SEMESTER S3

CIRCUITS & NETWORKS

Course Code	**PCEET302**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	3:1:0:0	**ESE Marks**	60
Credits	4	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	Introduction to Electrical Engineering	**Course Type**	Theory

Course Objectives:

1. This course analyses electrical circuits in steady-state and dynamic conditions with DC and sinusoidal excitations
2. It also describes the two-port networks in terms of various parameters.

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Mesh analysis and nodal analysis (Review only)- super mesh and super node - Superposition principle - source transformation – analysis with DC and AC (sinusoidal) excitation Thevenin's theorem - Norton's theorem - Maximum power transfer theorem - analysis with DC and AC (sinusoidal) excitation with independent and dependent sources. Reciprocity Theorem - application to the analysis of DC Circuits.	12
2	Resonance - series resonance– resonant frequency – variations of impedance and current with frequency – bandwidth – quality factor– parallel resonance (series RL in parallel with C –calculation of resonant frequency). Power in 3-phase circuits – complex power - active, reactive and apparent power in balanced load – steadystate analysis of 3-wire unbalanced delta connected circuit - steady state analysis of 3-phase 4-wire and 3-wire (using Millman's theorem only) unbalanced star connected circuit –neutral shift	12
3	Laplace transforms(Review only) Transient response of simple series and parallel RL and RC circuits with	12

	DC excitation and initial conditions – natural response and forced response – time constant - solution using Laplace transforms – transformed circuits in s-domain – solution using mesh analysis and nodal analysis Transient response of series RLC circuit with DC excitation and initial conditions – damping –overdamped, underdamped, critically damped and undamped - solution using Laplace transforms Transient response of simple series and parallel RL and RC circuits with sinusoidal excitation and zero initial conditions – solution using Laplace transforms	
4	Two port networks – Z, Y, h, T parameters – conditions for symmetry and reciprocity – relationship between parameters – interconnection of two port networks – series, parallel and cascade Coupled circuit – dot convention – fixing of dots – coefficient of coupling - conductively coupled equivalent circuit - sinusoidal steady state analysis of coupled circuits.	**9**

Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Apply circuit theorems to solve complex DC and AC electric networks	**K3**
CO2	Apply transformation from time domain to s-domain, solve dynamic electric circuits.	**K3**
CO3	Solve series and parallel resonant circuits	**K3**
CO4	Analyse three-phase networks in star and delta configurations under balanced and unbalanced conditions.	**K3**
CO5	Describe two-port networks in terms of various parameters.	**K3**
CO6	Explain the steady-state behaviour of coupled circuits with sinusoidal excitation	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										3
CO2	3	3										3
CO3	3	3										3
CO4	3	3										3
CO5	3	3										3
CO6	3	3										3

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Network Analysis	Van Valkenburg	Pearson	3rd 2019
2	Network Analysis and Synthesis	Ravish R Singh	McGraw Hill Education	2nd 2019
3	Electric Circuits & Networks	Suresh Kumar	Pearson	Ist 2008
4	Circuits and Networks, Analysis and Synthesis	A Sudhakar, Shyammohan S Palli	McGraw Hill Education	5th 2017