ODD SEMESTER EXAMINATION, 2024 – 25
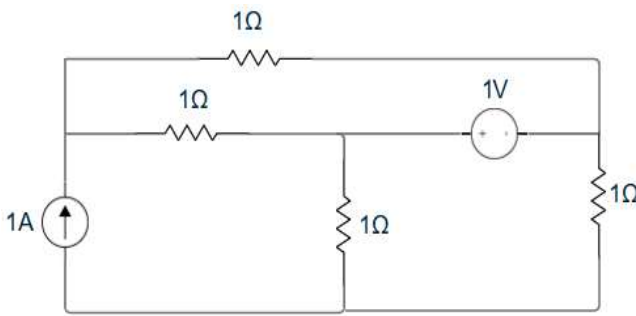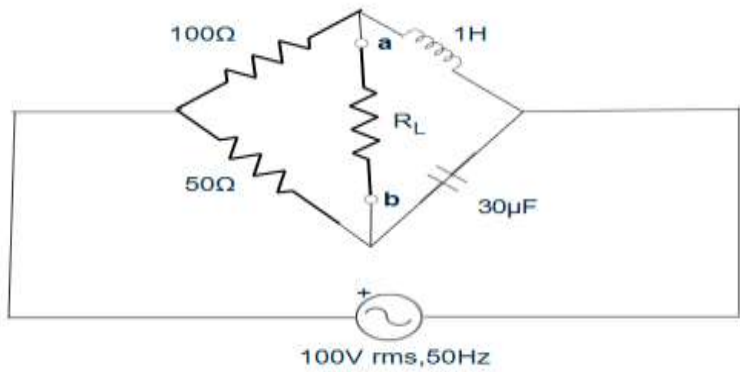
2nd Year (III Sem) B.Tech.: Electronics & Communication Engineering

Networks & Systems

Duration: 3:00 hrs   **Max Marks: 100**

Note: - Attempt all questions. All Questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer.
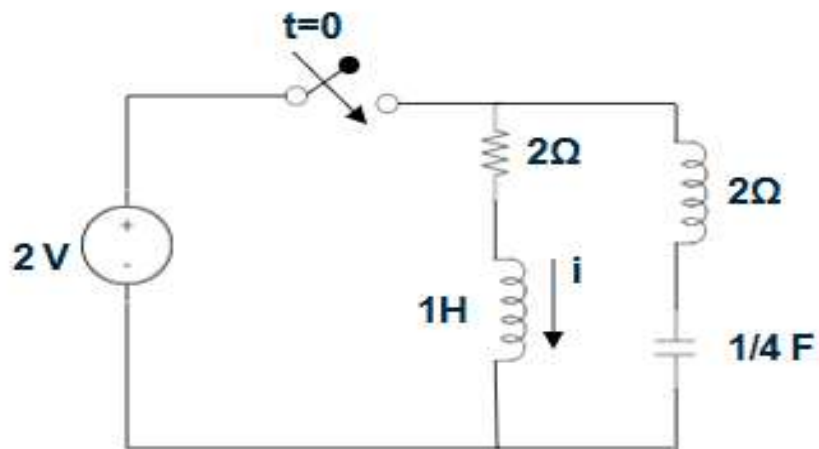
Q 1.	Answer any two parts of the following. (10x2= 20)
	a) (i) What are independent and dependent sources? What are unit step, unit ramp & unit impulse signals. (5 marks)
	(ii).What are the different circuit elements. Explain each one of them. (5 marks)
	b) Describe any five properties of linear- time invariant system. (10 marks)
	c) Find power by dependent sources (i.e. I & V source). (10 marks)
Q 2.	Answer any two parts of the following. (10x2= 20)
	a) (i) What are the properties of a tree in the graph theory. What is the relationship between twigs and links. (5 marks)
	(ii) Derive the expression for the maximum power delivered to the load resistor R_L in terms of the source voltage Vs and the internal resistance Rs. (5 marks)
	b) Find thevenin equivalent across R_L i.e. ab. (10 marks)

c) Determine the voltage V_x, then apply reciprocity theorem and compare the two voltages. (10 marks)
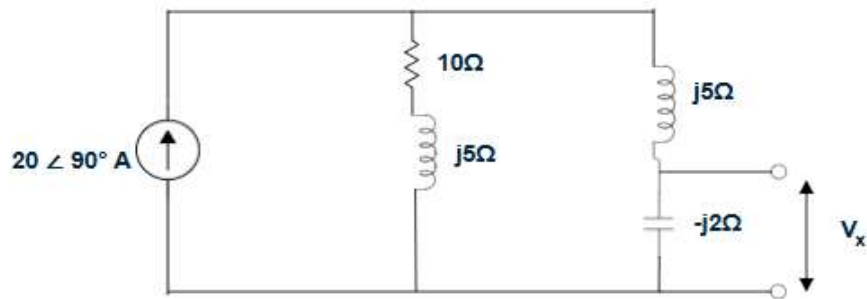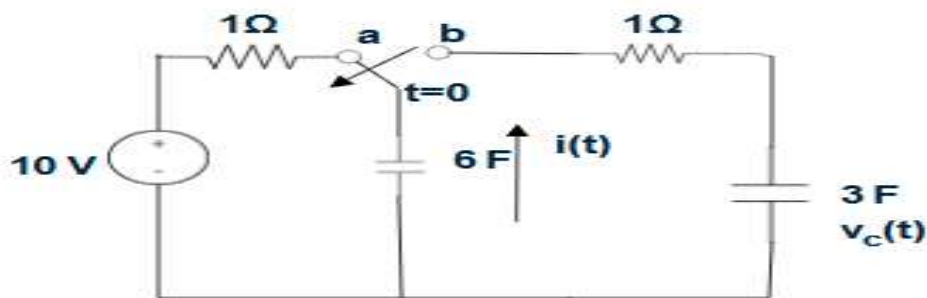

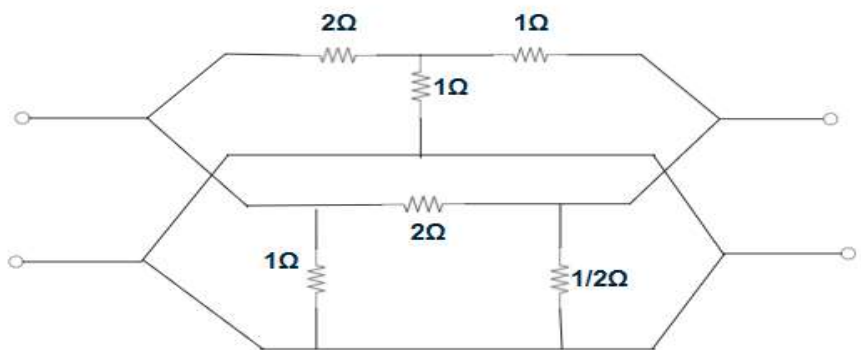| Q 3. | Answer any two parts of the following. (10x2= 20) |

a) (i) Define and derive the general expression for the Fourier series of a periodic signal. (5 marks)
   (ii) State and explain the major properties of the Fourier series (e.g., linearity, time-shifting, frequency-shifting, etc.). (5 marks)

b) Using Laplace transform, find the solution for the current i(t) in an RL series circuit with a step input voltage $V(t)=V_0$. Find expression for current i(t), if switch is opened at t=0. (10 marks)

c) The switch in the circuit is in position **a** for long time and then moved to position **b** at time t =0. Find current i(t) using Laplace Transform. (10 marks)

Q 4.	Answer any two parts of the following. (10x2= 20)

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a) (i) What are ladder networks and lattice networks? How are they constructed using two-port networks?
(5marks)

 (ii) Draw the equivalent circuit of a two-port network using h-parameters.   (5 marks)

b) Derive the condition of Reciprocity and Symmetry for T parameters.   (10 marks)

c) Find Y parameters?   (10 marks)

Q 5.   Answer any two parts of the following.   (10x2= 20)

a) (i) Define the network function of a two-terminal network and explain how impedance & admittance functions are derived.   (5 marks)

 (ii) Discuss the relationship between the transfer function and impulse response of a system. How are poles and zeros related to the transfer function?   (5 marks)

b) Find the Cauer I and II forms of the RL impedance function   (10 marks)

$$Z(s) = \frac{2(s+1)(s+3)}{(s+2)(s+6)}$$

c) Find Foster I and II forms   (10 marks)

$$Z(s) = \frac{(s+1)(s+3)}{(s+2)(s+4)}$$

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