

## **ELECTRONIC SYSTEM DESIGN**

### **UNIT I:**

Design of Power supply system: Unregulated D. C. power supply system with rectifiers and filters. Design of emitter follower regulator, series regulators, overload protection circuits for regulators.

### **UNIT II:**

Design of class A Small signal amplifiers: Emitter follower, Darlington pair amplifiers with and without Bootstrapping, Two stage direct-coupled amplifier. Design of Class A, Class AB audio power amplifier with drivers.

### **UNIT III:**

Design of sinusoidal oscillators: OPAMP base Wein bridge and Phase Shift Oscillators with AGC circuits, Transistor based Hartley, Colpits and Crystal oscillators, Evaluation of figure of merit for all above oscillator circuits.

### **UNIT IV:**

Design of constant current sources, Design of function generators, Design of tuned amplifiers, Design of Butterworth, Chebyshev filter upto sixth order with VCVS and IGMF configuration.

### **BOOKS:**

1. Regulated power supply Handbook. Texas Instruments.
2. Electronics; BJT's FETS and Microcircuits – Anielo.
3. Monograph on Electronics circuits Design: Goyal & Khetan.

**Electronics System Design:** Practicals based on above syllabus.

NOTE: 50% practicals should be based on SPICE simulation.

## **UHF AND MICROWAVE**

### **UNIT I:**

Causes of failure of conventional tubes at high frequency. Two-cavity klystron amplifier, Reflex Klystron oscillator.

### **UNIT II:**

Traveling wave tube, slow wave structure. Backward wave architecture (Carcinotron), Magnetron: Cylindrical magnetron, parallel plate magnetron, voltage tunable magnetron.

### **UNIT III:**

Microwave components: Attenuators, Tees, and Directional couplers. Circulators, Isolators; Gyrotrons, Phase shifter, Cavity resonator, Transmission line resonator.

### **UNIT IV:**

Scattering matrices: Scattering matrices of transmission lines, microwave junction and tees, directional coupler, circulator.

### **UNIT V:**

Microwave filters: Design of Microwave filters by Image Parameter method, insertion loss method, Microwave measurement, Microwave power measurement – Bolometer method and Calorimeter method, VSWR measurement, Attenuation measurement, Impedance and Q factor measurement.

### **UNIT VI:**

Microwave solid state devices: GaAs oscillator, parametric amplifier, PIN diode, Detector diode, MASER. Strip lines: Microstrip lines, coplanar, shielded, parallel strip lines.

**TEXT BOOKS:**

1. Microwave device and circuits: Samuel Y. Lio
2. Foundations of microwave engineering. R. E. Collins.
3. Microwave engineering: R. Chatterjee.

**REFERENCE BOOKS:**

1. Microwave communication: Hund
2. Microwave theory and measurement: G. Lance.

## **MOBILE COMMUNICATION**

### **UNIT I:**

The cellular concept, Evolution of mobile radio communication, Cellular telephone system, frequency reuse, channel assignment and handoff strategies, interference and system capacity, trunking and grade of service,. Improving capacity in cellular system.

### **UNIT II:**

The mobile radio environment causes of propagation path loss, causes of fading – long term and short term, definition of sample average, statistical average, probability density function, cumulative probability distribution, level crossing rate and average duration of fade, delay spread, coherence bandwidth, intersymbol interference.

### **UNIT III:**

Modulation techniques for mobile communication: BPSK, QPSK. Transmission and detection techniques, 4 QPSK transmission and detection techniques. QAM, GMSK.

### **UNIT IV:**

Equalization, diversity and channel coding: fundamentals of equalization, space polarization, frequency and time diversity techniques, space diversity, polarization diversity, frequency and time diversity, fundamentals of channel coding.

### **UNIT V :**

Multiple access Techniques: Introduction to multiple access,FDMA,TDMA, spread Spectrum Multiple Access,Frequency Hopping Multiple access (FHMA) ,Code Division multiple access (CDMA),Space Division Multiple access (SDMA).

### **UNIT VI:**

GSM – global system for mobile: services and features, GSM system architecture, GSM radio subsystem, GSM channel types, GSM frame structure, signal processing GSM, introduction to CDMA, digital cellular standard.

### **TEXT BOOKS:**

1. Wireless Communication – Principles and practice by T. S. Rappaport (Prentice Hall PTR, upper saddle river, New Jersey)
2. Mobile Communication – Design fundamentals by William C. Y. Lee, (John Willey)

### **REFERENCE BOOKS:**

1. Wireless digital communication by Kamilo Feher (PHI)
2. Mobile Cellular communication by W. C. Y. Lee (McGraw Hill)

3. The Mobile Radio Propagation channel by J. D. Parson.

## **OPTICAL COMMUNICATION**

### **UNIT I:**

Principle of optical communication – Attributes and structures of various fibers such as step index, graded index mode and multi mode fibers. Propagation in fibers – ray mode, Numerical aperture and multi path dispersion in step index and graded index fibers. Material dispersion and frequency response.

### **UNIT II:**

Electromagnetic wave equation in step index and graded index fibers modes and power flow in fibers. Manufacture of fibers and cables, fiber joints, splices and connectors.

### **UNIT III:**

Signal degradation in fibers – Attenuation, material dispersion, wave guide dispersion, pulse broadening, mode coupling.

### **UNIT IV:**

Optical sources – LED and LASER structures and properties. Sources Launching and coupling.

### **UNIT V:**

Photo detector – Pin and Avalanche Photo – detectors. Structures and Properties.

### **UNIT VI:**

Transmission link – Point to point links, WDM, Data buses, star and T – Coupler, NRZ, RZ, and block codes. Measurement in optical fibers – Attenuation, dispersion, Refractive index profile and optical source characteristic measurements.

**BOOKS:**

1. Optical fiber communication, principles and practice: John M Senior PH International Service)
2. Optical fiber communication: B Keiser (McGraw Hill)
3. Optical communication system: J Gower (prentice Hall of India)
4. Optical fiber system: Kao (Tata McGraw Hill)

## **DIGITAL IMAGE PROCESSING**

### **UNIT I:**

Digital Image representation, elements of digital image processing systems. Sampling and quantization: simple image model, basic relationship between pixels and image geometry.

### **UNIT II:**

Image transforms – introduction to Fourier transform, DFT, properties of 2 – dimensional DFT, FET other separable image transforms – DCT, DST, Walsh, Haar, start transform.

### **UNIT III:**

Image enhancement – Basic gray level transformations, Histogram processing enhancement using arithmetic / logic operations, spatial filtering, smoothing and sharpening filters, smoothing frequency domain filter, sharpening frequency domain filters.

### **UNIT IV:**

Image Compression – fundamental, image compression models, information theory error – free compression, lossy compression, Image compression standards.

### **UNIT V:**

Image segmentation – Detection of discontinuities, Edge linking and boundary detection, and thresholding region based segmentation.

### **UNIT VI:**

Representation and description – Representation, boundary descriptors, Regional Descriptors.

### **BOOKS:**

1. Digital Image processing R. C. Gonzales, R. E. Woods, Pearson Edition, 2<sup>nd</sup> edition Fundamentals of digital image processing. A. K. Jain (PHI).

## **COMPUTER COMMUNICATION NETWORK.**

### **UNIT I:**

Network & Services. Communication Network Approaches to network Design, Types of Network, Two stages, and three stages Network, Time Division Switching, and Time Multiplexed Switching. Time Multiplexed Time Switching.

### **UNIT II:**

LAN Network and Medium Access Layer: LAN structure, random access, multiple access protocols, IEEE standard 802 for LAN & MAN High speed LANS, FDDI, fast Ethernet.

### **UNIT III:**

Application and Layered Architecture: OSI reference model, TECP / IP protocol, IP packets, IP addressing, subnet addressing, address resolution and reverses resolution, TCP / IP utilities.

### **UNIT IV:**

Physical Layer and Data Link Layer: Transmission media, wireless transmission, X.25 network, narrow band and Broadband ISDN, ATM.

Data link Layer design, Error detection and correction Elementary data link protocols, and sliding window protocols.

### **UNIT V:**

Network layer and Transport Layer: Network lalyer design, Routing, congestion, Internetworking Transport layer design issues, and Transport services primitives. Internet transport protocol, wireless TCP and UDP.

### **UNIT VI:**

Application Layer: Network security, Cryptography, secret key, public – key, digital signature, Domain Name system, Electronic Mail system, Multimedia, Real Time Transport protocol.

**BOOKS:**

1. Telecommunication Switching systems & Networks by Vishwanathan.
2. Communication Networks by Leon – Gracia, Indra Widjaja.
3. Computer Communication by W. Stanlling.
4. Computer Networks Tanenbaum.

## **FUZZY LOGIC & NEURAL NETWORK.**

### **UNIT I: INTRODUCTION**

1. Fuzzy sets, Relations, Approximate reasoning, Representing: set of rules.
2. Fuzzy knowledge based (FKBC) parameter. Introduction rule and database; inference engine choice of fuzzification and defuzzification processes.

### **UNIT II: NONLINEAR FUZZY CONTROL**

Introduction, Control Problem, FKBC as nonlinear transfer element, Types of FKBC.

### **UNIT III: ADAPTIVE FUZZY CONTROL**

Introduction, design and performance evaluation, main approach to design.

### **UNIT IV:**

1. Fundamental concepts of ANN

Model of artificial Neural Network (ANN), Learning and adaptation learning rules. Feed forward Networks:

Classification Model, features and decision, regions, minimum distance classification, perception, Delta learning rules for multiperptron layer, Generalized learning rules, back propagation Algorithm, back propagation training, learning factors.

### **UNIT V: RECURRENT NETWORKS**

Mathematical foundation of discrete time and gradient type hope field networks, Transient Reponses and relaxation modeling.

### **UNIT VI: ASSOCIATIVE MEMORIES AND SELF-ORGANIZING NETWORKS.**

Basic concepts and performance analysis of recurrent associative memory, Bi-directional associative memory, Hamming net and MAXNET. Unsupervised learning of clusters, counter propagation network, feature mapping, self-organizing feature maps, cluster discovery network (ART 1)

### **BOOKS:**

1. Introduction of Artificial Neural Networks, jacek Zurada (JHP)
2. Neural Network and Fuzzy System, Bart Kosko. (PHI)

3. Neural Networks: A comprehensive Foundation, Simon Haykin (Maxwell)  
Macmillan Canada Inc).
4. An Introduction to Fuzzy Control, D. Driankov, norsa.
5. Fuzzy sets: Uncertainty and information, Klir and Folger (PHI)
6. Digital Image Processing (AWPC) by Gonzalez.