EC332 ELECTRONIC INSTRUMENTATION

REVIEW OF MEASUREMENTS AND ERROR: Definition, accuracy and precision, Significant figures, Types of error, Statistical analysis, Probability of error, limiting error; CATHODE RAY OSCILLOSCOPE: Introduction, Block diagram of CRO, cathode ray tube, CRT circuits, Vertical deflection system, delay line, horizontal deflection systems, Multiple trace, Oscilloscope probes and transducers, Measurements with CRO, special oscilloscope. ; SIGNAL GENERATION: Sine-wave generator, Frequency synthesized signal generator, Frequency divider generator, Sweep frequency generator, pulse and square wave generator, Function generators, Audio frequency signal generator, Digital and Analog Noise generator SIGNAL ANALYSIS: Wave analyser, Distortion analyser and spectrum analyser; FREQUENCY AND TIME INTERVAL MEASUREMENT: Simple frequency counter, measurement error, extending frequency range of counter, Automatic computing counter, Measurement of higher frequency by wave meter, heterodyne freq. meters; ANALOG AND DIGITAL DATA ACQUISITION SYSTEMS: Introduction, Signal conditioning of input, Single channel data acquisition systems, Multi-channel data acquisition systems, Data conversion, A/D and D/A converters, Multiplexers, Sample and hold circuits; INPUT OUTPUT DEVICES AND DISPLAY: Introduction, Analog displays and recorders, Digital I/O devices, Displays, Display multiplexing, Zero suppressing.

Essential Readings:

1. A.D. Helfrick, W.D. Cooper – *Modern Electronic Instrumentation and Measurement Techniques*, PHI, New Delhi, 2002.
2. D.A. Bell – *Electronic Instrumentation and Measurement,* PHI, New Delhi, 2003.

Supplementary Readings:

1. C.S. Rangan, G.R. Sarma and V.S.V. Mani - *Instrumentation Devices and Systems,*TMH, 2000
2. H.S. Kalsi – *Electronic Instrumentation,* TMH, 2000.
3. D. Patranabis- *Principles of Electronic Instrumentation*, PHI, 2008.

EC312 ELECTROMAGNETIC THEORY

Laplace and Poisson's equation, Solution of Laplace equation by separation of variables in Cartesian, cylindrical and spherical co-ordinates, cylindrical and spherical harmonics, Examples. ; Maxwell's equations for static fields, their modifications for time-varying fields conducting and dielectric media. ; EM Wave equations and uniform plane waves, in free space and in lossy medium, wave propagation in good dielectrics, in good conductors: Depth of penetration, Poynting vector and power flow, Reflection and refraction of EM Waves. ; Transmission lines: Transmission line equations, Parameters- primary and secondary constants, Reflection coefficient and SWR, Matched Transmission line, Impedance matching, Smith chart problems, Analogy of transmission lines with e.m. waves. ; Guided waves and Waveguides: Electric and magnetic fields in rectangular waveguide; TE, TM and TEM modes, Dominant modes, $_{c, g}$, v_p, v_g, Numerical examples. ; Radio Wave Propagation: Modes of propagation, Structure of Troposphere, Tropospheric+-* Scattering, Ionosphere, Ionospheric Layers - D, E, F_1, F_2, regions. Sky wave propagation - propagation of radio waves through Ionosphere, Effect of earth's magnetic field, Virtual height, Skip Distance, MUF, Critical frequency, Space wave propagation.

Essential Reading:

1. N. Ida, *Engineering Electromagnetics*, *Springer*,*2004*
2. E.C. Jordan and K.G. Balmain, *Electromagnetic waves and Radiating systems*, *Prentice hall*, *2004*

Supplementary Reading:

1. M. N. O. Sadiku, *Elements of Electromagnetics*- Oxford University Press, 2006
2. W. H. Hayt, *Engineering Electromagnetics*, *McGraw Hill*, *2007*

EC314 DIGITAL COMMUNICATION

DIGITAL MODULATION TECHNIQUES: BPSK, BFSK and DPSK, QPSK, M-ary PSK, MSK, M-ary FSK, GMSK. **OPTIMUM RECEIVERS FOR AWGN CHANNEL**: Optimum receiver for signals corrupted by AWGN, performance of optimum receiver for memory less modulation, optimum receiver for CPM signals, optimum receiver for signals with random phase in AWGN channel. **CARRIER AND SYMBOL SYNCHRONIZATION:** Signal Parameter estimation, carrier phase estimation, symbol timing estimation, Joint estimation. **CHANNEL CAPACITY AND CODING**: Channel models and channel capacity, Block codes – coding and decoding, cyclic codes, algebraic codes, Reed-Solomon Code, Convolutional codes; **SPREAD SPECTRUM SIGNALS FOR DIGITAL COMMUNICATION:** Direct sequence (DS) spread spectrum and its applications, frequency hopping (FH) spread spectrum, synchronization of spread spectrum systems.

Essential Reading:

1. H. Taub and D.L. Schilling, *Principle of Communication Systems*, 2nd Ed., McGraw Hill, 1986.
2. J.G. Proakis, *Digital Communication,* McGraw-Hill Publications, 2000.

Supplementary Reading:

1. B. Sklar, *Digital Communications*, Pearson Education, India, 2001
2. J.G. Proakis, M. Salehi, *Communication Systems Engineering*, Pearson Education International, 2002
3. Lee & Moseschmitt, *Digital Communication,* Springer, 2004.

EC322 EMBEDDED SYSTEMS

INTRODUCTION TO 8-bit and 16 bit microcontroller: 8051 family of microcontroller, architecture, memory organization, special function registers, timer counter, serial interface, interrupt organization, instruction sets and programming, instruction timing and interfacing, practical applications, introduction to 16-bit microcontroller 8096.
INTRODUCTION TO Embedded systems, Processor and memory organization, Devices and Buses for device networks, Device drivers and Interrupt servicing mechanism, Programming concepts and Imbedded programming in C and C++, Program modeling concepts in single and multiprocessor-development Process, Real time operating system.

Essential Readings:

1. R. Kamal; *EMBEDDED SYSTEMS Architecture, Programming and Design;* Tata McGraw-Hill Publishing Company Limited; 2003.
2. M.A. Mazdi & J.G. Mazdi; *The 8051 Microcontroller and Embedded System,* Pearson Education India, 2005.

Reference Readings:

1. K J Ayala; *The 8051 Microcontroller Architecture, Programming and Application*; Penram International Publishing (India), 2004.
2. T. D Morton; *Embedded Microcontrollers*; Pearson Education, India; 2003.