PVP 20

Code: 20ES1302

II B.Tech - I Semester –Regular / Supplementary Examinations
DECEMBER 2022

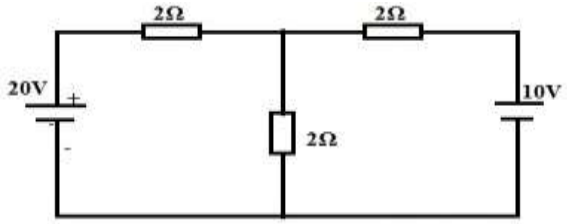
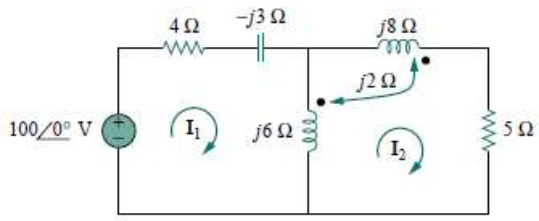
CIRCUIT THEORY
(ELECTRICAL & ELECTRONICS ENGINEERING)

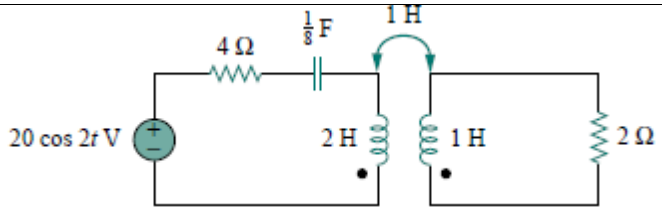
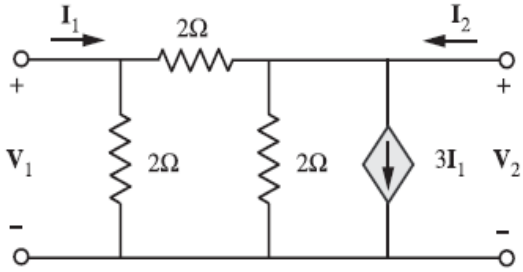
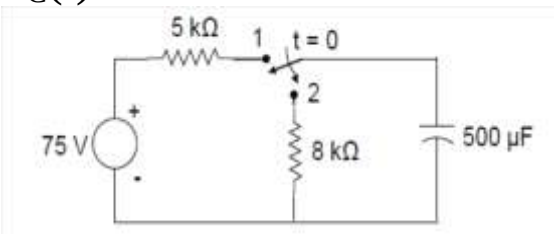
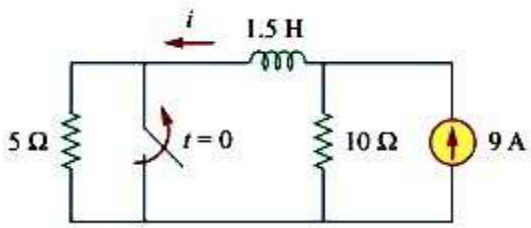
Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Explain the significance of Sinusoids in Circuit Analysis.	L2	CO1	7 M
	b)	Calculate the steady state current in a series RC circuit (R=10 Ω, C=100μF) excited by a sinusoidal voltage of 100V, 50Hz AC supply.	L3	CO2	7 M
OR					
2	a)	Explain Phasor diagram with one example for a complex quantity. Transform these sinusoids to phasors: (i) $i = 6\cos(50t - 40°)$ A, (ii) $v = -4\sin(30t + 50°)$ V	L2	CO1	7 M
	b)	Derive the expression for voltage across the elements R, L, C and current flowing through the circuit when a sinusoidal voltage $V=V_m\text{Sin}(\omega t)$ is applied to a series RLC and also draw phasor diagram.	L3	CO2	7 M

		UNIT-II			
3	a)	Differentiate the series and parallel resonance.	L2	CO3	7 M
	b)	Verify Tellegen's theorem for the following DC network. 	L3	CO3	7 M
		OR			
4	a)	A coil of inductance 5 mH and resistance 10 Ω is connected in parallel with a 250 nF capacitor across a 50 V variable-frequency supply. Determine (i) the resonant frequency, (ii) the dynamic resistance, (iii) the current at resonance, and (iv) the circuit Q-factor at resonance.	L3	CO3	7 M
	b)	State and explain Compensation theorem.	L3	CO3	7 M
		UNIT-III			
5	a)	Calculate the mesh currents in the circuit of Fig. 	L3	CO3	7 M
	b)	Derive the condition for Reciprocity and symmetry in a two port Z - parameter representation.	L4	CO5	7 M
		OR			
6	a)	For the circuit in Fig., determine the coupling coefficient and the energy stored in the coupled inductors at t = 1.5 s.	L2	CO3	7 M

					
	b)	Refer the network shown in the Fig. containing a current-controlled current source. For this network, find the y parameters. 	L3	CO5	7 M
		UNIT-IV			
7	a)	What is the condition for the response of a series RLC circuit excited by DC supply to have critically damped response?	L4	CO4	7 M
	b)	The switch in circuit shown was in position 1 for a long time. It is moved from position 1 to position 2 at time t = 0. Sketch the wave form of $v_C(t)$ for t > 0. 	L3	CO4	7 M
		OR			
8	a)	The switch in fig. has been closed for a long time. It opens at t=0 find i(t) for t>0. 	L3	CO2	7 M

	b)	Derive an expression for the step response of series R-C circuit.	L4	CO4	7 M
		UNIT-V			
9	a)	A delta connected load has a parallel combination of resistance 5Ω and capacitive reactance –j5Ω in each phase. If a balanced three phase 400V supply is applied between lines, find the phase currents and line currents and draw the phasor diagram.	L3	CO3	7 M
	b)	The three-phase balanced load in figure, has impedance per phase of $Z_Y = 8 + j6\ \Omega$. If the load is connected to 208V lines, predict the readings of the wattmeter W_1 and W_2. Find total active power and reactive power.	L4	CO4	7 M
		OR			
10	a)	A 415V, 3-phase a.c. motor has a power output of 12.75kW and operates at a power factor of 0.77 lagging and with an efficiency of 85 per cent. If the motor is delta-connected, determine (i) the power input, (ii) the line current and (iii) the phase current.	L3	CO3	7 M
	b)	The two-wattmeter method produces wattmeter readings P_1 = 1560 W and P_2 = 2100 W when connected to a delta connected load. If the line voltage is 220 V, calculate: (i) the per-phase average power, (ii) the per-phase reactive power, (iii) the power factor.	L4	CO4	7 M