



Semester – II

Subject Name: AC. Circuit

Subject Code: 09EE1104

Diploma Branches in which this subject is offered: Electrical Engineering

Objective: This is one of the important electrical engineering core subject. After studying this students should be able to understand the basic concept of A.C. circuits for highly effectively working as a skilled electrical engineer. This subject teach to students apply the principle of A.C. circuit; solve the problem of electrical industry and electric network. Basically electrical engineering dividedly power generation, transmission, distribution and utilization in form of A.C. so every electrical engineer should know basic concept of A.C. system. To solve the given problem by using the knowledge of fundamental concept of series circuit, parallel circuit and poly-phase circuits. To analyse and measure various type of powers in terms of power factor using watt meters.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, student will be able

1. To understand various parameters of AC circuit
2. To apply the principle of AC circuits to maintain electrical network.
3. To describe quantitative comparison between AC and DC system, single phase and three phase system.
4. To analyse series and parallel RLC circuit.
5. To understand comparison between series and parallel circuit.
6. To analyse and understand single phase and three phase AC circuit.
7. To analyse and measure various type of powers and power factor.

Pre-requisite of course: Basic knowledge of physics and D.C. Circuits.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
2	0	4	4	50	30	20	25	25	150



Contents:

Unit	Topics	Contact hours	Weightage (%)
1	Fundamentals of AC circuit <ul style="list-style-type: none">• Introduction• Comparison of AC and DC• Advantage of AC system over DC system• Definition related to AC• Generation of alternating EMF• Equation of alternating EMF• Waveform of alternating EMF• Basic alternator• RMS value• Mean value or Average value• Form factor• Different form of alternating voltage and current• Peak factor or crest factor• Phasor representation of alternating quantity• Phase of alternating quantity, phase and phase difference• Addition and subtraction of alternating quantities• Mathematical representation of phasors• Mathematical operation of vector	07	23
2	Analysis AC series circuit <ul style="list-style-type: none">• Introduction• Purely resistive AC circuit• Purely inductive AC circuit• Purely capacitive AC circuit• AC circuit with series elements• RL series circuit• RC series circuit• LC series circuit• Power factor, power triangle, impedance triangle, active and reactive components• Q factor of coil• RLC series circuit	08	27
3	Analysis AC parallel circuit <ul style="list-style-type: none">• Introduction• Method of solving parallel circuit• Phasor algebra method• Admittance method• Complex algebra method• Series-parallel circuit• Comparison between series and parallel circuit	06	20



4	<p>Three phase AC circuits</p> <ul style="list-style-type: none"> • Introduction • Advantages of three phase system over single phase system • Generation of three phase EMF and its waveform • Term related to three phase AC system • Numbering of phase • Balance supply and balance load • Interconnection of three phase • Concept of line value and phase value • Star connection • Delta connection • Introduction of Generation of six phase supply 	05	17
5	<p>AC power analysis</p> <ul style="list-style-type: none"> • Introduction • Power triangle, complex power • Power and power factor • Methods of improving power factor • Advantages of power factor improvement • Causes of low power factor • Disadvantage of low power factor • Measurement of single phase power • Measurement of three phase power • Various methods of measurement of power in three phase AC circuit • Measurement of reactive power 	04	13

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
35%	40%	15%	10%	0%	0%



Suggested List of Experiments:

Sr. No.	Unit No.	Name of Topics	Contact Hours
1	1	To determine basic terminology of alternating waveform using DSO.	4
2	1	To study basic function of electrical measuring instruments to measure electrical parameters	4
3	2	To determine inductance and resistance of inductive load and find active power flow through resistor.	2
4	2	Determination of parameter in series RL circuit with relevant phasor diagram.	2
5	2	Determination of parameter in series RC circuit with relevant phasor diagram.	2
6	2	Determination of parameter in series RLC circuit with relevant phasor diagram.	2
7	3	Determination of parameter in parallel RL circuit with relevant phasor diagram.	2
8	3	Determination of parameter in parallel RC circuit with relevant phasor diagram.	2
9	3	Determination of parameter in parallel RLC circuit with relevant phasor diagram.	2
10	3	To measure parameter for series-parallel circuit.	4
11	4	To measure phase and line quantity relationship in star and delta connection in a three phase system.	2
12	5	To study various power factor improvement techniques and measure improved power factor.	4
13	5	Determination of power in three phase balanced circuit using two watt meter and three watt meter method.	4
14	5	Determination of power in three phase unbalanced circuit using watt meter.	4



Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

References:

1. B. L. Theraja, "A Text Book of Electrical Technology Vol-I", S. Chand & Co. Ltd., 2014
2. Tarlok Singh, "Fundamental of Electrical Engineering", S. K. Kataria & Sons, 2012
3. D.P. Kothari and I.J. Nagrath, "Theory and Problem in Basic Electrical Engineering", Prentice Hall India, 2012.
4. S.K. Sahdev, "Fundamentals of Electrical Engineering & Electronics", Dhanpat Rai & Co. LTD., 2014
5. U. A. Bakshi & V. U. Bakshi, "Basic Electrical Engineering", Technical Publication Pune, 2012
6. U. A. Patel, "Elements of Electrical Engineering", Atul Prakashan, 2016
7. V.N. Mittal, "Basic Electrical Engineering". Tata-McGraw-Hill, 2nd edition, 2006.

Supplementary Resources:

1. <http://nptel.ac.in/courses/108108076/>
2. <http://nptel.ac.in/downloads/108105053/>
3. <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/video-lectures/>
4. <https://www.facstaff.bucknell.edu/mastascu/eLessonsHTML/EEIndex.html>
5. <http://www.electrical4u.com/nature-of-electricity/>
6. <http://vlab.amrita.edu/index.php>