Automatic Control System (EC- 505)

1 Introduction :

open loop and closed loop control systems,feedback characteristics of control systems, Mathematical Representation of physical systems Electrical, Mechanical,Hydraulic, Thermal systems, Block diagram algebra and signal flow graphs, Mason's gain formula.

2Time domain analysis:

Standard Test Signals, Time response of First, Second and Higher order systems, Performance Indices. Error Analysis: Static and Dynamic Error Coefficients, Effect of adding poles and zeroes to the system, response of P, PI, and PID controllers.

3 Concept of Stability:

Concept of stability, Asymptotic and conditional stability, Routh Hurwitz Criterion, Root Locus technique (Concept and construction) Frequency Response Analysis: Correlation between time and frequency response, polar and Inverse polar plots, Nyquist stability criterion, Bode plots, All pass and minimum phase systems, M and N circle.

4 Design through compensation techniques:

Realization of lag, lead and lag-lead compensators, Design of closed loop control system using root locus and Bode plot Compensation

5 Stable Variable Analysis:

Introduction, State space representation, State modes of linear systems, State equations, transfer matrices, diagonalization solution of state equations, controllability and observability, effect of pole zero cancellation in transfer function.

6 Advances in Control Systems:

Basic Introduction to Neuralv Networks and Fuzzy logic control.

Text Books:

1. I J Nagrath & M Gopal, Control System Engineering; New Age International publishers.

Reference Books:

1. B C Kuo, Automatic Control Systems; PHI

2. Norman S Nise, Control System Engineering;John Wiley & Sons, Singapore

3. Dr D Ganesh Rao, Control System; Sanguine Technical Publisher, Bangalore

4. K Ogata, Modern Control Engineering; PHI.

Analog Integrated Circuits (EC-502)

1 IC OP-AMP applications:
OP-AMP Fundamentals (brief review of
differential amplifier, current mirror, active load, level shifter, output stage; ac and dc characteristics) Basic building blocks using OP-AMPS. Inverting/Non-inverting VCVS, Integrators, Differentiators, CCVS and VCCS, Instrumentation Amplifiers.

2 Waveform Generator:
Square wave generators: 555Timer, Crystal controlled Oscillator
Ramp Generator: Triangle generator, Sawtooth generator
Sine wave generator: Requirement for sinusoidal oscillations, Wien-bridge and twin-T oscillators.
Function Generators: Multi op-amp function generators, IC function generators
Digitally controlled frequency synthesizer: PLL Fundamentals, PLL synthesizer, Totally digital synthesizer.

3 Active Filters:
Introduction to filtering: Frequency response, Characteristics and terminology, Active versus passive filters
Low pass filter: First order low pass active filter, second order active filter model, second order low pass filter characteristics, Sallen-Key unity gain filter, Sallen-Key equal component filter, Higher order filters.
High pass active filter.
Band pass filter: single op-amp band pass filter, multistage band pass filter
State variable filter

4 Non-linear Circuits:
Logarithmic Amplifiers, Log/Antilog Modules, Precision Rectifier, Peak Detector, Sample and Hold Circuits. OP-AMP as Comparator, Schmitt Trigger, Square and Triangular Wave Generator, Monostable Multivibrator.
IC Analog Multiplier applications
OTA

5 Voltage Regulators:
OP-AMP Regulators, IC Regulators, Fixed Voltage
Regulators (78/79, XX), SMPS.

Antenna and Wave Propagation (EC-504)

1. **Antenna Principles**:

Potential Functions & Electromagnetic Field, Current Elements, Radiation from Monopole & Half Wave Dipole, power radiated by current element, radiation resistance.

Network Theorems:Directional Properties of Dipole Antenna. Antenna Gain, Effective Area, Antenna Terminal Impedance, Practical Antennas and Methods of Excitation, Antenna Temperature and Signal to Noise Ratio.

2. **Antennas Arrays**:

Two Element Array, Horizontal Patterns in Broadcast Arrays, Linear Arrays, Multiplication of patterns, effect of the earth on vertical patterns, Binomial array.

3. **Wave Propagation**:

Modes of Propagation, Plane Earth Reflection, Space wave and Surface Wave, Refelection and refraction waves by the Ionosphere Tropospheric Wave. Ionosphere Wave Propagation in the Ionosphere, Virtual Height, MUF Critical frequency, Skip Distance, Duct Propagation, Space wave

4. Practical antennas:

VLF and LF transmitting antennas, effect of antenna height, Field of short dipole, electric field of small loop antenna, Directivity of circular loop antenna with uniform current, Yagi-Uda array: Square corner yagi-uda hybride, circular polarization Rhombic Antenna: Weight and Leg length Parabolic Reflectors: Properties, Comparison with corner reflectors Horn Antenna: Length and Aperture. Introduction to Turstile Antenna Effect of ground on antenna performance. Broadband Antenna: Frequency independent concept, RUMSEY's Principle, Frequency independent planar log spiral antenna, Frequency independent planar log spiral antenna,frequency independent conical log antenna

5. Antenna Measurements:

Radiation Pattern measurement, Distance requirement for uniform phase, uniform field amplitude requirement, Introduction to phase measurement; Gain Measurement: Comparison method, Near field method, Introduction to current distribution measurement, Measurement of antenna efficiency, measurement of Noise figure and noise temperature of an antenna polarization measurement.

Text Books:

1. Jordan Edwards C. and Balmain Keith G./ "Electromagnetic Waves and Radiating Systems"/ Prentice Hall (India)

2. Kraus, John D. & Mashefka, Ronald J. / "Antennas: For All Applications" / Tata McGraw Hill, 3rd Ed.

Reference Books:

1. Prasad, K.D./ "Antennas and Wave Propagation"/ Khanna Publications

2. Collin, R. / "Antennas and Radiowave Propagation" / Tata McGraw-Hill

3. Hayt Jr. William H./ "Engineering Electromagnetics "/ Tata McGraw-Hill

Microprocessors and Applications (TEC- 503)

1 Introduction to Microprocessors:
Evolution of Microprocessors, History of computers, Timing and control, memory devices: semiconductor memory organization, Category of memory, 8-bit Microprocessor (8085): Architecture, Instruction set, Addressing modes, Assembly Language Programming.

2 16-bit Microprocessors (8086/8088):
Architecture, Physical asegmentation, memory organization, Bus cycle, Addressing modes, difference between 8086 and 8088, Introduction to 80186 and 80286, Assembly Language Programming of 8086/8088.

3 Data Transfer Schemes:
Introduction, Types of transmission, 8257 (DMA), 8255 (PPI), Serial Data transfer (USART 8251), Keyboard-display controller (8279), Programmable Priority Controller (8259)

4 Programmable Interval Timer/ Counter (8253/8254):
Introduction, modes, Interfacing of 8253, applications. ADC and DAC: Introduction, DAC memthodes, ADC converters, Types of ADC, ADC IC (0808/0809, DAC and ADC Interfacing and Applications.

5 Advanced Microprocessors:
Introduction to 32-bit and 64-bit microprocessors, PowerPC, Microcontroller (8051): Introduction, Architecture, Instruction set.

Text Books

1. R. Singh and B. P. Singh : Microprocessor Interfacing and Application, New Age International Publishers, 2nd Edition.

2. B.P. Singh and R. Singh : Advanced Microprocessor and Microcontrollers, New Age International Publishers, 2nd Edition.

Reference Books

1. D. V. Hall : Microprocessors Interfacing, TMH (2nd Edition).
2. R. S. Gaunkar: Microprocessor Architecture, Programming and Applications with 8085/8080, Penram Publication
3. Y.C. Liu and G.A. Gibson : Microcomputer Systems: The 8086/8088 Family Architecture Programming and Design, PHI 2nd Edition,ddress, 2//2 10