CO document

Course Name: Control System and Instrumentation (EC 601) 6th Semester; Electronics and Communication Engineering

TABLE-1

After completion of the course students will be able to-

Module	**Hr**	**Sub-Topic (from syllabus)**	**Instructional Learning Outcome(ILO) (Cognitive Process /Knowledge Dimension)**	**Topic Learning Outcome (TLO)**	**Course Outcome(CO)**
I	4	Node and mesh analysis, matrix approach of network containing voltage and current sources, and reactances, source transformation and duality;	1.1 Explain Node and mesh analysis (P1.2.1) (P2.5.1), P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2 (A/CK) 1.2 Explain matrix approach of network containing voltage (P1.2.1) (P2.5.1), P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2 (A/CK) 1.3 Explain matrix approach of network containing current sources, and reactance (P1.2.1) (P2.5.1) (P4.4.1) (P4.4.2), P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 1.4 Elaborate source transformation and duality (P1.2.1), P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK)	TLO1: Compute Laplace function. TLO2: Construct poles zero diagram in s plane and comment stability. TLO2: Construct transfer function from block diagram and SFG.	CO1 : Compute transfer function and pole zero diagram to find stability. **(Apply)** Assessment Tools: CT, PS, TP
II	4	Network theorem: Superposition, reciprocity,	2.1 Apply Superposition theorem and Reciprocity theorem to DC and AC. circuits. (P1.2.1) (P2.5.1) P9.2.1, P9.2.2,	TLO2.1 : Solve complex	**CO2: Solve** complex electrical circuit

		Thevenin's, Norton's, Maximum power Transfer, compensation and Tallegen's theorem as applied to AC. circuits.	P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 2.2 Apply Thevenin's and Norton's theorem to DC and AC. circuits. (1.2.1) (2.5.1) (3.6.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 2.3 Apply Maximum Power Transfer theorem to DC and AC. circuits. (P1.2.1) (P2.5.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 2.4 Apply compensation and Tallegen's theorem to DC and AC. Circuits (1.2.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK)	electrical problem in DC circuits with different theorem TLO2.2 Solve complex electrical problem in AC circuits with different theorem	problems using network theorems. (Apply) Assessment Tools: CT, PS **CO3: Explain** the different types of Fourier Series and Fourier Transformation along with the Spectrum L2 (Understand) Assessment Tools: CT, PS
III	6	Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform, steady state response of a network to non-sinusoidal periodic inputs, power factor, effective values, Fourier transform and continuous spectra, three phase unbalanced circuit and power calculation	3.1 Show Trigonometric and exponential Fourier series: Discrete spectra and symmetry of waveform. (P1.2.1) (P2.5.1) (3.6.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 3.2 Explain steady state response of a network to non-sinusoidal periodic inputs. (P1.2.1) (P2.5.1) (P3.6.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 3.3 Explain the relation of power factor, effective values (P1.2.1) (P2.5.1) P9.2.1,	TLO3.1 Explain Fourier series of different waves and spectrum TLO3.2 Explain different types fourier transformation and spectrum	

			P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 3.4 Show Fourier transform and continuous spectra. (P1.2.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 3.5 Calculate three phase balanced circuit and power calculation (P1.2.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 3.6 Calculate three phase unbalanced circuit and power calculation (P1.2.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK)		
IV	6	Laplace transformation and their properties: Partial function, singularity function, waveform synthesis, analysis of RC, RL and RLC networks with or without initial conditions with Laplace transforms evaluation of initial conditions.	4.1 Explain Laplace transformation and their properties (P1.2.1) (P2.5.1) (P3.6.1) 4.2 Explain Partial function, singularity function (P1.2.1, P2.5.1, P3.6.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 4.3 Explain waveform Analysis P1.2.1, P2.5.1, P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK)	TLO4.1 Explain the Laplace transformation , their properties with waveform analysis and synthesis	**CO4: Solve** electrical network problems using differential equation and Laplace transform. (Apply)L3 Assessment Tools: CT, PS, TP, P

			4.4 Explain waveform synthesis P1.2.1, P2.5.1, P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 4.5 Solve the analysis of RC, RL and RLC networks without initial conditions P1.2.1, P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 4.6 Solve the analysis of RC, RL and RLC networks with initial conditions P1.2.1, P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK)	TLO4.2 Solve different RC,RL,RLC network with Laplace transformation	
V	12	Transient behavior, concept of complex frequency, Driving points and transfer functions poles and zeros of immittance function, their properties, sinusoidal response from pole-zero locations, convolution theorem and two port networks and interconnections, Behavior of series and parallel resonant circuit, introduction of pass, low pass, high pass and band reject filters. Basic idea of Circuit Synthesis, Cauer & foster forms, examples	5.1 Explain Transient behavior, concept of complex frequency P1.2.1 , P2.5.1, P3.6.1 P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 5.2 Calculate Driving points and transfer functions (P1.2.1, P2.5.1, P3.6.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 5.3 Explain poles and zeros of immittance function P1.2.1, P2.5.1, P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 5.4 Explain their properties P1.2.1, P2.5.1, P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1,	TLO5.1 Explain transient behavior, pole zero function and their properties TLO5.2 Solve driving points and transfer functions TLO5.3 Solve different	**CO5: Solve** the electrical problems with two port network representation with pole zero concept and transient responses (Apply) Assessment Tools: CT, PS

			P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 5.5 Show sinusoidal response from pole-zero locations 1.1 P1.2.1, P2.5.1, P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 5.6 Explain convolution theorem and two port networks (P1.2.1) (P2.5.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 5.7 Show their interconnections (P1.2.1) (P2.5.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 5.8 Explain the Behavior of series and parallel resonant circuit (1.2.1) (3.6.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 5.9 Introduce pass, low pass, high pass and band reject filters. (P1.2.1) (P2.5.1) P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 5.10 Explain Basic idea of Circuit Synthesis P1.2.1, P2.5.1, P3.6.1, P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 5.11 Represent the networks in Cauer & foster forms P1.2.1, P9.2.1, P9.2.2, P9.2.3,	problems related to two port network and series and parallel circuits	

			P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK) 5.12 Calculate with some examples P1.2.1, P9.2.1, P9.2.2, P9.2.3, P9.2.4, P9.3.1, P10.1.1, P10.1.2, P10.1.3, P10.2.1, P10.2.2, P10.3.1, P10.3.2(A/CK)		

Summary of sub topic of CO-PO of CO and POs relation

CO	No of ILOs	NO of PI associated with POs	% of ILOs related with POs
CO1	12	PO1: 5, PO2: , PO4: , PO9: 7, PO10: 7, PO12: 1	PO1: 1, PO2:3 , PO4:2 60(%), PO9 -5(71.4%), PO10 -7(100%), PO12 – 1 (16.66%)
CO2	6	PO1: , PO2: , PO3, PO4: , PO9: 7 , PO10: 7, PO12: 1	PO1: , PO2: , PO3, PO4: PO9 -5(71.4%), PO10 -7(100%), PO12 – 1 (16.66%)
CO3	3	PO1: , PO2: , PO3, PO4: ,, PO9: 7 , PO4:10 , PO10: 7, PO12: 1	PO1: , PO2: , PO3, PO4: PO9 -5(71.4%), PO10 -7(100%), PO12 – 1 (16.66%)
CO4	9	PO1: , PO2: , PO3, PO4: , PO9: 7 , PO10: 7, PO12: 1	PO1: , PO2: , PO3, PO4: PO9 -5(71.4%), PO10 -7(100%), PO12 – 1 (16.66%)
CO5	6	PO1: , PO2: , PO3, PO4: , PO9: 7 , PO10: 7, PO12: 1	PO1: , PO2: , PO3, PO4: PO9 -5(71.4%), PO10 -7(100%), PO12 – 1 (16.66%)

CO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	1	-	-	-	-	1	1	-	1	1	1

CO2	3	2	1	1	-	-	-	-	1	1	-	1	1	1
CO3	3	2	1	1	-	-	-	-	1	1	-	1	1	1
CO4	3	2	1	1	-	-	-	-	1	1	-	1	1	1
CO5	3	2	1	1	-	-	-	-	1	1	-	1	1	1
Course	3	2	0.8	1	-	-	-	-	1	1	-	1	1	1

Rubric for CO PO PSO mapping:

Methods	**Attainment Levels**	
=PI mapped with CO/PO given	Level 1	>20
	Level 2	<=20 and <50
	Level 3	<=50