPICE Environment, Using Model Editor, Using Magnetic Parts Editor, Using Stimulus Editor, Drawing a Circuit Preparation for Simulation: Preparing schematic for simulation, Understand the sources for simulation, Understand different markers.

UNIT - III

PCB Designing Process:- Trends in PCB Designing: Older PCB Method, PCB Designing Using Graph Paper, Making a hand drawn PCB, Using Computer for EDA General rules of Layout, Resistance, Capacitance and Inductance, Conductor Spacing, Supply and Ground Conductors, Component Placing and mounting, Cooling requirement and package density, Layout check. Basic artwork approaches, Artwork taping guidelines, General artwork rules: Artwork check and Inspection. Film master preparation, Image transfer photo printing Properties of laminates, copper cladlaminates.

UNIT – IV

Concept of Schematic Designing:- Brief Introduction of various simulators, Description to simulator tool, Hands on practice on available library of components, working through wiring and schematic designing, materials of copper clad laminates, Types of Laminates, Manual cleaning process, Basic printing process for double sided PCB's, Photo resists, wet film resists, Coating process for wet film resists, Exposure and further process for wet film resists, Dry film resists.

UNIT – V

Fabrication Processes and Safety:- Post heating-need, method and applications. Post Weld Heat Treatment (PWHT)- need, methods, applications and selection criteria. Methods of relieving thermal stresses. Arc welding parameters-setting criteria: (i). Voltage (ii). Current (iii). Welding speed (iv). Welding feed (v). Arc length. Advance welding methods and their applications; (i). Ultrasonic welding (ii). Laser beam welding (iii). Electron beam welding (iv). Friction stir welding, Welding automation, Process equipment fabrication procedures, procedures: (i). Plate edge bending and rolling (ii). Weld edge preparation (iii). Marking procedures of shell and dish end (iv). Plate cutting by gas and plasma arc with automation (v). Shell alignment by string and laser beams.

Reference Book :-

1. Electronic Design & Fabrication Techniques by Mark.D.Birnbaum.
2. Electronic Design & Fabrication Techniques by David A Bell.

Consumer Electronics (ECE-2.11)**UNIT-I**

Audio System:- Microphones: construction, working principles and applications of microphones, their types viz: Carbon, moving coil, velocity, crystal, condenser, cordless etc. Loud Speaker: Direct radiating, horn loaded woofer, tweeter, mid range, multi-speaker system, baffles and enclosures. Sound recording on magnetic tape, its principles, block diagram, and tape transport mechanism Digital sound recording on tape and disc, CD system, Hi-Fi system, pre-amplifier, amplifier and equalizer system, stereo amplifiers.

UNIT-II

Monochrome TV:- Elements of TV communication system. Scanning- its need for picture transmission. Need for synchronizing and blanking pulses. Progressive scanning- Gross structure, interlaced scanning, resolution and band width requirement, tonal gradation. Composite Video Signal (CVS) at the end of even and odd fields. Equalizing pulses and their need, Monochrome picture tube – construction and working, comparison of magnetic and electric deflection of beam, Construction and working of camera tube: vidicon and plumbicon, Block diagram of TV camera and the transmitter. Block diagram of a TV receiver: function of each block and waveform at the input and output of each block. Concept of positive and negative modulation VSB Transmission Tuner.

UNIT – III

Colour TV:- Primary colours, tristimulus values, trichromatic coefficients, concepts of additive and subtracting mixing of colours, concepts of luminance, Hue and Saturation, Representation of a colour in colour triangle, non spectral colour, visibility curve, Compatibility of colour TV system with monochrome system. Block diagram of colour TV camera. Colour Schemes: Introduction to PAL, NTSC, SECAM systems, Advantages and disadvantages, block diagram of , video camera and its explanation, Construction and working principles of Trinitron and PIL types of colour picture tubes. Concept of convergence, purity of beam shifting, Block diagram of PAL TV receiver, explanation and working.

UNIT – IV

Cable Television, VCD, DVD and VC:- Block diagram and principles of working of cable TV and DTH, cable TV Principle of video recording on CDs and DVDs. Recordable and Rewritable CDs. Study of VCD and DVD Systems. Hi-Fi system, pre-amplifier, amplifier and equalizer system, stereo amplifiers Introduction of functioning of digital movie and still camera.

UNIT –V

Basic Block:- Diagram Working Principle and Application of, Cordless Telephone, Photostat Machine, Electronic Ignition system for automobiles Cellular Phones, Microwave Oven.

Reference Book :-

1. Consumer Electronics by Bali S. P.
2. Digital Consumer Electronics by Ronald K. Jurgen.

Digital Electronics & Microprocessors (ECE-2.12)**UNIT-I**

Introduction:- Microprocessors – evolution, importance and Application.

Architecture of a Microprocessor – 8085:- Concept of bus and bus organisation, Functional block diagram and function of each block, Pin details of 8085 and related signals, Demultiplexing of address/data bus and memory read/write cycles.

UNIT –II

Instruction Set for Intel 8085:- Instruction and data format – opcode and operand and its word size, Instruction cycle, machine cycle, T-states, fetch cycle, and execute cycle, Different addressing modes, Status flags and their importance , Data transfer, arithmetic and logical operation, branching, and machine control instructions, Use of stacks and subroutines, Assembly language programming

UNIT – III

Interfacing and Data Transfer Schemes:- Memory mapped I/O and I/O mapped I/O schemes, Interrupts of 8085, Programmable data transfer, DMA data transfer and interrupt driven data transfer schemes with their applications. Different postulates and De-Morgan's theorems in Boolean algebra, Use Of Boolean Algebra For Simplification Of Logic Expression, Karnaugh Map For 2,3,4 Variable, Simplification Of SOP And POS Logic Expression Using K-Map.

UNIT – IV

Basics of Digital Electronics:- Binary, Octal, Hexadecimal number systems and compare with Decimal system. Binary addition, subtraction, Multiplication and Division. 1's complement and 2's complement numbers for a binary number, Subtraction of binary numbers in 2's complement method. Use of weighted and Un-weighted codes & write Binary equivalent number for a number in 8421, Excess-3 and Gray Code and vice-versa. Importance of parity Bit, Logic Gates: AND, OR, NOT, NAND, NOR and EX-OR gates with truth table. Realize AND, OR, NOT operations using NAND, NOR gates.

UNIT –V

Combinational Logic Circuits:- Give the concept of combinational logic circuits. Half adder circuit and verify its functionality using truth table. Realize a Half-adder using NAND gates only and NOR gates only. Full adder circuit and explain its operation with truth table. Realize full-adder using two Half-adders and an OR – gate and write truth table Full subtractor circuit and explain its operation with truth table. Operation of 4 X 1 Multiplexers and 1 X 4 demultiplexer Working of Binary-Decimal Encoder & 3 X 8 Decoder. Working of Two bit magnitude comparator.

Reference Book :-

1. Digital Electronics & Microprocessors by A.K Chhabra.
2. Digital Electronics & Microprocessors by Anil K. Maini.

Power Electronics (ECE-2.13)**UNIT-I****Introduction to thyristors and other power electronics devices:-**

Construction, working principles of SCR, two transistor analogy of SCR, VI characteristics of SCR. SCR specifications and ratings. Different methods of SCR triggering. Create Triggering using R, RC and UJT triggering. Different commutation circuit for SCR. Series and parallel operation of SCR. Construction and working principle of DIAC, TRIAC & their V-I characteristics. Construction, working principle of UJT, VI characteristics of UJT. UJT as relaxation oscillator. Brief introduction to Gate Turn off thyristors (GTO), Programmable uni-junction transistor (PUT), Basic idea about the selection of Heat sink for thyristors. Application of SCR such as light intensity control, speed control of universal motors, fan regulator, battery charger.

UNIT –II

Controlled Rectifiers:- Single phase half wave controlled rectifier with load (R, R-L), Single phase half controlled full wave rectifier (R, R-L) Fully controlled full wave bridge rectifier. Single phase full wave centre tap rectifier.

Uninterrupted Power supplies:- UPS, on-line, off line & its specifications.

UNIT – III

Inverters, Choppers, Dual Converters and Cyclo converters:- Principle of operation of basic series and parallel inverter circuits, concepts of duty cycle of series and parallel. Inverters & their application. Choppers: Introduction, types of choppers (Class A, Class B, Class C and Class D). Step up and step down choppers. Dual Converters and Cyclo converters: Introduction, types and basic working principle of dual converters and Cyclo converters and their application.

UNIT – IV

Thyristorised Control of Electric Drives:- DC drive control: Half wave drives. Full wave drives, Chopper drives (Speed control of DC motor using choppers), AC drive control: Phase control (Speed control of induction motor using variable frequency), Constant V/F, operation, Cyclo converter/Inverter drives. Slip power control of AC drives.

UNIT –V

Switch Realization and Switching Loss Calculation:- Review of Quadrant operation of Ideal Switches: Diode, Thyristor, BJT, IGBT, MOSFET and TRIAC-Realization of Semiconductor switch for one quadrant operation, Current bidirectional operation, Voltage bidirectional operation, four quadrant operation- Thermal Design of Power Switching Devices-Estimation of loss in switch: Conduction Loss Switching Loss – Blocking Loss- Transistor Switching with Clamped Inductive Load.

Reference Book :-

1. Power Electronics by P.C. Sen.
2. Power Electronics by P.S. Bhimbhrah.

Microwave & Radar Engineering (ECE-2.14)**UNIT-I**

Introduction to Microwaves and Microwave Devices:- Introduction to microwaves and its applications, Classification on the basis of its frequency bands (HF, VHF, UHF, L, S, C, X, KU, KA, mm, SUB, mm) Basic concepts of thermionic emission and vacuum tubes, Effects of inter-electrode capacitance Lead Inductance and Transit time on the high frequency performance of conventional vacuum tubes, and steps to extend their high frequency operations. Constructional, characteristics, operating principles and typical applications of the following devices (No mathematical treatment) Multi cavity klystron, Reflex klystron, Multi-cavity magnetron, Traveling wave tube, Gunn diode and, Impatt diode.

UNIT – II

Wave guides and Microwave Components:- Rectangular and circular wave guides and their applications. Mode of wave guide; Propagation constant of a rectangular wave guide, cut off wavelength, guide wavelength and their relationship with free space wavelength (no mathematical derivation). Impossibility of TEM mode in a wave guide. Field configuration of TE₁₀, TE₂₀ and TM₁₁ modes. Constructional features, characteristics and application of tees, bends, matched termination, twists, detector, mount, slotted section, directional coupler, fixed and variable attenuator, isolator, circulator and duplex, coaxial to wave guide adapter.

UNIT – III

Microwave Communication systems:- Block diagram and working principles of microwave communication link. Troposcatter Communication: Troposphere and its properties, Tropospheric duct formation and propagation, Troposcatter propagation.

UNIT – IV

Radar Systems:- Introduction to radar, its various applications, radar range equation (no derivation) and its applications. Block diagram and operating principles of basic pulse radar. Concepts of ambiguous range, radar area of cross-section and its dependence on frequency. Block diagram and operating principles of CW (Doppler) and FMCW radars, and their applications. Block diagram and operating principles of MTI radar. Radar display- PPI.

UNIT –V

Satellite communications and Microwave antennas:- Basic idea, passive and active satellites, Meaning of the terms; orbit, apogee, perigee, Geostationary satellite and its need. Block diagram and explanation of a satellite communication link. Microwave antennas, Structure characteristics and typical applications of Horn and Dish antennas.

Reference Book :-

- 1 Microwave and Radar Engineering by Gottapu Sasibhushana Rao.
2. Microwave and Radar Engineering by M. Kulkarni.

Maintenance of Computer System (ECE-2.15)

UNIT-I

Introduction to Computer Problem Solving:- Introduction to procedural, structured and object oriented programming languages, Introduction to programming and Programs concepts, Implementation of algorithms, Efficiency of Algorithms, Analysis of Algorithms, Design the Flowcharts, Requirements for solving problems by computer, Top-down Design, Program verification. Introduction to C++ Programming, Structure of a C++ program, identifiers and keywords, constants: Numeric, Character and String constants, C++ operators: Arithmetic , Relational, Equality, Logical, Unary, Conditional, Assignment, Bitwise, Sizeof and Comma operator. Constants, Variables, Data Types.

UNIT –II

Functions and Arrays :- Defining Function, function declaration, Types of functions, return statement, Actual and Formal arguments, Recursive function, Call- by-value, call- byreference, Function overloading. Arrays: Array declaration, Initialization, Accessing elements of the Array, Storing values in Array, One dimensional arrays, Two dimensional arrays.

UNIT – III

Strings and Structures:- String definition, Reading and Writing strings, String operations: String length, String appending, String reverse, String comparison, String concatenation using string Library functions.

Structures:- Structures declaration, Initialization of structures, Accessing members of a structures, Array of structure: Passing individual members, Passing the entire structure, structures and functions.

UNIT – IV

Decision control and Looping Statements:- Decision Making and Branching: Simple if , if-else, nested if statement. Looping Statements: While , do-while, for loop, nested for loops, break and continue statements, go to label statement.

UNIT –V

Files:- Introduction to Files, opening a file, closing a file, Reading data from files: fscanf(), fgets(),fgetc(), fread(). Writing Data to Files: fprintf(), fputs(), fputc(), fwrite(). Storage class: advantages of storage class, auto, extern, register, static.

Reference Book :-

1. Maintenance of Computer System by Terry Wireman.
2. Maintenance of Computer System by William W.Cato, R. Keith Mobley.

Entrepreneurship Development & Management(ECE- 2.16)**UNIT-I**

Introduction:- Meaning and Importance, Evolution of term 'Entrepreneurship, Factors influencing entrepreneurship, Psychological factors, Social factors, Economic factor, Environmental factors, Characteristics of an entrepreneur, Entrepreneur and Entrepreneur, Barriers to entrepreneurship.

Types of entrepreneur:- According to Type of Business, According to Use of Technology, According to Motivation, According to Growth, According to Stages, New generations of entrepreneurship viz. social entrepreneurship, Edupreneurship, Health entrepreneurship, Tourism entrepreneurship, Women entrepreneurship etc.

UNIT –II

Entrepreneurial Motivation:- Motivation, Maslow's theory, Herzberg's theory, McGregor's Theory, McClelland's Need – Achievement Theory, Culture & Society , Values / Ethics , Risk taking behavior.

Creativity:- Creativity and entrepreneurship, Steps in Creativity, Innovation and inventions, Using left brain skills to harvest right brain ideas, Legal Protection of innovation, Skills of an entrepreneur, Decision making and Problem Solving (steps indecision making).

UNIT – III

Organisation Assistance:- Assistance to an entrepreneur, New Ventures, Industrial Park (Meaning, features, & examples), Special Economic Zone (Meaning, features & examples), Financial assistance by different agencies, MSME Act Small Scale Industries, Carry on Business (COB) licence, Environmental Clearance, National Small Industries Corporation (NSIC), Government Stores Purchase scheme (e-tender process), Excise exemptions and concession, Exemption from income tax, Quality Standards with special reference to ISO, Financial assistance to MSME, Modernisation assistance to small scale unit, The Small Industries Development Bank of India(SIDBI), The State Small Industries

Development Corporation(SSIDC), Export oriented units, Incentives and facilities to exports entrepreneurs, Export-Import Bank of India, Export oriented zone.

UNIT – IV

Rules And Legislation:- Applicability of Legislation, Industries Development (Regulations) Act, 1951., Factories Act, 1948, The Industrial Employment (Standing Orders) Act, 1946, Suspension, Stoppage of work, Termination of employment, West Bengal Shops and Establishment Act, 1963, Environment (Protection) Act, 1986, The sale of Goods Act, 1950, Industrial Dispute Act 1947.

Project Report:- Introduction, Idea Selection, Selection of the Product / Service, Aspects of a Project, Phases of a Project, Project Report, Contents of a Project Report, Proforma of a Suggested Project Report for a manufacturing Organization, Suggested Readings.

UNIT –V

Agencies for industrial assistance:- West Bengal Electronics Development Corporation, ICICI West Bengal Infrastructure Development Corporation, West Bengal Industrial Infrastructure Development Corporation, Other Corporations with focus as specific segments, State Industrial Development Corporation (SIDC), State Financial Corporation (SFCs), Directorate General of Supplies and Disposals(DGS & D), Registration with DGS & D, Registration Categories, Registration Procedure, Benefits of DGS & D, Information facilities centre in DGS & D, Khadi and Village Industries Commission (KVIC), Industrial Estate, Financing of Industrial Estates, Shilpabandhu-M Incentives for entrepreneurs 9reference to The West Bengal State Support for Industries Scheme 2008 & 2013.

Reference Book :-

1. Entrepreneurial Development, by S S Khanka.
2. The Entrepreneur, by Mark Casson.

Wireless & Mobile Communication (TMECE-2.17)**UNIT-I****Introduction to Digital Communication / Mobile Communication:-**

Digital Modulation Techniques: Basic block diagram and principle of working of the following: Amplitude shift keying (ASK); Interrupted continuous wave (ICW), two tone modulation. Frequency shift keying (FSK), Phase shift keying (PSK). Mobile Communication Systems: Mobile communication systems: Two way mobile radio – cordless telephone – Cellular radio – Analog and Digital systems standards – Personal Communication systems (PCS) and Mobile personal Computers MPC – One way mobile.

UNIT –II

Radio Propagation:- Radio Propagation Concepts: Fundamentals of radio propagation and system concepts – causes for propagation path loss – fading – Doppler spread – time delay path loss – foliage loss – path loss measurement from point to point prediction model.

UNIT – III

Frequency Management:- Frequency management – Frequency bands for mobile communication – frequency reuse techniques – FDMA. TDMA and CDMA techniques.- Comparison between GSM and CDMA.

UNIT – IV

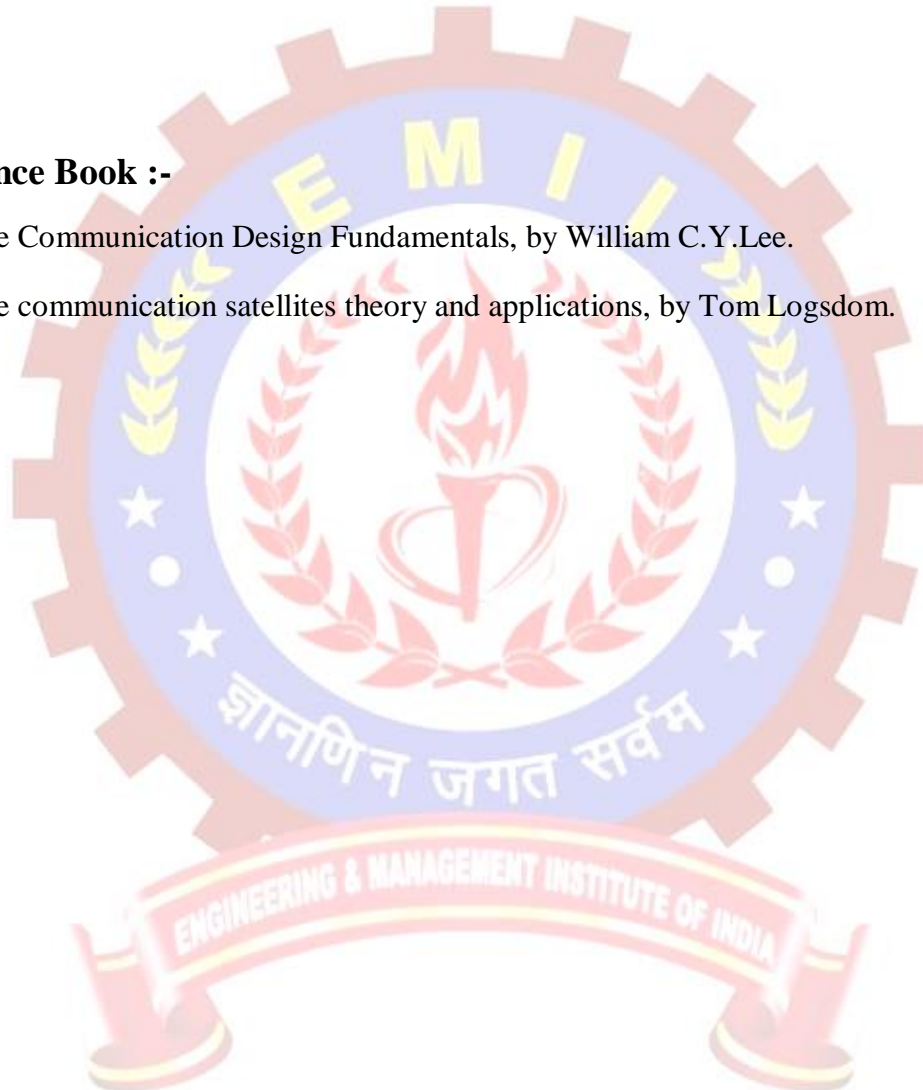
Radio Interference:- Mobile radio interference: Noise limited and interference limited environment – co-channel and adjacent channel environment – inter-modulation – Near –end and far-end ratio.

UNIT –V

Design Parameters:- Design parameters: Design characteristic at base station and mobile unit- Mobile communication satellites – Mobile communication satellites at Geo-synchronous orbits – IRIDIUM satellites ODYSSEY satellites.

Reference Book :-

- 1 Mobile Communication Design Fundamentals, by William C.Y.Lee.
2. Mobile communication satellites theory and applications, by Tom Logsdon.



Final year Project

Project (ECE-2.18)

Select any one topic:-

1. Microprocessor based rolling display/bell and calendar.
2. Microprocessor based stepper motor control.
3. Speed control of DC Machines by Microprocessors.
4. Temperature monitoring using microprocessor based systems.
5. Microprocessor based solar tracking system.
6. Fabrication and assembling of digital clock.
7. Design and fabrication of timing circuits using 555 and counters.
8. Design and fabrication of amplifiers and oscillators circuits.
9. Fabrication of demonstration type Radio receiver.
10. Caller Identification unit for phone.