

Subject Code: 1ET4030301	Subject Title: A.C Circuit
Pre-Requisite	--

RATIONALE:

Most of electrical power generation, transmission, distribution and utilization are in the form of alternating current. Therefore it is essential for every electrical engineer to know the behavior of resistance, capacitance, inductance and related concepts in AC systems.

This course is not only a prerequisite to learn the advanced electrical courses and develop the skills but also enable the students to apply the principle of ac circuits to troubleshoot electrical circuits in industries/Power System. This is one of the most important core engineering courses for electrical engineers and hence students should try to develop mastery over concepts of AC circuits for effective working as an electrical engineer

COURSE OBJECTIVE:

The course content should be taught and implemented with an aim to develop different skills

1. To study concept of AC system.
2. To understand behavior of basic parameters when they connected in series as well as parallel.
3. To study about three phase star and delta connection.
4. To able to measure power in AC circuits.
5. To Understand importance of power factor.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment
3	1	2	5	60	40	20	30

DETAILS OF COURSE CONTENTS:

Sr No	Topics and Sub-topics	Total Hours	% Weightage
1	A.C Fundamentals 1.1 Advantages of AC system over DC system 1.2 Principle of generating an alternating voltage 1.3 Cycle, Time period, Frequency, Amplitude, Phase and Phase difference, Average value, R.M.S. value, Form factor, Peak Factor and Power Factor 1.4 Vector representation of alternating quantities,	10	20

	addition, subtraction, multiplication and division		
2	A.C SERIES CIRCUITS 2.1 Waveforms, phasor diagram and expression of voltage, current and power in pure: Resistance, Inductance, Capacitance 2.2 AC through RL, RC, LC, RLC series circuit 2.3 Impedance Triangle and Quality Factor. 2.4 Resonant frequency and Resonance condition in RLC series circuit 2.5 Numerical based on series circuits.	10	25
3	A.C PARALLEL CIRCUITS 3.1 Solution of AC RL, RC, LC and RLC parallel circuits using phasor method. 3.2 Solution of AC RL, RC, LC and RLC parallel circuits using admittance method. 3.3 Resonant frequency and resonance condition in parallel AC circuits 3.4 Numerical based on AC parallel circuits and parallel resonance.	08	25
4	POLY PHASE CIRCUITS 4.1 Principle of generation of three phase alternating voltage. 4.2 Single and three phase circuits 4.3 Line and phase voltage, line and phase current 4.4 Three-phase star connection 4.5 Three phase delta connection	08	20
5	POWER IN A.C CIRCUITS 5.1 Active, reactive and apparent power with examples. 5.2 Lagging, leading power and unity power factor 5.3 Effects of poor power factor.	06	10

COURSE OUTCOME:

The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the following competencies and course learning outcomes:

1. Understand the of concept of AC system.
2. Understand behavior of basic parameters when they connected in series as well as parallel.

3. Understand the three phase connection.
4. Understand importance of power factor.

LIST OF PRACTICAL:

- 1 Use CRO to measure peak value, RMS value, Period and frequency of alternating quantity.
- 2 Measure of inductance and resistance of choke coil and also the active power through resistor.
- 3 Measure voltage, current, power and power factor in a series RL circuit with relevant phasor diagram.
- 4 Measure voltage, current, power and power factor in a series RC circuit with relevant phasor diagram.
- 5 Measure voltage, current, power and power factor in a series RLC circuit with relevant phasor diagram.
- 6 Measure voltage, current, power and power factor in a RL parallel circuit with relevant phasor diagram.
- 7 Measure voltage, current, power and power factor in a RC parallel circuit with relevant phasor diagram.
- 8 Measure voltage, current, power and power factor in a RLC parallel circuit with relevant phasor diagram.
- 9 Measure voltage, current, power and power factor for combined series-parallel circuits
- 10 Measure resonance frequency and resonant impedance in RLC series circuit.
- 11 Test voltage and current relation for 3 phase star and delta connections.
- 12 Measure active and reactive power of three phase circuits.

LIST OF REFERENCES:

1. B.L.Thereja, Electrical Technology, Volume-1
2. J.B.Gupta, Fundamentals of Electrical Engineering
3. U.A Patel, Elements of Electrical & Electronics Engineering.
4. www.kpsec.freeuk.com
5. www.google.com