GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Diploma Engineering				Branch	Electrical Engineering		
Semester	III				Version	1.0.0.0		
Effective from Academic Year			2019-20		Effective for the batch Admitted in			June 2018
Subject code	1EE2301		Subject Name		AC CIRCUITS			
Teaching scheme					Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	2	0	5	Theory	40	60	100
Hours	3	0	4	0	7	Practical	60	40	100

Pre-requisites:
None

Course Learning Outcomes:
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: T1. To study concept of AC system. T2. To understand behavior of basic parameters when they connected in series as well as parallel. T3. To study about three phase star and delta connection. T4. Able to measure power in AC circuits. T5. Understand importance of power factor. The practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate course learning outcomes.

Course Content				
Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
UNIT – 1 AC Fundamentals	1a. Advantages of AC system over DC system 1b. Principle of generating an alternating voltage 1c. Cycle, Time period, Frequency, Amplitude, Phase and Phase difference, Average value, R.M.S. value, Form factor, Peak Factor and Power Factor 1d. Vector representation of alternating quantities, addition, subtraction, multiplication and division	1.1 Advantages of AC system over DC system 1.2 Generation of an alternating voltage 1.3 Various terms regarding ac waveform 1.4 Vector representation of alternating quantities & mathematical operations	12	08

UNIT – 2 AC Series circuits	2a. Waveforms, phasor diagram and expression of voltage, current and power in pure Resistance, Inductance, Capacitance 2b. Impedance triangle and quality factor 2c. AC through RL, RC, LC, RLC series circuit 2d. Resonant frequency and Resonance condition in RLC series circuit	2.1 Pure resistive, inductive and capacitive circuits. 2.2 Impedance triangle and quality factor 2.3 RL, RC, LC, RLC ac series circuit 2.4 Resonance in RLC AC series circuit	16	12
UNIT – 3 AC Parallel Circuits	3a. Behaviour of AC voltage, current and power through RL, RC and RLC parallel circuit. 3b. Resonance in RLC parallel circuit. 3c. Numerical based on AC parallel circuit and parallel resonance 3d. Differentiate between Series and parallel resonance.	3.1 Solution of AC RL, RC, LC and RLC parallel circuits using Phasor method, admittance method and complex algebra method. 3.2 Resonance in RLC AC parallel circuits 3.3 Examples based on AC parallel circuits and parallel resonance. 3.4 Comparison between series and parallel resonance.	14	10
UNIT – 4 Poly phase circuits	4a. Advantages of three phase system over single phase system. 4b. Generation of three phase alternating voltage. 4c. Line and phase voltage, line and phase currents in 3- phase AC circuits 4d. Star and delta connection with phasor diagrams	4.1 Advantages of three phase system over single phase system. 4.2 Generation of three phase AC voltage. 4.3 Line and phase voltage, line and phase current 4.4 Three-phase star and delta connection	10	08
UNIT – 5 Power in AC Circuits	5a. Concept of active power, reactive power and power factor with power triangle 5b. Concept of lag and lead 5c. Effects of power factor 5d. Power factor improvement 5e. Methods of power measurement	5.1 Components of Power triangle 5.2 Lagging, leading and unity power factor 5.3 Effects & causes of poor power factor. 5.4 Methods of improving power factor. 5.5 Measurement of power in three phase circuit	08	07

List of Practical

No.	Unit	Name of Practical
1	I	Use CRO to measure peak value, RMS value, Period and frequency of alternating quantity.
2	II	Measure of inductance and resistance of choke coil and also the active power through resistor
3	II	Measure voltage, current, power and power factor in a series RL circuit with relevant phasor diagram.
4	II	Measure voltage, current, power and power factor in a seriesRC circuit with relevant phasor diagram.
5	II	Measure voltage, current, power and power factor in a seriesRLC circuit with relevant phasor diagram.
6	III	Measure voltage, current, power and power factor in a RL parallel circuit with relevant phasor diagram.
7	III	Measure voltage, current, power and power factor in a RC parallel circuit with relevant phasor diagram.
8	III	Measure voltage, current, power and power factor in a RLC parallel circuit with relevant phasor diagram.
9	III	Measure voltage, current, power and power factor for combined series-parallel circuits
10	III	Identify of electrical components (R, L, C) using high frequency generator.
11	III	Measure resonance frequency and resonant impedance in RLC series circuit.
12	IV	Test voltage and current relation for 3 phase star and delta connections.
13	V	Measure active and reactive power of three phase circuits.

List of Instruments/Equipment/TrainerBoard	
1	Ammeter: 0A-1A/0A-5A/0A-10A
2	Voltmeter: 0V-50V/0V-150V/0V-300V/0V-500V
3	Wattmeter: 0-1000W(5A/10A,300V/600V)
4	Multimeter
5	CRO
6	Choke coil: 0- 80 mH, variable choke coil
7	Single phase variac : 0-300V/ 1KVA

List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	Electrical Technology Vol-1	Theraja, B. L	S. Chand, New Delhi, 2011 or latest
2	Principles of Electrical Engineering	Gupta, B. R.	S. K. Kataria & Sons, New Delhi, 2011 or latest

Link of Learning Web Resource	
1	Electronic Work bench or Circuit maker
2	www. kpsec.freeuk.com
3	www.google.com