PVP 23

Code: 23EC3201

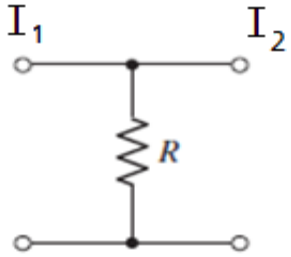
I B.Tech - II Semester – Supplementary Examinations
DECEMBER 2024

NETWORK ANALYSIS
(ELECTRONICS & COMMUNICATION ENGINEERING)

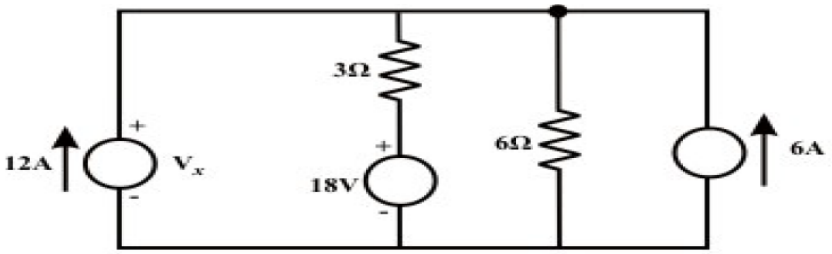
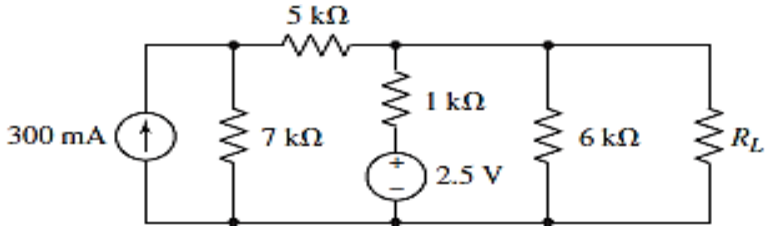
Duration: 3 hours Max. Marks: 70

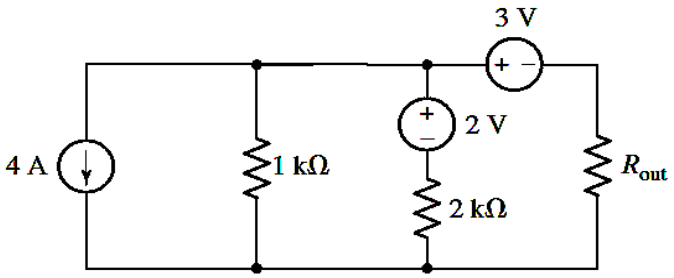
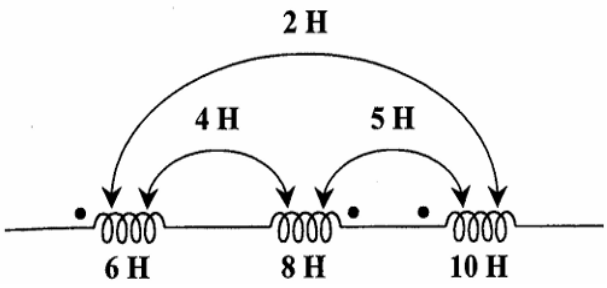
Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

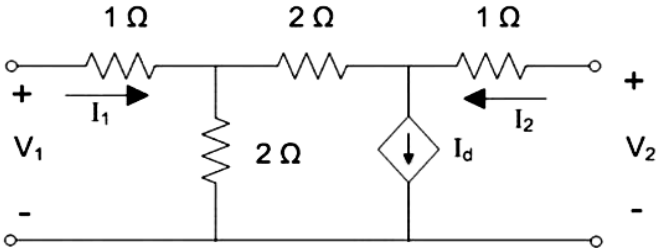
PART – A

1.a)	State the Kirchhoff's voltage and current law.
1.b)	A voltage source of $20 \sin \pi t$ V is connected across a 5 kΩ resistor. Find the current through the resistor and the power dissipated.
1.c)	Explain the concept of source transformation.
1.d)	What is the condition for maximum power transfer in DC and AC circuits?
1.e)	Comment on the impedance and phase angle between voltage and current at resonance.
1.f)	Distinguish between Self-inductance and Mutual Inductance.
1.g)	What is the behavior of an inductor in initial state condition?
1.h)	Give the expressions for Time constant of series RL & RC circuits.
1.i)	Define Open-Circuit Impedance Parameters of a Two-Port Network.
1.j)	Find the 'Y' parameters of the following two port network 

PART – B

			Max. Marks
		UNIT-I	
2	a)	Explain about Nodal analysis and write the steps for applying nodal analysis.	5 M
	b)	For the circuit shown in the figure. Find V_x using the mesh current method 	5 M
		OR	
3	a)	Explain star to delta transformation with an example.	5 M
	b)	Show that the current, $i = I_m \sin(\omega t)$, passing through series RL circuit will lag the voltage by some angle from 0^o to 90^o depending on the relative magnitude of R and ωL.	5 M
		UNIT-II	
4	a)	State and prove the Norton's theorem.	5 M
	b)	Obtain the Norton's equivalent of the following circuit connected to R_L and find the current flowing through it. 	5 M
		OR	
5	a)	State and prove the maximum power transfer theorem.	5 M

	b)	Determine the Norton equivalent connected to resistor Rout. Select a value for R_{out} such that maximum power will be delivered to it. 	5 M
UNIT-III			
6	a)	Draw the parallel RLC circuit and derive the expression for resonant frequency.	5 M
	b)	In parallel RLC circuit R=8 kΩ, L=0.2 mH, C=8 μF. Calculate resonant frequency (ω_0), Quality factor (Q), Half power frequencies (ω_1 and ω_2), and bandwidth ($\omega_1 \sim \omega_2$).	5 M
OR			
7	a)	Derive the relation between mutual inductance & co-efficient of coupling.	5 M
	b)	For the three coupled coils connected as shown in the figure. Calculate the total inductance 	5 M
UNIT-IV			
8	a)	Explain the DC transient analysis of series RLC circuit in underdamped case.	5 M
	b)	A series RLC circuit with Q=250 resonates at 1.5MHz. Find half power frequencies and bandwidth of the network.	5 M

		OR	
9	a)	Explain the procedure to obtain the transient response of series RL circuit using Laplace Transform.	5 M
	b)	A parallel RLC circuit having an inductance of 10mH and a capacitance of 100 μF. Determine the resistor values that would lead to over damped and underdamped responses.	5 M
		UNIT-V	
10	a)	Explain about h-parameters and its applications of two port network.	5 M
	b)	Find the hybrid parameters of the following network 	5 M
		OR	
11	a)	Obtain the relationship between the image parameters and the short circuit and open circuit impedances.	5 M
	b)	A network has the following open circuit (O.C) and short circuit (S.C) impedances: open circuit impedance at port-1, $Z_{OC1} = 500 + j200$ ohms open circuit impedance at port-2, $Z_{OC2} = 400$ ohms short circuit impedance at port-1, $Z_{SC1} = 400 + j300$ ohms short circuit impedance at port-2, $Z_{SC2} = 358 + j93$ ohms Find its image impedance parameters (Z_{i1} & Z_{i2})	5 M