101908/CO900F BASICS OF ELECTRICAL &ELECTRONICS ENGINEERING

Course Contents and Lecture Schedule

No	Topic	No. of Lectures
1	**Elementary Concepts of Electric Circuits (8 hours)**	
1.1	Elementary concepts of DC electric circuits	
	Basic Terminology including voltage, current, power, resistance, emf; Resistances in series and parallel; Current and Voltage Division Rules; Capacitors & Inductors: V-I relations and energy stored.	1
	Ohms Law and Kirchhoff's laws-Problems;	2
	Star-delta conversion (resistive networks only-derivation not required) - problems.	1
1.2	Analysis of DC electric circuits	
	Basic Network Terminology including network element, branch, junction point, node, mesh, loop. Mesh current method - Matrix representation - Solution of network equations.	1
	Node voltage methods-matrix representation-solution of network equations by matrix methods.	1
	Numerical problems.	2
2	**Elementary Concepts of Magnetic circuits, Electromagnetic Induction and AC fundamentals (8 hours)**	
2.1	Magnetic Circuits	
	Basic Terminology: MMF, field strength, flux density, reluctance - comparison between electric and magnetic circuits	1
	Numerical problems on series magnetic circuits.	2

2.2	Electromagnetic Induction	
	Faraday's laws, problems, Lenz's law- statically induced and dynamically induced emfs	1
	Self-inductance and mutual inductance, coefficient of coupling	2
2.3	Alternating Current fundamentals	
	Generation of alternating voltages- Representation of sinusoidal waveforms: frequency, period, Average, RMS values and form factor of periodic waveforms (sinusoidal) -Numerical Problems.	2
3	**AC Circuits (8 hours)**	
3.1	AC Circuits	
	Phasor representation of sinusoidal quantities. Trigonometric, Rectangular, Polar and complex forms.	1
	Analysis of simple AC circuits: Purely resistive, inductive & capacitive circuits; Inductive and capacitive reactance, concept of impedance. Average Power, Power factor.	2
	Analysis of RL, RC and RLC series circuits-active, reactive and apparent power.	1
	Simple numerical problems.	2
3.2	Three Phase AC Systems	
	Generation of three phase voltages; advantages of three phase systems. Power generation, transmission and distribution-one line diagram.	2
4	**Introduction to Semiconductor devices (8 hours)**	
4.1	Evolution of electronics – Vacuum tubes to nano electronics (In evolutional perspective only).	1
4.2	Resistors, Capacitors and Inductors: types, specifications, standard values, color coding (No constructional features).	2

4.3	PN Junction diode – Principle of operation, V-I characteristics, principle of avalanche breakdown.	2
4.4	Bipolar Junction Transistors – PNP and NPN structures, Principle of operation, relation between current gains in CE, CB and CC, input and output characteristics of common emitter configuration	3
5	**Basic electronic circuits and instrumentation (9 hours)**	
5.1	Rectifiers and power supplies – Block diagram description of a dc power supply. Working of half wave rectifier, full wave bridge rectifier, capacitor filter (no analysis). Working of simple zener voltage regulator	3
5.2	Amplifiers – Block diagram of Public Address system. Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response, Concept of voltage divider biasing.	4
5.3	Electronic Instrumentation – Block diagram of an electronic instrumentation system.	2
6	**Introduction to Communication Systems (7 hours)**	
6.1	Evolution of communication systems – Telegraphy to 5G.	1
6.2	Radio communication –Principle of AM & FM, frequency bands used for various communication systems, block diagram of super heterodyne receiver.	4
6.3	Mobile communication –Basic principles of cellular communications, principle and block diagram of GSM.	2