

Program: Diploma in Electrical & Electronics Engineering	
Course Code: 3033	Course Title: Fundamentals of Electric Circuits
Semester : 3	Credits: 4
Course Category: Program Core	
Periods per week: 4 (L:3 T:1 P:0)	Periods per semester: 60

Course Objectives:

- To understand the concepts of dc and ac circuits.
- To familiarize dc and ac circuit fundamentals in electrical systems.
- To know the single-phase and three-phase interconnections.

Course Prerequisites:

Topic	Course code	Course name	Semester
Basics of Electric Circuits		Fundamentals of Electrical & Electronics Engineering	2
Electromagnetism & Electrostatics		Elementary concepts of Electrical systems	2

Course Outcomes:

On completion of the course, the students will be able to:

CO _n	Description	Duration (Hours)	Cognitive Level
CO1	Apply various network theorems to compute circuit parameters	15	Applying
CO2	Solve circuit parameters in series ac circuits for different loads	14	Applying
CO3	Solve the circuit parameters in ac series-parallel circuits	14	Applying
CO4	Identify various three-phase interconnections and powers in balanced systems	15	Applying
	Series Test	2	

CO – PO Mapping

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO1	3						
CO2	3						
CO3	3						
CO4	3						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline

Module Outcome	Description	Duration (Hours)	Cognitive Level
CO1	Apply various network theorems to compute circuit parameters.		
M1.01	List and define various types of networks and parameters.	2	Remembering
M1.02	Explain the statement of various network theorems.	2	Understanding
M1.03	Explain the procedure to solve various network theorems.	3	Understanding
M1.04	Apply various network theorems to compute the unknown quantities in a network.	8	Applying
Contents: Basic terms related to network theorems -types of network and parameters -statement-procedure-Superposition theorem- Thevenin's theorem-Norton's theorem-Maximum power transfer theorem - Reciprocity theorem - problems (circuits with maximum three loops only)			
CO2	Solve circuit parameters in series ac circuits for different loads		
M2.01	Illustrate ac through pure resistance, capacitive and inductive circuits	3	Understanding
M2.02	Explain ac through R-L, R-C and R-L-C series circuits	3	Understanding
M2.03	Solve various parameters in series ac circuits.	5	Applying
M2.04	Explain resonance and Q-factor in series circuit and solve problems	3	Applying

	Series Test – I	1	
Contents: Mathematical representation of vectors - polar form - Rectangular form- Complex form - trigonometric form - conversion from polar form to rectangular form and vice versa – problems - Addition, subtraction, multiplication and division of alternating quantities in these forms - problems AC through pure R, L, and C - phasor diagrams- derivation of power AC through R - L, R - C, and R – L - C circuits – phasor and impedance diagrams - power factor -various powers - derivation – units - active power - reactive power - apparent power - problems Resonance in R-L-C series circuits- derivation of resonance frequency - definitions - equations – Q - factor – bandwidth - problems.			
CO3	Solve the circuit parameters in ac series-parallel circuits		
M3.01	Explain ac through R-L-C series-parallel circuits.	3	Understanding
M3.02	Illustrate vector and admittance methods to solve circuit parameters.	3	Understanding
M3.03	Solve the circuit parameters in ac parallel circuits.	5	Applying
M3.04	Summarize the resonance in ac parallel circuit.	3	Understanding
Contents: AC through R-L-C parallel circuits-R-L-C series parallel circuits – phasor diagrams Vector and admittance methods- example problems Powers -equations- active power-reactive power- apparent power -power factor-problems Resonance in R-L-C parallel circuits -basic concept -definitions - equations -resonance frequency-Q-factor –bandwidth - problems.			
CO4	Identify various three-phase interconnections and powers in balanced systems		
M4.01	Illustrate generation of three-phase ac voltages	2	Understanding
M4.02	Compare line and phase quantities in balanced star and delta connections	3	Understanding
M4.03	Outline the balanced Star and Delta conversions and solve problems	5	Applying
M4.04	Solve various powers in balanced three-phase systems	5	Applying
	Series Test – II	1	

Contents:

Generation of three phase ac voltages - principle - diagram-working - voltage equations- phasor diagram - waveforms -phase sequence -advantages of three phase systems

Three phase Interconnections - star-delta - relation between phase and line quantities(vector diagram and derivation needed)-problems

Conversions of balanced three phase systems - Star/Delta and Delta/star (Equations of equivalent values and problems only)

Three phase powers - active, reactive and apparent powers in balanced star and delta systems. (derivation needed) - problems.

Text / Reference:

T/R	Book Title/Author
T1	Theraja, B. L.: Theraja, A. K.; A Text Book of Electrical Technology Vol-I, S. Chand & Co. Ramnagar, New Delhi, ISBN: 9788121924405
R1	Mittle, V.N.; Mittle, Arvind; Basic Electrical Engineering, McGraw Hill Education, Noida, ISBN: 978-00-705-9357-29.
R2	Saxena, S.B Lal; Dasgupta, K; Fundamentals of Electrical Engineering, Cambridge University Press Pvt. Ltd., New Delhi, ISBN: 978-11-0746-435-34
R3	Gupta, B.R; Singhal, Vandana,; Fundamentals of Electrical Network, S.Chand and Co., New Delhi, ISBN : 978-81-219-2318-73.
R4	Sivanandam, S.N, Electric Circuit Analysis, Vikas Publishing House Pvt. Ltd, Noida, ISBN:97881259-1364-110

Online resources

Sl.No	Website Link
1	NPTELcourses: https://nptel.ac.in/courses/108/104/108104139
2	https://nptel.ac.in/courses/117/106/117106108
3	https://nptel.ac.in/courses/108/105/108105159
4	https://nptel.ac.in/courses/108/102/108102097
5	https://nptel.ac.in/courses/108/105/108105053
6	Virtual labs: https://www.vlab.co.in
7	www.swayam.gov.in
8	www.electrical4u.com
8	NPTEL channel: www.youtube.com/channel/UC640y4UvDAlya_WOj5U4pfA