LEVEL IV COURSES

4104 – CIRCUIT THEORY

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)			
Lectures	Practical	Credits			Theory		Practical Ex.	Total
4	2	6	25	25	3 Hrs	100	-	150

Pre-requisite	Source
1005	ELL

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

Rationale: This subject will enable a student to analyse a circuit for current, voltage, power in each of its branches for phase 1 and for 3 phase system as well as measure the circuit parameters such as resistance, reactance, impedance and admittance. The student understands the concept of resonance and the various properties of resonant circuit. The student is also acquainted with the concept of transients in D.C. only.

COURSE CONTENTS	Hrs.	Mks.
1. INTRODUCTION TO NETWORK Concept of linear, bilateral circuit elements, practical voltage and current source and their conversion, Kirchoff's law: Statement and application Mesh and nodal analysis, Network Theorem Thevenin's, Norton's, Superposition, maximum power transfer theorem, statement and application to D.C. circuit only, Conversion of star to delta and delta to star network.	10	20
2. A. C SINGLE PHASE CIRCUIT Relationship between current, voltage and power in case of pure resistance, pure inductance and pure capacitance in A.C. circuit. Concept of reactance, Impedance and impedance triangle, Analysis of single phase series circuit R - L, R-C and R-L-C in series, drawing phasor diagram (both opponent and vector method of analysis), Analysis of R-L-C parallel circuits.	16	20
3. RESONANT CIRCUIT Concept of resonance in circuit, definition of resonant frequency. Q factor, bandwidth, Calculation of resonant frequency, Q factor and band-width for series and parallel circuit.	10	16
4. A. C BRIDGE CIRCUIT General equation for bridge balance for Maxwell' s Hay's, Desauty's, Wien and measurement of L, C, R and Q with above bridges. (No derivation)	6	12
5. POLY PHASE CIRCUIT Calculation of phase and line current and voltage for star and delta connected balance loads, drawing phasor diagram. Calculation of active and reactive power.	12	16
6. UNBALANCED 3 PHASE SYSTEM Symmetrical components, voltage and current, graphical composition of sequence vector, evaluation of components.	8	12
7. TRANSIENTS IN D.C Introduction to transients in D.C. Types of transients, transient in R-L, R-C in D.C.circuits.	2	4
Total	64	100

LIST OF EXPERIMENTS:

1. Verification of Kirchoff's law in d.c. circuit. (2 turns).
2. Verification of Thevenin's Theorem in d.c. circuit. (2 turns).

3. Verification of Superposition theorem.(2 turns)
4. Measurement of voltage current and d.c. resistance in a R-L circuit and determination of resistance and inductance.
5. Study of effect of addition of capacitance in R-L circuit on current, & p.f.
6. Study of effect on line current (a.c.) in star/delta connection of 3 resistance.
7. Determination of resistance & inductance of a given R-L load by measurement of voltage, current and p.f.
8. Connection and measurement of current drawn, power consumed and voltage drop in each element of a 2 branch parallel circuit.
9. Design assembly and testing of a series resonant circuit.(2 turns)
10. To plot charging & discharging curve of R-C circuit.
11. Analysis of bridges (Measurement of L C R & Q using bridges) (2 turns).

REFERENCE BOOKS:

1. A Course in Electrical Circuit by Soni Gupta.
2. Electrical Technology by B.L.Theraja. Vol I.
3. Principles of Electrical Engg. by Vicent Deltero Prentice Hall of India.