

## **FIFTH SEMESTER**

### **SUBJECT : ENGG. ECONOMICS & INDUSTRIAL MANAGEMENT**

- UNIT-I** Demand utility and Indifference curves, Approaches to analysis of demand, Elasticity of demand, Measures of demand elasticity, Factors of Production, Advertising elasticity, Marginalism. **08**
- UNIT-II** Laws of returns and costs, Price and output determination under perfect competition, Monopoly, Monopolistic competition, oligopoly, Depreciation and methods for its determination. **08**
- UNIT-III** Functions of central and commercial banks Inflation, Deflation, Stagflation, Direct and Indirect taxes, Monetary and cycles, New Economics Policy, Liberalisation, Globalisation, Privatisation, Market friendly state. Fiscal policy of the government, Meaning and phases of business. **08**
- UNIT-IV** Definition, nature and scope of management, Functions of Management Planning, Organising, Directing, controlling, Communicating. **06**
- UNIT-V** Meaning of Marketing management, Concepts of Marketing, Marketing Mix, Administrative and cost plus pricing, Channels of distribution, Advertising and sales promotion. **08**
- UNIT-VI** Meaning, nature and scope of financial management, Brief outline of profit and loss account, Balance sheet, Budgets and their importance, Ratio analysis, Principles of costing. **08**

### **SUBJECT : LINEAR ELECTRONIC CIRCUITS**

- UNIT-I** Basic Operational Amplifier Circuits  
Differential amplifier stages, Current source biasing, level shifting techniques, common mode and differential mode gains and impedances of a differential stage. **08**
- UNIT-II** Overload protection circuits, Frequency response and compensation characteristics of ideal and non-ideal operational amplifiers, error measurement of various parameters. **08**
- UNIT-III** Simple circuits like inverting, non-inverting, but for amplifiers, summers, integrators and differentiator, log, antilog, Multiplier, divider circuits, Differential amplifier configurations, bridge amplifiers, Instrumentation amplifier, grounding and shielding problem in instrumentation amplifiers. **08**
- UNIT-IV** Precision rectifiers, RMS to De conversion, constant current and voltage source sinusoidal oscillators, with frequency and amplitude stabilisation, Elementary idea of active filter, Second order-Butterworth Chebyshev filter. **08**
- UNIT-V** Non-linear OP-AMP circuits for clipping, clamping and comparator circuits with non-linear components, multiplexers and demultiplexers, bistable, monostable astable multivibrator circuits using OP-AMP, **08**

Sample/Hold Circuits, D/A & A/D conversion circuits, phased Locked loops, **09**

**UNIT-VI** Applications of Linear ICs like LM741 (Industrial OP-AMPIC), LM555 (.industrial timer IC), LM566,(VCO) LM565 (PLL) LM339(Comparator), LM723 (Voltage regulator), Regulator IC series 78XX, 79XX, switch mode power supply. **09**

### **SUBJCET : SIGNALS AND SYSTEMS**

**UNIT-I** Spectral analysis, Fourier series, Fourier transforms, Dirac Delta function, Fourier transform of periodic signals, Spectral density, auto corelation and Cross Corelation, Transmission of signals through linear systems, phase and group delay. **10**

**UNIT-II** Random process, probability, random variables, processes stationarity, mean corelation covariance functions, time averages and ergodicity, transmission of random process through a linear filter, spectral density, Guassian process, noise narrow band noise, envelope of sine wave plus narrow band noise. **10**

**UNIT-III** Elementary theory of SSB, DSB, & Noise calculation, Noise calculations in SSBSC, DSB with carrier, square law demodulation, envelope demodulator, Noise in FM reception, effect of transmitter noise, FM threshold effect. **08**

**UNIT-IV** Bandwidth and rate of pulse transmission pulse spreading & interference, PSD of digital signals line coding, signalling schemes like on-off, polar and bipolar signalling, Control of PSD by pulse shaping, Nyquist first & second criteria. **08**

**UNIT-V** Digital carrier systems : Matched filter detection of binary signals, decision, threshold, error probability, Salient features of ASK, FSK & PSK systems, DPSK systems including Mary Communication Systems. **07**

**UNIT-VI** Information theory, information measure, Entropy, channel capacity of descrete & continuous channel, error control coding concepts of hamming distance & hamming codes, Convolution codes, comparison of codes & uncoded systems. **08**

### **SUBJCET : POWER ELECTRONICS**

**UNIT-I** Semiconductor Devices used in Power Electronics : Silicon controlled, rectifier (SCR), Asymmetrical SCR (ASCR), Reverse conduction thyristor (RCT), Light activated SCR (LASCR), Field controlled thyristor (FCT), TRIAC, Monolithic Darlington (MD), insulated Gate Bipolar Transistor (IGBT), Power MOSFET,GTO, Triggering devices : UJT, PUT, SIAC, GOS, SCS, SUS, SBU. Device treatment should deal with construction characteristics, ratings, Application. **08**

Thermal equivalent circuit, Heat sink calculation, protection requirements and methods.

**UNIT-II** Thyristor as power Controller: Phase angle control, Extinction angle control, Symmetrical angle control, time ratio control, Pulse width modulation, Burst-Integral cycle, Turn on Systems **08**

Requirements :. METHODS CIRCUITS, R, RE, UJT, MSI (Medium Scale Integrated circuits) for single phase line commutated converter single phase converter, single phase inverter, Digital methods, Turn off (commutation) systems : **08**  
Requirements : Methods (Circuits) types A, B, C, D, E, and F.

**UNIT-III** Uncontrolled Rectifiers: Single phase: Midpoint two pulse (M-2), Bridge two pulse (B-2) for resistive, inductive and motor loads, Three phase: Midpoint three pulse (M-3), Midpoint six pulse (M-6), Bridge three pulse (B-3), Bridge six pulse (B-6) for resistive, inductive and motor loads, Filter-C input, L input LC. **08**  
Analysis of waveforms, Fourier.

**UNIT-IV** Single phase/three phase half Control (One quadrant operation); Single phase, Midpoint two pulse, Bridge two pulse of resistive, inductive and motor loads.  
Three phase : Midpoint three pulse, midpoint six pulse, bridge three pulse, bridge six pulse for resistive, inductive and motor loads.  
Full control (two quadrant operation) :  
Single phase Midpoint three pulse, Bridge two pulse, for resistive, inductive and motor loads.  
Three phase-Midpoint three pulse, Midpoint six, pulse, Bridge six pulse for resistive, inductive and motor loads.  
Dual converter for quadrant operation. :  
Single phase bridge, three phase bridge, circulating, non circulating. **08**

**UNIT-V** Inverters: Types-Series, parallel, bridge, FWM voltage source inverter (VSI), current source inverters (CSI), Filters-Types, calculation. **08**  
Commutation methods : Auxiliary, complementary, Transistorised Power controllers, circuits (Treatment- for inverters should consist of circuit, wave form and analysis).

**UNIT-VI** Choppers: Types A, B, C, D, E, Multi phase line filter one, two and four quadrant operation of choppers, Commutation methods: Voltage, Current, Load, (Treatment should consist of circuit, waveform analysis). **07**  
AC regulator: Single phase and three phase Manual, auto, solid state, servo control, Uninterrupted power supplies (UPS), Switched mode power supply (SMPS).

## **SUBJECT: MICROPROCESSOR AND INTERFACING**

**UNIT-I** Approach to integrated system design using Microprocessor, Bus concepts, Address Data & Control, Organisation of a computer with MPU. Bits / Bytes / Words / Long words their ranges accuracy & precision Memory organisation, linear / Absolute decoding. **06**

<b>UNIT-II</b>	Introduction to Intel's 8085 A architecture-description, software Instruction, Addressing Modes-Timing diagrams, Assemblers & Disassembles – (by Hand Coding).	<b>10</b>
<b>UNIT-III</b>	Flag structure, concept of PSW stacks & subroutines-simple & Nested, PUSH, POP instructions & CALL / RETURN instructions, Stack manipulation, Simple Programs.	<b>10</b>
<b>UNIT-IV</b>	Interrupts Concept and structure in 8085, Interrupt service routines, Advanced instructions & Programming of 8085 A,	<b>08</b>
<b>UNIT-V</b>	Methods of data transfer-serial, parallel, synchronous & asynchronous. IN/OUT instructions. Timing diagrams simple hardware interface to 8085 of standard Latches /Buffers / Keys / display devices as I/O ports. Handshaking concepts. Architecture and interface of 8255 & 8085. Interfacing of ADC & DAC Stepper Motor Interface with 8085.	<b>10</b>
<b>UNIT-VI</b>	Hardware consideration-bus contention, slow memory interfacing, complete signal description of 8085. Multiplexed keyboard / Display interface and assembler Directives. General awareness about microcomputer System related products.	<b>10</b>

## **6<sup>th</sup> Semester**

### **FIELDS AND RADIATING SYSTEMS**

**UNIT-I**      Guided Waves:

Waves between parallel planes, TE, TM, TEM waves and their characteristics, Attenuation in parallel plane guides, wave impedance's. **10**

**UNIT-II** Rectangular Waveguides:  
TM, TE waves in rectangular guides, and their characteristics, wave velocity, guide wave length, wave impedance's, field configurations. **10**

**UNIT-III** Transmission Lines: Transmission line equations and their solution. Transmission line parameters. Characteristic impedance, propagation constant, attenuation constant, and phase constant, waveform distortion, Distortionless transmission lines, loading of transmission lines, reflection coefficient and VSWR. Equivalent circuits of transmission lines. Transmission lines at radio frequency. Open and short circuited lines. Smith chart, stub matching. **15**

**UNIT-IV** Scalar and vector potentials, retarded potentials, field due to a current elements, power radiated and radiation resistance, for field due to a dipole, power radiated and radiation resistance, Reciprocity theorem applied to antennas gain and aperture of an antenna, Radiation intensity, Directivity and Antenna gain. **08**

**UNIT-V** Two element arrays and their directional characteristics, linear array analysis, Broadside and end-fire arrays, pattern multiplication, binomial arrays, design of broadcast array for a specific pattern. **07**

**UNIT-VI** Basic principles of parabolic reflections, analysis and power pattern, lens antennas, folded dipole, turnstile and Yagi antenna, Log-periodic antennas, Horn antennas, Travelling wave antennas, and casse grain antennas. **08**

**Books :-**

1. Electromagnetic waves and radiating systems : Edward C. Jordan and Keith G. Balmain.
2. Antennas : Krauas.

**6<sup>th</sup> Semester**

**CONTROL SYSTEM ENGINEERING.**

**UNIT-I** Introduction to need for automation and automatic control, use of feedback, broad spectrum of system application.

Mathematical modeling, diff. Equations, transfer functions, block diagram, signal flow graphs, application to elementary system simplifications, effect of feedback on parameter variation, disturbance signal, servomechanisms and regulators.

Control system components, electrical, electromechanical, hydraulic, pneumatic and other components. Their functional analysis and input, output representation. **08**

**UNIT-II** Time response of systems, first order and second order system (standard inputs) concept of gain and time constants, steady state error, type of control system, approximate methods for higher order system. **10**

**UNIT-III** Root location and its effect on time response, elementary idea of root locus, effect of adding pole and zero and proximity of imaginary axis. **07**

**UNIT-IV** Stability of control systems, conditions of stability characteristics equation, Routh Hurwitz criterion, special cases for determining relative stability. **07**

**UNIT-V** Frequency response methods of analyzing linear system, Nyquist and Bode plot, stability and accuracy analysis from frequency response, open loop and close loop frequency response. Nyquist criterion, effect of variation of gain and addition of pole and zero on response plot, stability margins in frequency response. **08**

**UNIT-VI** State variable method of analysis, characteristic of system state choice of state representation of vector matrix differential equation, standard form, relation between transfer function and state variable. **10**

**TEXT BOOKS :**

1. Control System Analysis : Nagrath and Gopal
2. Linear System Analysis : D. Azzo & Honpis, 1975.

**NOTE :** Practical based on the above syllabus.

**ELECTRONIC INSTRUMENTATION**

**UNIT-I** Generalized instrumentation systems, active & passive transducers, digital & analog mode of operation static & dynamic characteristic & performance of instruments. Statistical treatment of measurement errors, Gaussian error distribution, probability tables, combination of errors. **08**

Study of transducers & measuring system for the following :-

**UNIT-II** Motion measurement : relative & absolute motion measurement of displacement, velocity & acceleration, calibration of accelerometer, electrical transducer for motion measurement, LVDT, Piezoelectric transducers, variable inductance & measurement of shaft torque & power. **08**

**UNIT-III** Temperature : Laws of thermoelectric ckts, thermocouples, cold junction compensation, thermistors, active-temp, sensors, radiation, thermometry, broad band and narrow band radiation methods, two colour pyrometer, optical pyrometer, temperature measurement of flowing liquids, dynamic response & compensation of temperature sensor, heat flux sensors. **10**

**UNIT-IV** Strain: Bonded & unbonded electrical strain gauges, gauge factor, temperature compensation methods, problems in biaxial strain fields, error in the measurement of biaxial strains. **08**  
Miscellaneous measurements : measurement of liquid level; flow; pressure and pH.

**UNIT-V** Signal conditioning techniques used in various transducers, linearization, gain clipping, filtering, differential amplification, shielding techniques, various standards for signal transmission like 420 mA current loop converter etc. **08**

**UNIT-VI** Recording of data CRD, data acquisition systems, IEEE 4888 bus, principle of operation, protocols etc, test equipment's like multimeter, signal generator, signal analyzer. **10**

#### **BOOKS :**

1. Measurement System, application and Design : E.D.Doeblin, Mc-Graw Hill, Kogalculsha.
2. Circuit Design for electronic instrumentation : Wob Shell.
3. Instrumentation, Measurement and Feedback : B.E.Jones, Mc-Graw Hill.

#### **COMMUNICATION ELECTRONICS**

**UNIT-I** Frequency spectrum of electromagnetic waves, their properties, wave propagation etc. Tuned Amplifiers, gain and bandwidth, neutralization, noise, types, source, noise figure calculation. **12**

**UNIT-II** A.M.modulators, series plate modulated class 'C' amplifier, efficiency and power calculations, SSB modulation SSB-SC modulations. A.M.Demodulators, square law detector, diode peak detector, envelope detector, detectors for SSB and SSB-SC A.M. signals, AM using transistors. **10**

**UNIT-III** Angle Modulation, Frequency modulation, spectrum, Reactance tube and FET modulators, Armstrong method, F.M. transmitters, frequency stabilization, FM discriminator, Foster Seely, PLL detectors, stereophonic FM. **10**

**UNIT-IV** Pulse modulation : Pulse Amplitude modulation (PAM), Pulse Width Modulation (PWM), Pulse Position Modulation (PCM), Delta Modulation (DM). **12**

**UNIT-V** Radio Receivers and its measurements : TRE receiver, superhetrodyne receiver, detailed study of block schematic and circuits of mixer, RD-stage, I.F. stage detector, Automatic Gain Control (AGC), FM Radio receivers. **10**

Receiver Measurements : Sensitivity, selectivity, image frequency rejection etc. communication receiver, block schematic and its special features.

**UNIT-VI** Line Telephony : Elemental phone system, central switching, simple exchange, two-end-four wire connections, time division multiplexing, analog time-division searching, time slot interchanging (TSI), space array for digital signals, combined space time searching. **08**

**TEXT BOOK :**

1. Communication Electronics : Kennedy, TMH

**REFERENCE :**

1. Communication Electronics Forest Barker, IBT
2. Radio Electronics : Miller
3. Electron Tube Circuits : Seely]
4. Principle of Communication systems : Taup and Smillieri  
TMH
5. Communication Electronics : Roddy and Coolen  
PHI
6. Communication Electronics : Deshpande TMH

**COMPUTER ORGANISATION**

**UNIT-I** Register Level Design: General characteristics, description languages, combinational and sequential components, design methods. Processor level design-components, design techniques. Processor Design: Processor organisation, information representation, number formats. **08**

**UNIT-II** Instruction Sets : Instruction formats, instruction types, multiplication & division ALU design, floating point arithmetic, IEEE 754 floating point formats. **07**

**UNIT-III** Control Design : Instruction sequencing, interpretation, hard wired control – design methods, multiplier and CPU control unit. **08**



**UNIT-IV** Memory Organisation : Device characteristics, RAM, Serial access memories, virtual memory, concept of cache & associative memories. **10**

**UNIT-V** System Organisation : Local and long distance communication input-output systems, interrupt, DMA, introduction to parallel processing. **08**

**UNIT-VI** Concept of parallel processing, pipelining, vector processors, introduction of RISC architecture, data flow architecture. **06**

**TEXT BOOKS :**

1. PHI A.S.Tanen Baum, "Structured Computer Fundamentals". Third edition,
2. Y.Chu. 11 "Computer System Architecture", Prentice Hall, Engle Wood Chiffs.N.J.
3. C.T.Gear, "Computer Organisation and Programming", Mc Graw Hill, N.V.
4. PAI. Computer Architecture and Organisation : J.P.Hayes, second edition,

**ELECTRONIC WORKSHOP**

Fabrication and testing of small electronics circuit, PCB design and technical report presentation.

Study of Indian standards in Electronic Industry.

Manufacturing practices in Electronic Industry.

Reference Material :

PCB Design : Boshar, TMH Pub.

Elliot : Integrated Circuit Fabrication Technology (TMH)

(Practical as per above syllabus).