4136 - CIRCUITS AND NETWORKS

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)			
					Theory		Practical Ex.	Total
Lectures	Practical	Credits						
4	2	6	25	25	3 Hrs.	100	50	200

Pre-requisite	Source
1003	EXN

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	25	–	125

Rationale: It is necessary to be able to analyse & understand electric circuits. This course begins with different theorems and techniques desired to analyse electric circuits. The behaviour of circuits under steady state, transient and resonance is also dealt with. Introduction to networks and its applications is also covered.

COURSE CONTENT	Hrs	Mks
1. BASIC CONCEPTS Meaning of Voltage, Current AC/DC, resistance, inductance, capacitance, concept of mesh, loop, node, port, lumped and distributed parameters, active and passive elements, series and parallel circuits, voltage and current sources.	8	10
2. NETWORK THEOREMS Statement, explanation of Kirchoff's Voltage and current laws, Thevenin's theorem, Norton's Theorem, Superposition theorem, maximum power transfer theorem. Application of above theorems in reduction and analysis of resistive network. DC mesh and node analysis of resistive circuits using determinants, Star/Delta and Delta/star transformation. Simple problems.	19	30
3. AC CIRCUITS AND RESONANCE Phasor algebra, application of above theorems to AC Circuits- RL, RC, and RlC circuits. Concept of active and reactive power. Resonance in series RLC circuits, graphical representation, Bandwidth, Q factor, Simple problems based on the above.	16	25
4. TRANSIENTS Concept of transient response, single order, differential equations and their solution, transients in simple RC and RL circuits,(dc), time constant, RC integrator, differentiator, low pass filters. Simple examples.	8	15
5. NETWORKS AND THEIR APPLICATIONS Definition of following terms- symmetrical, T,π, lattice, bridge T, open circuit and short circuit impedance, characteristic impedance, iterative and image impedance, propagation constant, attenuation and phase constant. Equivalent Symmetrical T to π, π to T, Bridge T to T or π conversion, Lattice to T and π. Function of filter, attenuator, equalizers and their application, classifications of filters based on frequency (no mathematical treatment), meaning of decibel, neper and relation between them. Design formulae for symmetrical attenuator circuits. Attenuations and Frequency characteristics of filters, attenuators, equalizer, Design formulace for constant R type filters (no derivations), simple design problems, on attenuation and filters.	13	20
Total	64	1

PRACTICALS:

Any 8 experiments from the following	(No. of turns)
1. Verification of Ohm's law, its application to series and parallel circuits	(2)
2. Verification of Kirchoffs voltage law and current law.	(2)
3. Verification of Superposition theorem	(1)
4. Verification of maximum power transfer theorem	(1)
5. Verification of Thevenin and Nortons theorems	(2)
6. Study of RLC series resonance circuit	(1)
7. To practically obtain characteristics impedance of 4 different symmetrical networks and verify the definition of characteristics impedance	(3)
8. Design, assemble and test simple attenuator circuit (Any 2 types	(2)
9. Design, assemble and test prototype filter (low pass).	(1)
10. Design, assemble and test prototype filter (high pass)	(1)
11. RC transient and time constant (charging and discharging).	(1)
12. RC integrator and differentiator	(3)

REFERENCE BOOKS:

1. Electronic Circuits by Schaum Series
2. Basic Electrical Engineering Vol.1 by B. L. Theraja.
3. HandBook of lines Communication by Royal Signals.
4. Electronic Circuits by Schaum Series.