S.E|sem-IV|choice Base| May-18
Electrical Engg

Q. P. Code: 39895

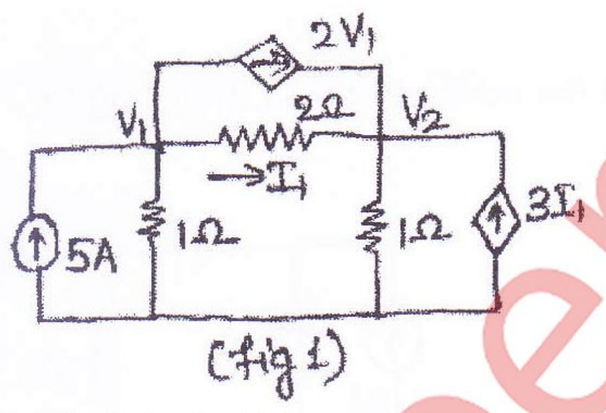
(3 Hours) EN

[Total Marks: 80

N.B.: (1) Question No. **1** is **compulsory.**
(2) Answer any **three** from the remaining **five** questions.
(3) **Assume** suitable **data** if necessary and justify the same.
(4) **Figures** to the **right** indicate the marks.

1 Answer **any four.** [20]

(a) Using nodal analysis, find voltages V_1 and V_2. (refer fig 1)



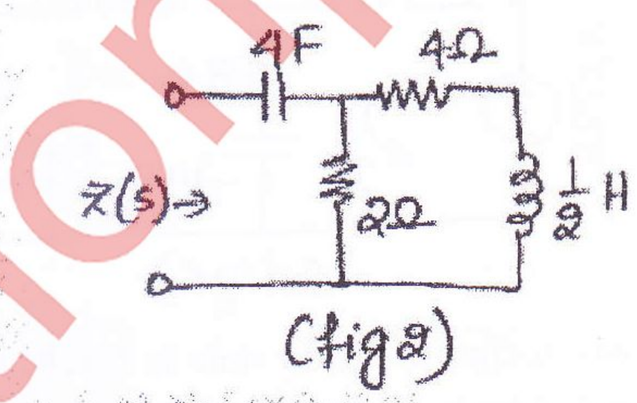
(fig 1)

(b) List out the properties of a tree.

(c) Using Laplace transform, obtain the expression for current in a series RC circuit when a unit ramp signal is applied.

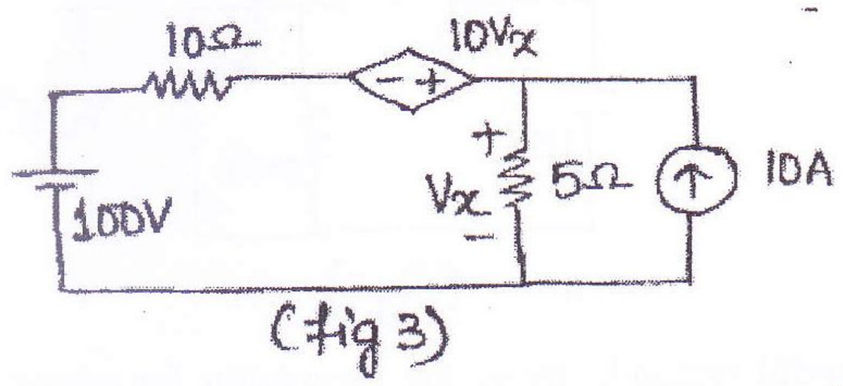
(d) Derive the condition for reciprocity in transmission parameters.

(e) Find poles and zeros of the impedance of the following network and plot them on the s-plane. (refer fig 2)



(fig 2)

2 (a) Using Thevenin's theorem, find the current in the 10Ω resistor. (refer fig 3) [8]



(fig 3)

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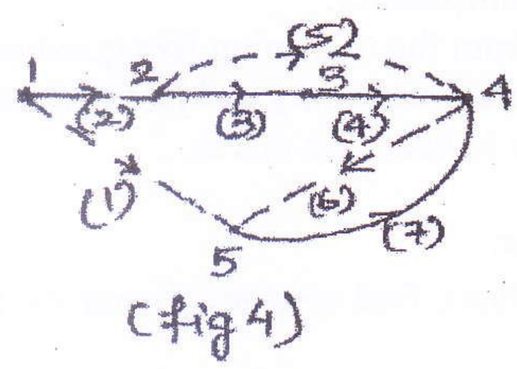
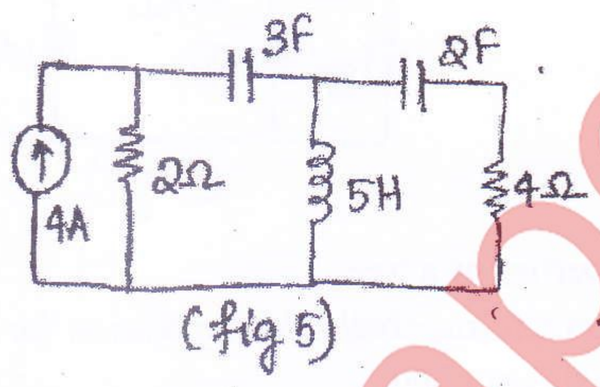
(b) For the graph shown, write the tieset matrix and f-cutset matrix. (refer fig 4) [8]



(fig 4)

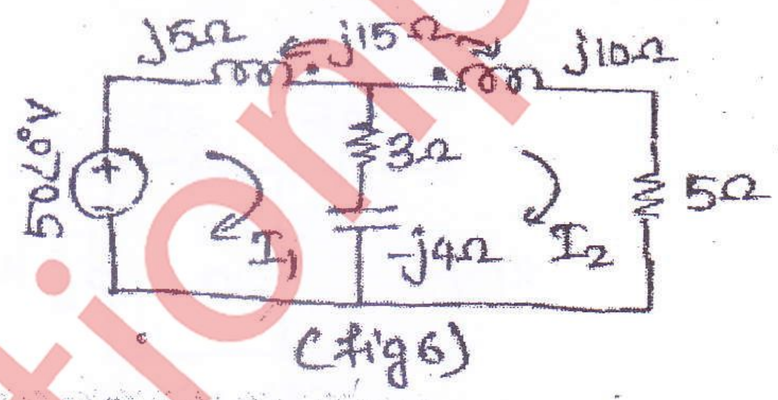
(c) Draw the dual of the network shown. (refer fig 5) [4]



(fig 5)

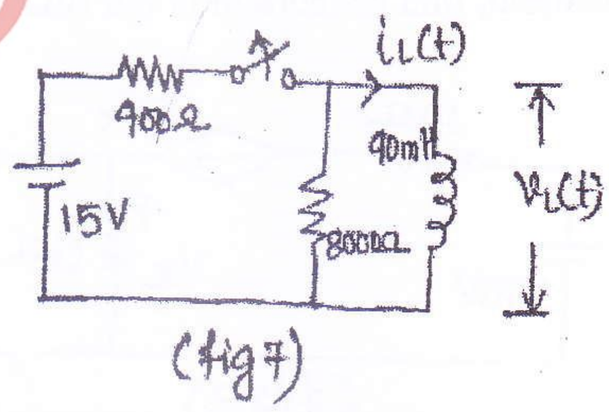
3 (a) Explain the concept of super mesh and super node with an example. [5]

(b) Write the mesh equations for the circuit shown. (refer fig 6) [5]



(fig 6)

(c) For the network shown in figure, steady state is reached with the switch closed. The switch is opened at $t = 0$. Obtain expressions for $i_L(t)$ and $v_L(t)$. (refer fig 7) [10]



(fig 7)

4 (a) Using differential method, derive the expression for current in a series RL circuit. Draw its characteristics and define time constant. [6]

(b) Mention the restrictions on pole and zero locations for driving - point functions. [4]

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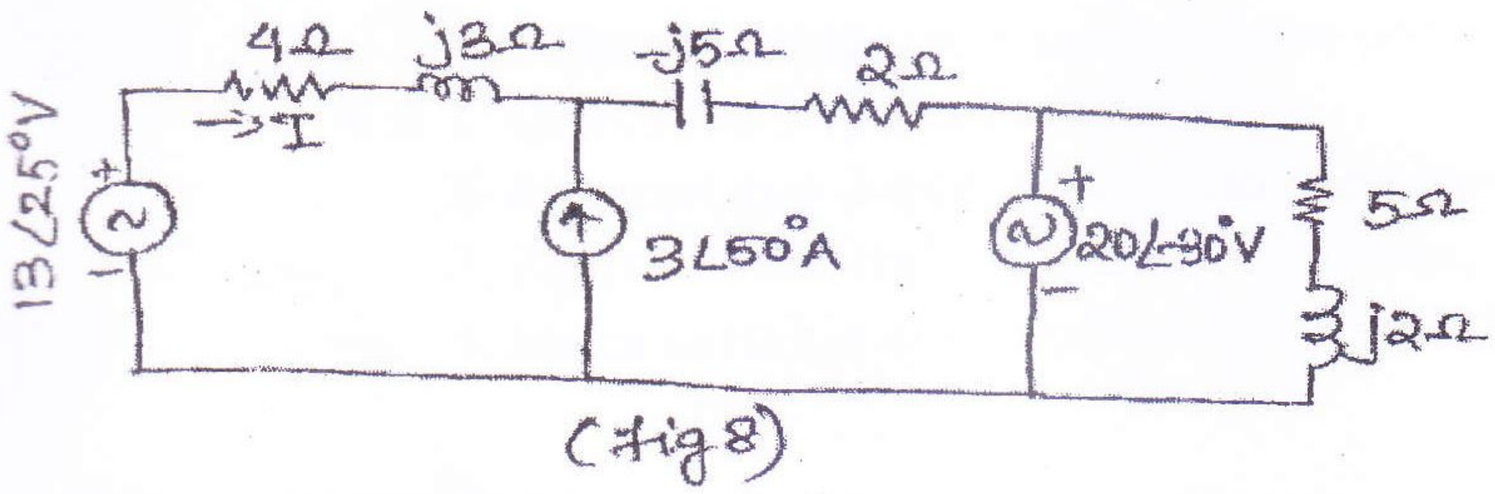
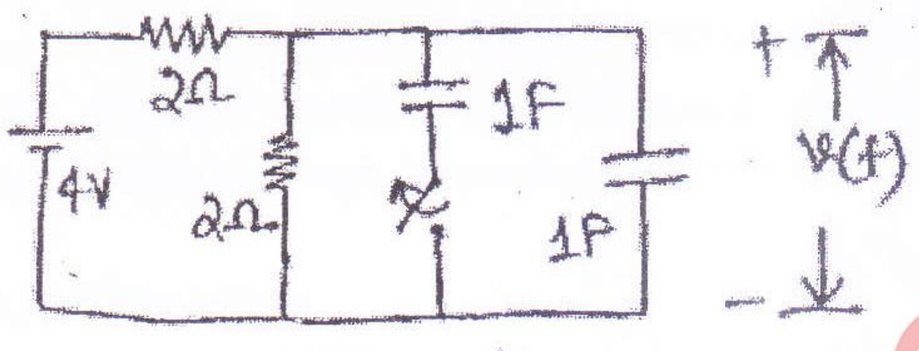
Find the current I in the network shown, using superposition theorem. (refer fig 8) [10]



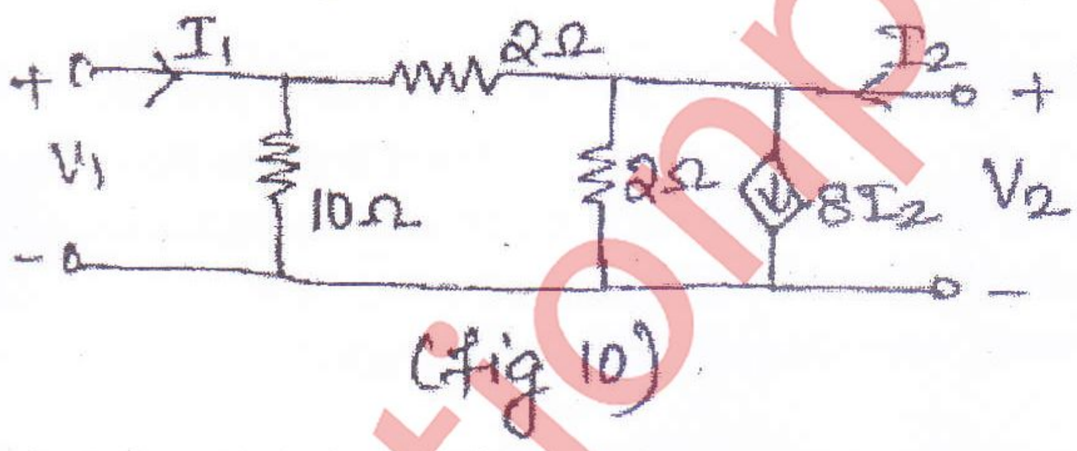
(fig 8)

The network shown in figure has acquired steady state at $t < 0$ with the switch closed. [10]
The switch is opened at $t = 0$. Determine $v(t)$. (refer fig 9)



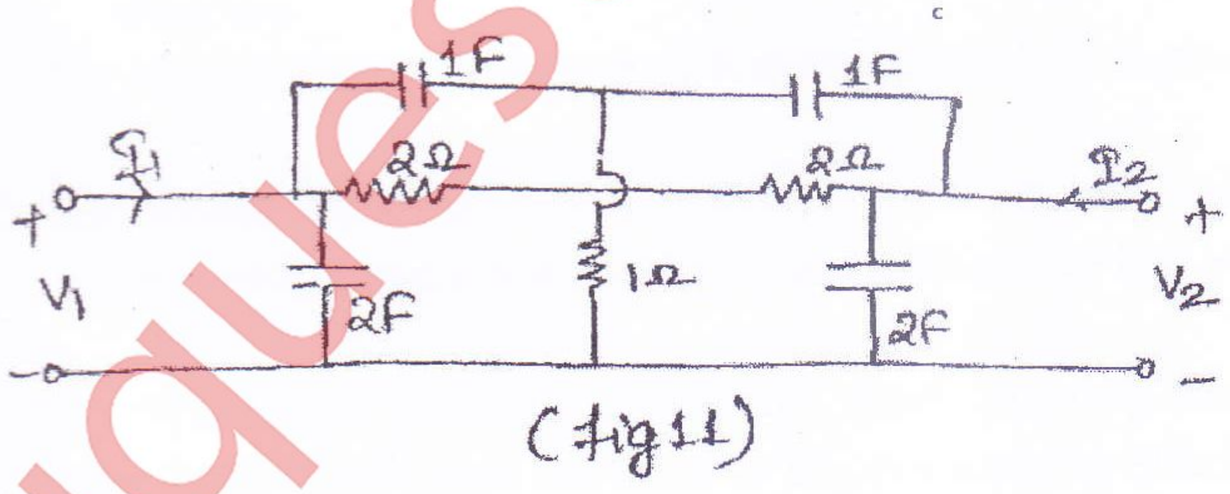
(fig 9)

For the network shown in figure, find Z and h – parameters. (refer fig 10) [10]



(fig 10)

Find the short circuit parameters for the network shown. (refer fig 11) [10]



(fig 11)

The voltage V(s) of a network is given by [10]

$$V(s) = \frac{3s}{(s+2)(s^2+2s+2)}$$

Plot its pole – zero diagram and hence obtain v(t) using graphical method.

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