

100908/CO900F Basics of Electrical & Electronics Engineering

Course Contents and Course Plan

No	Topic	No. of Lectures
1	Module 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	
	Mesh current method - Matrix representation - Solution of network equations.	2
	Node voltage methods-matrix representation-solution of network equations by matrix methods.	1
	Numerical problems.	1
2	Module 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
	Series and parallel magnetic circuits with composite materials, numerical problems.	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 waveforms-Numerical Problems.	2
3	Module 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, star and delta connections (balanced only), relation between line and phase voltages, line and phase currents- Numerical problems.	2
4	Module 4 : Introduction to Semiconductor devices (8 hours)	
4.1	Evolution of electronics – Vacuum tubes to nano electronics (In evolutionary 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	Module 5 : Basic Electronic Circuits And Instrumentation(9hours)	
5.1	Rectifiers and power supplies: Block diagram description of a dc power supply, Working of a 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	Module 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, Principle of antenna – radiation from accelerated charge	4
6.3	Mobile communication: basic principles of cellular communications, principle and block diagram of GSM.	2