

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (NEW) EXAMINATION – WINTER 2023****Subject Code:3131103****Date:25-01-2024****Subject Name:Network Theory****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

	Marks
Q.1 (a) Define : Tree, Sub-graph, connected graph.	03
(b) Derive the condition for reciprocity for ABCD parameters	04
(c) For the network of Fig.1, find the unknown currents. In Fig.1 Consider the current source as $7A$.	07
Q.2 (a) Explain ideal and practical Voltage source.	03
(b) Reduce the network of Fig.2 into one equivalent current source	04
(c) Obtain Thevenin's equivalent circuit for the Fig. 3 in which R_L resistance is preserved.	07
OR	
(c) Derive relationship between incidence matrix (A), fundamental tie-set matrix (B_f) and fundamental cut-set matrix (Q_f).	07
Q.3 (a) Determine the Laplace transform of $f(t) = e^{-5t} \sin 8t$.	03
(b) Explain briefly PRF.	04
(c) In the network of Fig.4, a steady state is reached with switch k open. At $t=0$, switch is closed. Determine $v_a(0^-)$ and $v_a(0^+)$.	07
OR	
Q.3 (a) Explain initial value theorem of Laplace transform.	03
(b) Calculate the step response for series R-L circuit for $t > 0$.	04
(c) In the network of Fig.5, switch k is closed at $t=0$. Find the particular solution for the current.	07
Q.4 (a) What is network synthesis?	03
(b) Obtain z-parameters in terms of y-parameters.	04
(c) For the network of Fig.6, determine the h-parameters.	07
OR	
Q.4 (a) State and explain maximum power transfer theorem.	03
(b) State and explain the superposition theorem using suitable example.	04
(c) Obtain the particular solution for current $i(t)$ in the circuit of Fig.7 when switch k is closed at $t=0$.	07
Q.5 (a) Explain active and passive network.	03
(b) What is time constant? What is its significance?	04
(c) In Fig.8, obtain current $i(t)$ when switch is moved from position 'a' to position 'b' at $t=0$.	07
OR	
Q.5 (a) Explain Lumped and distributed network.	03
(b) Obtain step response for R-C series circuit.	04

(c) In Fig.9, obtain current $i(t)$ when switch is moved from position 'a' to position 'b' at $t=0$. 07

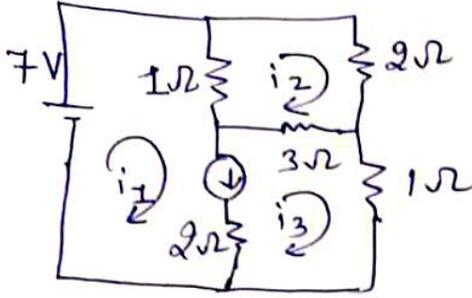


Fig 1.

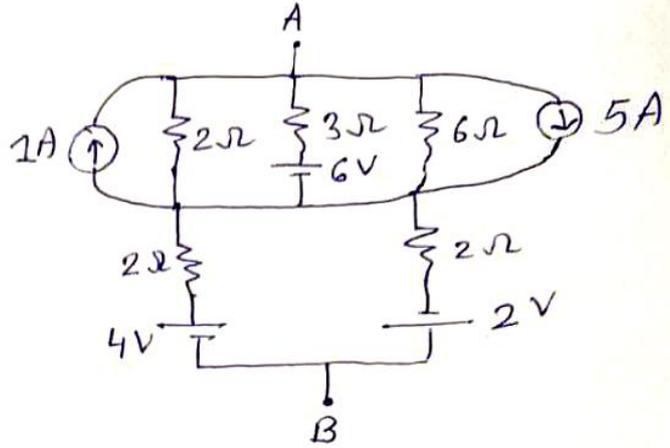


Fig 2.

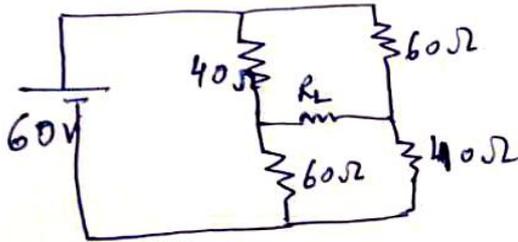


Fig 3.

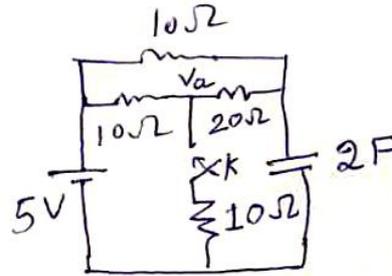


Fig 4.

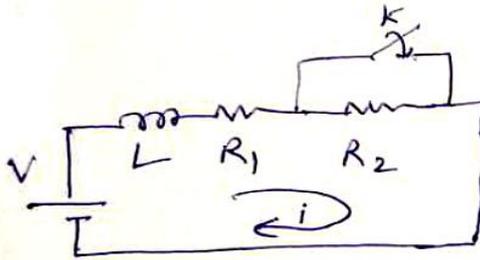


Fig 5.

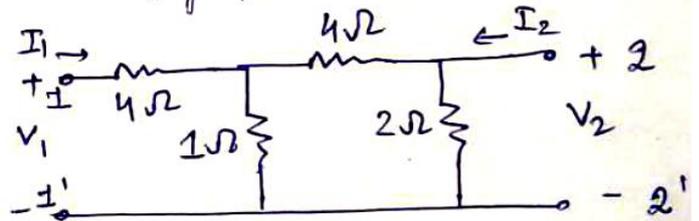


Fig 6.

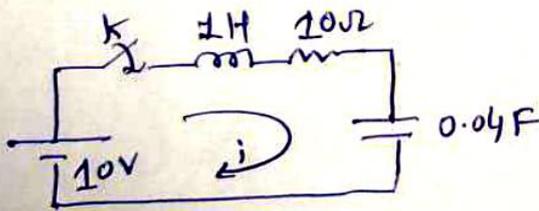


Fig 7.

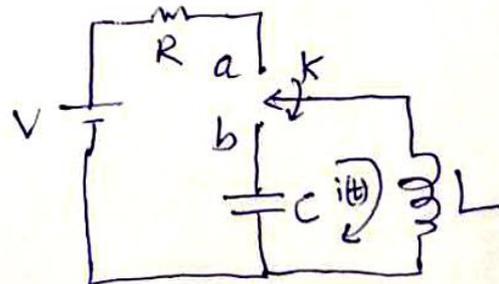


Fig 8.

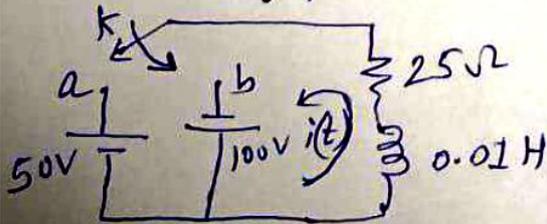


Fig 9
