

ELECTRONICS & COMMUNICATION ENGINEERING

FOURTH YEAR

COURSE SL. No.	SUBJECTS	MARKS DISTRIBUTION	
		THEORY	
PRACTICAL/SESSIONAL			
421.	Engineering Economics & Management	100	-
422.	Power Electronics	100	050
425.	Automatic control System	100	050
443.	Computer Communication & Networking	100	050
444.	Elective –I	100	-
	i. Advanced E.M.F Theory		
	ii. Designing with lcs		
446.	Electronic Instrumentation	100	050
447.	Microwave Engineering	100	050
448.	Elective-II	100	050
	i. Digital Communication		
	ii. Computer Aided Design & Robotics		
	Project	-	100
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		800	400

421. ENGINEERING ECONOMICS & MANAGEMENT

FIRST TERM

1. Engineering economy: (a) Simple and compound interest, Annuities. (b) Depreciation, Causes and Method. (c) Comparison of alternative and replacement method.: (i) Equivalent annual cost method. (ii) Present worth method. (iii) Rate of return method.
5 Lects.
2. Accounting (a) Double entry book keeping. (b) Journal (c) Ledgers. (d) Manufacturing Account: Profit and loss Accounts. (e) Balance sheet.
7 Lects.
3. Costing (a) Cost and cost accounting. Elements of cost (b) Break Even analysis, determining selling price and profitability. (c) Overhead cost allocation. (d) Costing system, Job costing, Unit costing process costing, operating cost, departmental cost (e) Cost control: Actual and standard cost, Budget and budgetary control.
7 Lects.
4. Entrepreneurship development: (a) Introduction to entrepreneurship. (b) Motivation (c) Psychological factors, Risk taking behaviour. (d) Rural entrepreneurship (e) Self employment. 5 Lects.

SECOND TERM

1. Management and organization: (a) Principle of management (b) Elements of management, planning organizing direction and control (c) Organisation structure and charts, line, staff functional and committee organization.
4 Lects.
2. Industrial management: (a) Industrial ownership: Proprietorship, partnership joint stock company and cooperative societies. (b) Site selection. (c) Plant layout: Process oriented, product oriented layouts, line balancing.
4 Lects.
3. Production materials Management: (a) Production types: Job order, Batch and mass production. (b) Inspection and quality control. (c) Inventory control, economic order quantity. 4 Lects.
4. Optimisation techniques: (a) Linear programming; Graphical method, Analytical method of solution. (two variables) (b) CPM and PERT.
5. Personal Management: (a) Function: Manpower planning recruitment, selection training, promotion, discipline, welfare. (b) Job evaluation. (c) Merit Rating. (d) Wages and incentives. 4 Lects.
6. Marketing Management (a) Market research and sales force casting (b) Sales management (c) Advertisement and sales promotion.
4 Lects.

Books Recommended

1. engineering economy by De Carmo, Sallion and Canada (Mac Millan) Publ. Co. New York, and Collier Mac Millan Publishers, London.
2. Industrial Organisation and management by Bethal, Atwater, Smith and Stackman (McGraw Hill Book Co.)
3. Industrial Organisation and Engg. Economics by Banga and Sharma (Khanna Publishers Delhi)
4. Industrial Engg. And Management by O.P. Khanna Dhanpal Rai and Sons, Delhi.
5. Management Accounting by Anthony Robert N.
6. Development Entrepreneurship by Undai Pareek and T. Vankateshwara Rao (Sanjiv Printery, Ahmedabad.)

422. POWER ELECTRONICS

FIRST TERM:

Power Transistors, IGBT, Power Mosfets, Thyristors, GTO – their characteristics, Protection & cooling; series & parallel operation of SCRs, Typical SCR firing controls circuit.

Phase Controlled Converters : Single phase/3-Phase full controlled, half wave & full wave converters with resistive load, R-L load, R-L-Source load with & without FWD; circuit p.f; Half or semi controlled convertors; line commutated inverters.

A.C. power controllers : Single phase/3-phase Integral Cycle control, Phase control, Unidirectional and Bidirectional phase control, average, rms values and circuit power factor

SECOND TERM:

Applications of Converters, Inverters & A.C. power controllers : D.C. Motor control, two quadrant D. C. motor operation; Induction motor control : Stator Phase control & Slip Ring rotor control, Slip Power Recovery scheme; Light dimmer and heater control.

S.C.R commutation : Forced commutation circuits; Introduction to choppers, Classification & Control Strategies; Choppers in D.C. motor control, Four quadrant choppers.

D. C. to A.C. Inverters : Classification and configuration, Series, Parallel, Full Bridge and Half Bridge Inverters; Single phase/3-phase Inverters; Amplitude and Harmonic control, PWM control, VSI & CSI, High frequency Inverters, Induction Heating, Application A. C. motor control, Constant Power/Constant Torque control, Online/Offline UPS.

Text Books :

1. Introduction to Power Electronics : Daniel W. Hart (P H International)
2. Power Electronics : M H Rashid (P H India)

References :

3. Thyristors and Their Applications : M Ramamurthy
4. Power Electronics : P S Bimbhra
5. Power Electronics : V Subramaniam (New Age International)

425. AUTOMATIC CONTROL SYSTEM

FIRST TERM:

1. Introduction and feedback characteristics of control system.
2. Mathematical modeling of physical system, Linearization of non-linear system.
Transportation lag.
3. Time domain analysis of control systems and performance indices.
4. Concept of stability and algebraic criteria.
5. Root-Locus techniques.

SECOND TERM:

6. Frequency domain analysis of Control system.
7. Frequency domain stability criterion.
8. Time domain design of control system.
9. Frequency domain design of control system.
10. Control system components.

Text Books:

1. Control systems Engineering-Nagrath, Gopal.
2. Automatic control system-Kuo.

443. COMPUTER COMMUNICATION & NETWORKING

FIRST TERM:

-Data transmission principle, transmission components, modern Error control and line control procedures, Role of computer for data communication, Computer communication-point to point multidrop, Concept of circuit message and packet switching Computer networking their structure (centralized, hierarchical distributed, multistar, ring etc.).

SECOND TERM:

-Components of computer network: hosts, FEP, communication channel, terminals, multiplexers, concentrators etc. Routing and flow control, Network software, security, reliability, statistics and accountability case study of computer communication network.

References :

1. A. S. Tanonbaum, Computer Networks, Prentice Hall 1981.
2. D.W. Davies, D.L.A. Barber, W.L. Price and C.M. Solononides, Computer Networks and their protocols Jhon-Weley, 1979.

444. ELECTIVE – I

i. ADVANCED E. M. F. THEORY

FIRST TERM

1. **RADIATION:** Vector potential in the electro magnetic field oscillation, electric dipole and power-radiated application to short antenna. Radiation from a half dipole and its radiation resistance.
2. **ANTENNA FUNDAMENTALS:** Radiation pattern, Antenna gain, Effective joint of an antenna, Antenna aperture, relation between antenna gain and antenna aperture, Elementary idea of self and mutual impedances in antenna, Antenna terminal impedance, reciprocity theorem of an antenna.
3. **ANTENNA ARRAYS:** Arrays of two point source, linear arrays of n-point sources, Broad side and End fire arrays, Pattern multiplication Binomial arrays.
4. **SPECIAL PURPOSE ANTENNAS:** Loop antenna traveling wave antenna, Rhombic antenna, Yagi antenna, Horn and reflector type antennas.

SECOND TERM

5. **GROUND WAVE PROPAGATION:** Introduction to different region of the atmosphere. Various propagation paths, Basic ideas of ground wave propagation, space wave and surface wave, True Tropospheric refraction, radius of curvature of a ray in the troposphere. Concept of modified earth, Duct propagation.
6. **SKY WAVE PROPAGATION:** Structure of the ionosphere, effective permittivity & conductivity of an ionized region. Effect of earth magnetic field. Critical frequency. MUF and OPWF. Virtual height, skip distance fading.
7. **ANTENNA DESIGN:** Design consideration for antennas at various frequency domains, common type of antennas in different frequency domains eg. Wide band antenna (Log periodic antenna)

Text Book:

Electro magnetic waves & radiating system By Jordan.

Ref. Book:

Electro magnetic by Krauss J.D.F. McGraw Hill

ii. DESIGNING WITH ICs

FIRST TERM:

Linear IC Design:

- Linear Circuit Application; Amplifiers; DC amplifiers Bridge amplifiers. Integrators, Differentiators, AC coupled feedback amplifiers, voltage to current converters Reference voltage sources and voltage regulators, current amplifiers charge amplifiers.
- Non-linear circuit application: Limiter network, feedback limiters, diode function generators, logarithmic amplifiers.
- Active Filters; Active filter characteristics, Pole pairs, network functions and parameters of low pass, high pass, band pass and band reject, filter realisation.
- Wave from generators : Square wave, Triangle wave and sine wave generator, use of 555 timer.
- Miscellaneous circuits : VCO, VFC, PLL etc.

SECOND TERM:

Digital IC Design:

- Review of logic families : their characteristics and interfacing
- Designing with counters and shift register
- Construction and debugging of IC Circuits
- Arithmetic Circuits.....
- Memories.
- Basic computer.

Books:1. Operational Amplifiers : Design and Applications Editors : Tobery-Graeme Huelsman, McGraw-Hill, 197

2. Practical Digital Design Using Ics by Joseph D. Greenfield, John Wiley & Sons, 1983.

446. ELECTRONIC INSTRUMENTATION

FIRST TERM:

- Review of industrial Electronic Instrumentation system.
- Elements, Functions & Application of measurement system.
- Standard of measurement.
- Performance characteristics of electronic instruments. Errors in measurements and their statistical analysis.
- transducers: Principle and operation of Transducers used for measurement of electrical and non-electrical parameters.
- Analog and Digital data acquisition system.
- Attenuators, Bridges, Electronic amplifiers and precision, rectifier, linearisation circuits, filters, voltage to current converters, current to voltage to frequency and frequency to voltage converter circuits.

SECOND TERM:

- Electronic indication, display, recording, analog and controlling instruments.
- * Electronic voltmeter, CRO, counters.
- * LCD-LED display devices and monitors.
- * Analog & Digital recorders.
- * Function generators.
- * wave analyser.
- * Spectrum analyzer.
- * Q meters.
- * P, PI, PID type controllers.
- * Power supply calibrating sources.
- * Computer controlled Instruments and interfacing techniques. (a brief introduction)
- * Application of electronic instruments.
- * Communication system.
- * Power generating, monitoring and distribution system,
- * Process control instrumentation system.
- * Wave from generators: Square wave, Triangle wave and sine wave generator, Use of 555 timer.
- * Miscellaneous circuit: VCO, VFC, PLL etc.

Text Books :

1. Electronic Instrumentation – A P Malvino
2. Electronic Instrumentation & Measurement Technique – W D Cooper & A D Helfric (PHI)

Reference Books :

1. Electronic measurement & Instrumentation – R. Prasad (Khanna Publications)

447. MICROWAVE ENGINEERING

FIRST TERM:

1. **Microwave Amplifier and oscillator** – Limitation of conventional tubes at UHF & microwave frequency. Multicavity Klystrons, multicavity traveling wave type magnetron. Traveling wave tubes Backward wave oscillators. Gun oscillator or IMPATT Diode. Master and parametric amplifier.
2. **Microwave components:** Coupling probes & loops, attenuating directional coupler. Magic T, phase shifter, crystal receiver, and mixer, isolator and circulator.

SECOND TERM:

3. **Principle of RADAR:** Radar Block diagram and operation. Radar range equation. Pulse and CW radar, MTI Block diagram of Radar receivers for pulse and CW Radar receiver. Noise figure, Duplexers and Displays.
4. **Satellite communication:** Transmission media, the role of satellite communication, merits and demerits. Satellite orbits, frequency bands transponders, earth stations, general link equation, microwave and satellite links applications.

Text Books:

Microwave devices & circuits by Samuel lia.

Ref. Book:

Microwave devices & Radar Engg. _ Mr. KulKarni.

448. ELECTIVE – II

i. DIGITAL COMMUNICATION

FIRST TERM:

1. **SPECIAL ANALYSIS** : Correlation between wave forms power and cross correlation, Autocorrelation, Autocorrelation of a periodic waveforms.
2. **RANDOM VARIABLES**: Introduction, Discrete and continuous, Random variables. Cumulative Distribution function. Probability Density Function, Relation between probability and Probability Density. Joint cumulative Distribution and probability Density. Random processes.
3. **DIGITAL MODULATION TECHNIQUES**:
 - (i) Binary Phase shift Keying-Generation and Reception.
 - (ii) Differential phase shift keying-Generatic a DPSK signal, Recovering data from the DPSK signal.
 - (iii) Quadrature phase shift keying: Principal of generation of QPSK signal. QPSK Receiver.
 - (iv) Binary Frequency shift keying: Generation of BFSK signal. Receiver for BFSK singal.
4. **Multiplexing PCM signals**: The T1 Digital system.

SECOND TERM:

5. **Base-band signal Receiver**: Concept of the Matched Filter, Impulse Response and Probability of Error of the Matched Filter.
6. **CODING**:
 - (i) Coding to increase average information per bit-Shannon Fano Algorithm.
 - (ii) Coding for Error detection. Hamming Distance.
 - (iii) Introduction to Voice Coders: Channel Vocoders, Speech model used in vocoders.
7. **FUNDAMENTALS OF TELEPHONE SWITCHING**: Elemental Phone system, central Switching. Time slot Interchanging. Space Switching. Space Array for Digital Signals. Combined space and Time Switching. Mobile Telephone Communication – The Cellular concept.

ii. COMPUTER AIDED DESIGN & ROBOTICS

Introduction concept of CAD/DAM

Computer System, computer aided Design system, hardware Computer Aided design system, software transformation system Geometric modeling, draughting Application of CAD/CAM techniques to finite element data preparation.

Computer Aided manufacture the A P T System CNC DNC sytem. The use of Micro computers in CAD/CAM system.

Industrial Robotics.

Automated guided vehicles. Process planning Materials management planning Implications of CAD/CAM for industry.

Books:

3. Computer Aided Design and manufacture By, C.B. Besant & C.W. K. Lw.
4. Principles of Computer-aided Design By, Joe Rooney & Philip Steamnan.
5. Computer Aided Design and manufacture CAD/Cam-Groover & Jinner.