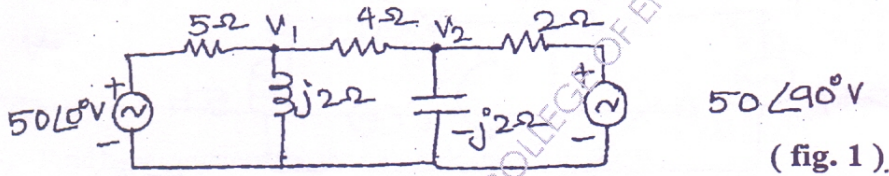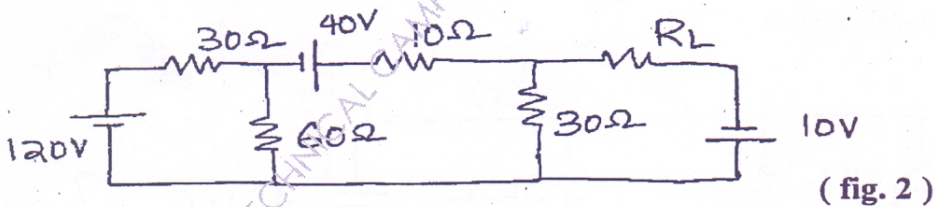QP Code : **1249**

(3 Hours) [Total Marks : 100

N.B. : (1) Question **No. 1** is compulsory.
(2) Solve any **four** out of remaining **six** questions.
(3) Each question carries 20 marks.
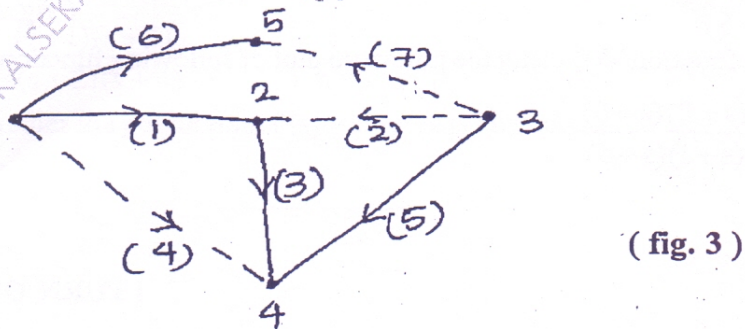(4) Assume suitable additional data if required.

1. (a) State and explain Reciprocity theorem. 5
   (b) Define tree and its properties. 5
   (c) Test whether $F(s) = \dfrac{s+3}{s+1}$ is positive real function. 5
   (d) Obtain pole-zero plot $F(s) = \dfrac{s^2+4}{(s+2)(s^2+9)}$ 5

2. (a) Using nodal analysis, find voltages V_1 & V_2. 10

(fig. 1)

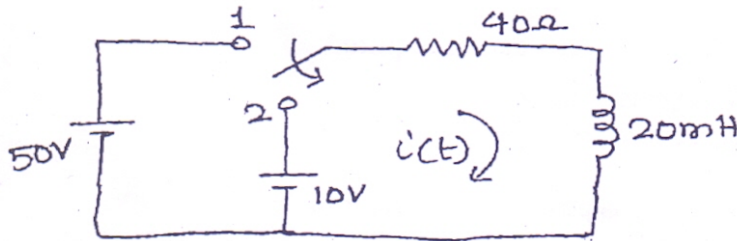   (b) Obtain Norton's equivalent network as seen by R_L. (fig 2) 10

(fig. 2)

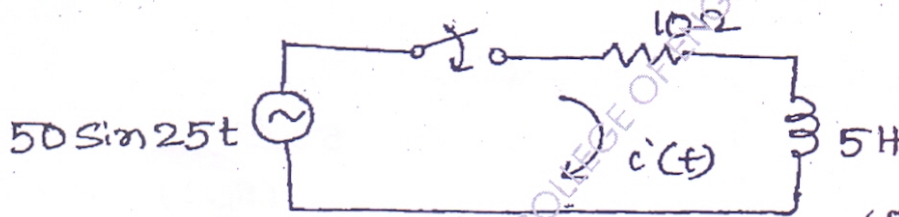3. (a) Fore the graph shown, write incidence matrix and tie-set matrix. 10

(fig. 3)

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QP-Con. 12202-15.

(b) The network of fig 4 is under steady state with switch at position 1. At t = 0,   **10**
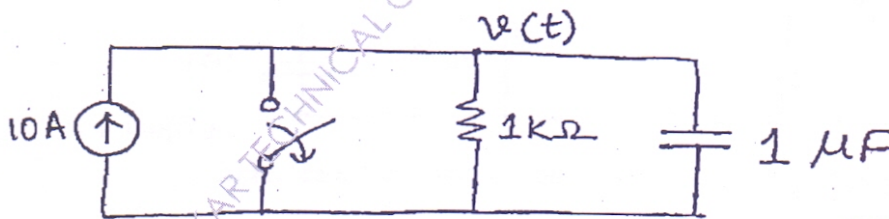switch is moved to postion 2. Find i (t).

(fig. 4)

4. (a) Determine curcent i(t) in the network show in fig.5, when switch S is closed   **10**
at t > 0 . (Using Laplace transform method.)

(fig. 5)

(b) In the given network of fig 6. Switch is opened at t = 0 . Solve for V , dv/ dt   **10**
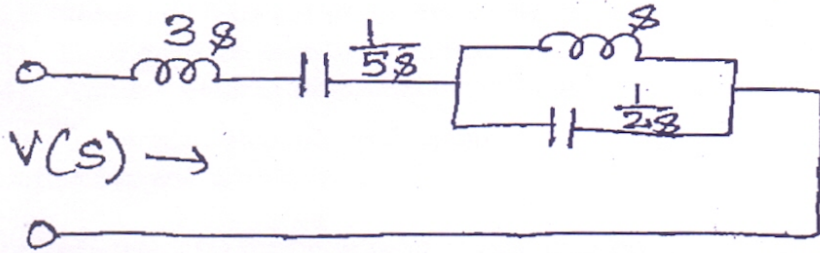& $d^2 v/dt^2$ at t = 0 $^+$.

(fig. 6)

5. (a) Find the function V(t) using the pole-zero plot of following function: **10**

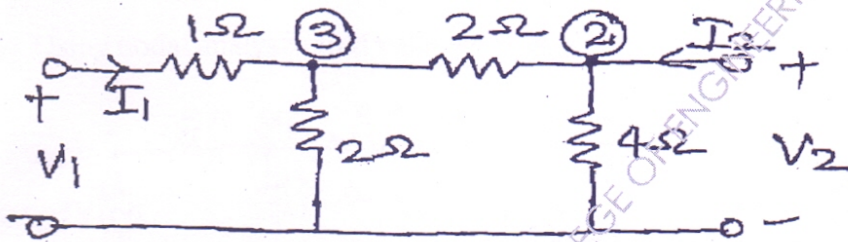$$V(s) = \frac{(s+2)(s+6)}{(s+1)(s+5)}$$

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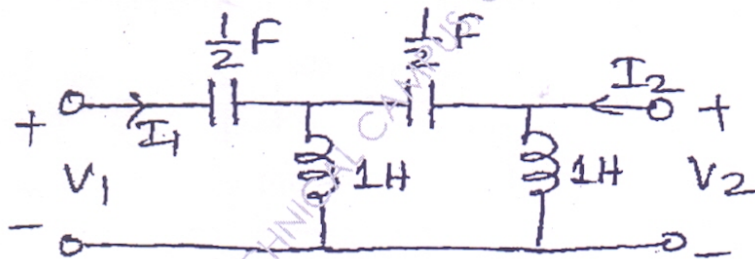(b) Find the driving point admittance function of the network shown in fig. 7. **10**

(fig. 7)

6. (a) Determine Y-parameters for the network shown in fig. 8. **10**

(fig. 8)

(b) Find h-parameters for the network shown in fig. 9. **10**

(fig. 9)

7. (a) Determine Foster form of realization of **15**

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

(b) Test whether the polynomial $P(s) = s^5+s^3+s$ is Hurwitz. **5**

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