

B.E. Fourth Semester (Electronics & Telecommunication) (New)
Network Analysis : 4 ET 02

P. Pages : 6

Time : Three Hours

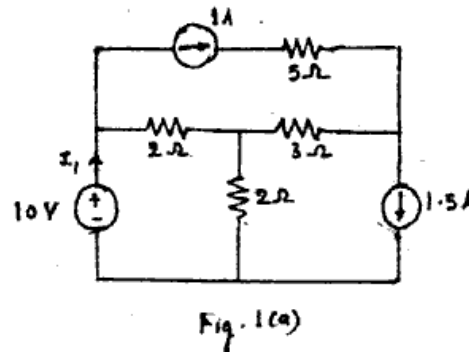


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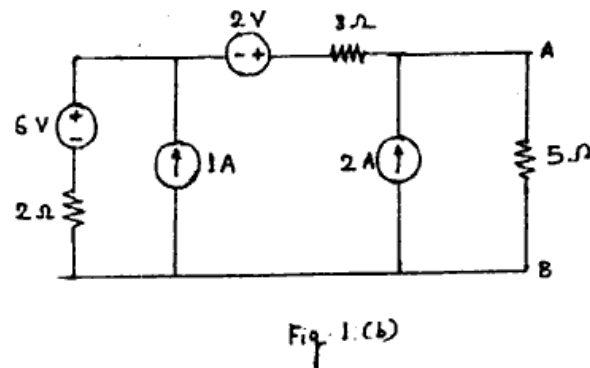
Max. Marks : 80

- Notes :
1. Assume suitable data wherever necessary.
 2. Illustrate your answer necessary with the help of neat sketches.
 3. Use of non programmable calculator is permitted.
 4. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) Determine current I , in the circuit shown in fig. 1(a), using mesh analysis. 7

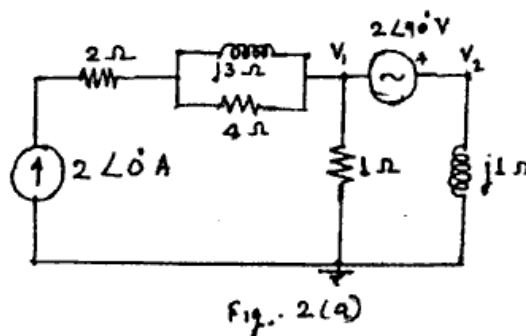


- b) Determine current in 5Ω resistor in the circuit shown in fig. 1 (b) using sources transformation. 7



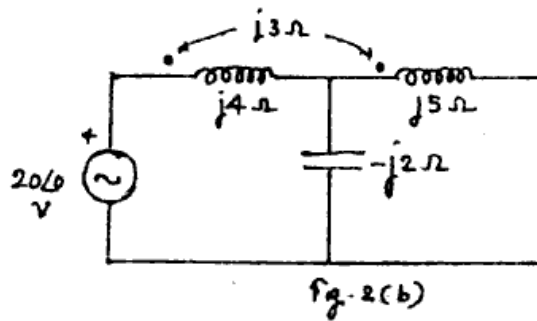
OR

2. a) Determine node voltages V_1 and V_2 in the circuit shown in fig. 2(a) using node analysis. 6



- b) Determine current flowing through the capacitor of the circuit shown in fig. 2(b)

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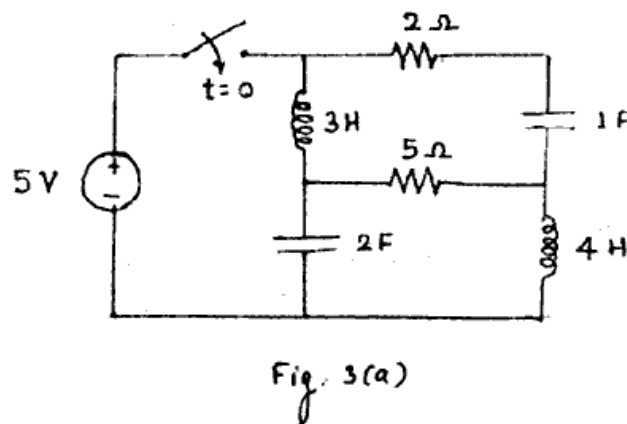


- c) Explain, with suitable examples, dependent sources.

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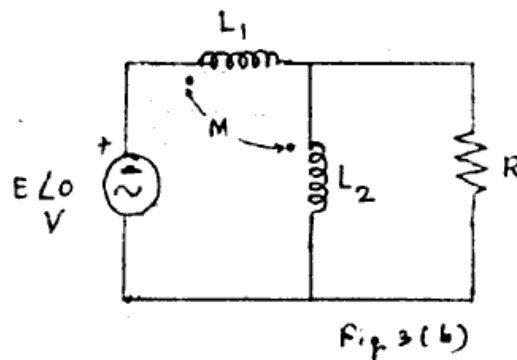
3. a) Draw the dual of the circuit shown in fig. 3(a).

5



- b) Draw the oriented graph for the network shown in fig. 3(b). Formulate f-cut set matrix and write equilibrium equations on node basis.

8



OR

4. a) Define the following terms with reference to a linear graph.
 i) tree,
 ii) fundamental circuit &
 iii) Fundamental cut-set.

3

- b) The oriented graph of a circuit is shown in Fig. 4(b). Write tie-set matrix corresponding to a tree with twigs {1, 2, 3, 4, 5}. 5

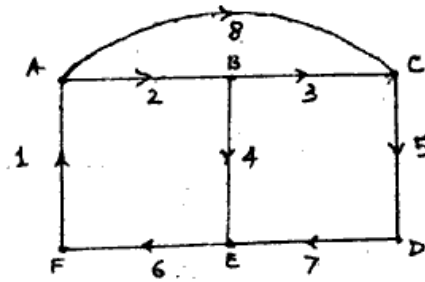


Fig. 4(b)

- c) Find incidence matrix for the oriented graph shown in fig. 4 (b). 5

5. a) In a circuit shown in fig. 5(a), the switch is opened at $t = 0$ and the capacitor is initially uncharged. Determine the expression for the voltage across the capacitor. 8

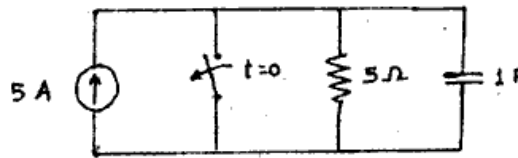


Fig. 5(a)

- b) Determine Laplace transform of the signal shown in fig. 5(b). 5

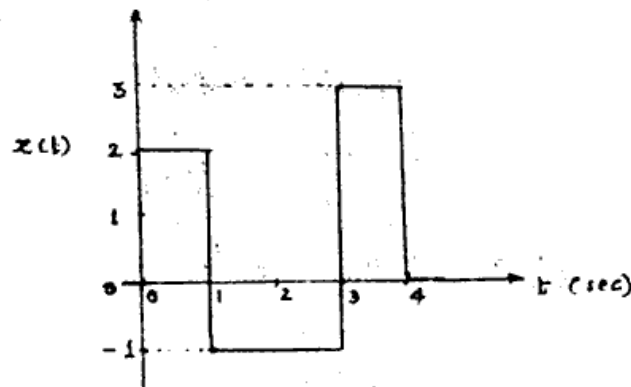


Fig. 5(b)

OR

6. a) The network shown in fig. 6(a) reaches a steady state with switch k closed. At $t = 0$, the switch is opened. Find the expression for the current through the inductor. 7

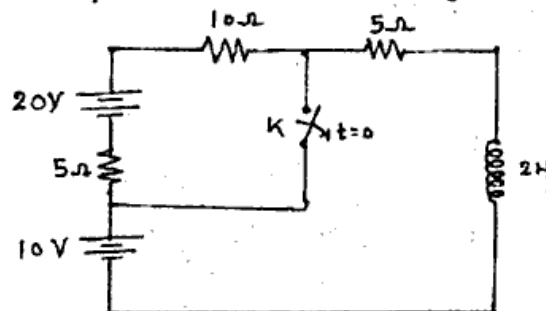


Fig. 6(a)

- b) The current in a resistive-inductive circuit is given as

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$$i(t) = -5e^{-10t}, \quad t \geq 0$$

Find

- time constant,
- initial rate of change of current,
- current at $t = 0.4s$,
- initial value of inductor current.

7. a) Determine the current through 4Ω resistor of the circuit shown in fig. 7(a) using supposition theorem.

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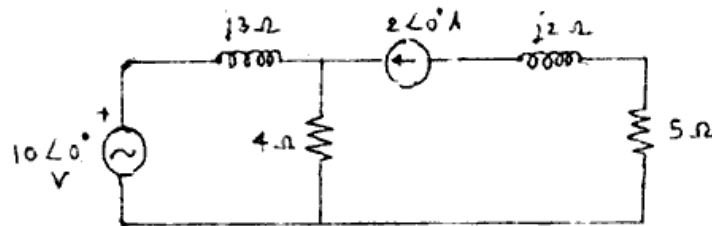


Fig. 7(a)

- b) State and explain reciprocity theorem.

6

OR

8. a) Find the Thevenin's equivalent of the circuit shown in fig. 8(a).

7

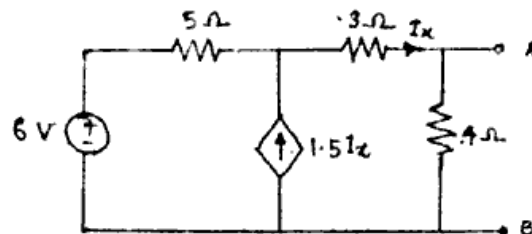


Fig. 8(a)

- b) State and explain Tellegen's theorem.

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9. a) Find the transfer function $V_2(s) / V_1(s)$ of the network shown in fig. 9(a).

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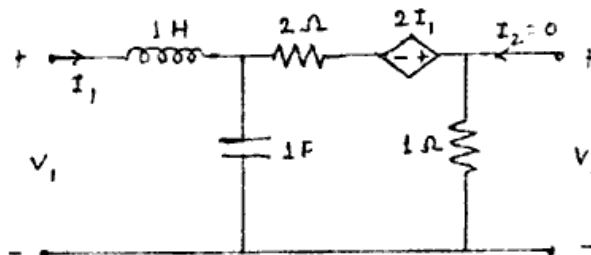
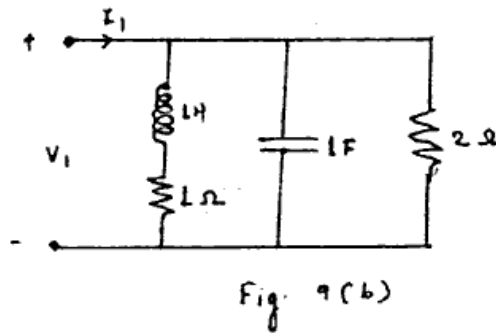


Fig. 9(a)

- b) Determine the driving point admittance of the network shown in fig. 9 (b).

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OR

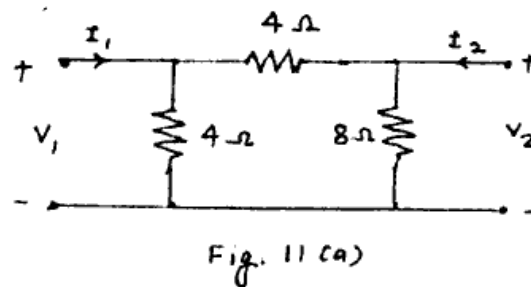
10. a) Define 4
- driving point impedance.
 - Voltage transfer function.
 - Current transfer function.
 - Transfer admittance function.
- b) State the conditions for driving point functions. 6
- c) Which of the following network functions represent transfer functions? Why? 4

i) $\frac{s^2 + s + 1}{s^2 + 2s + 4}$

ii) $\frac{10}{(s+2)(s+3)}$

iii) $\frac{10(s+4)}{s^4 + 3s^3 + 4s + 2}$

11. a) Find y-parameters of the network shown in fig. 11(a). 7

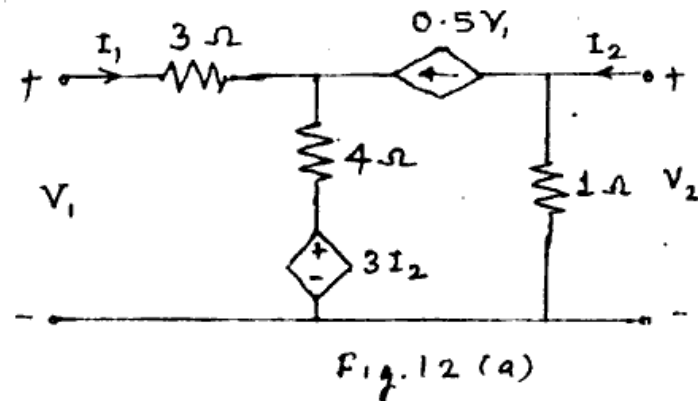


- b) Derive the condition for reciprocity of a two port network in terms of transmission parameters. 6

OR

12. a) Find h-parameters of the network shown in fig. 12(a).

7



- b) Two two-port networks are connected in parallel. Determine the expression for y-parameters of the overall network in terms of y-parameters of the individual network.

6

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