S.E. IV Comp Sem I. Electrical Network 8/6/06

45 : 1sthalf-D98

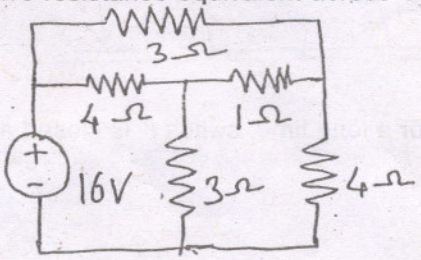
Con. 1952-06. **(REVISED COURSE)** **TV-7980**

(3 Hours) **[Total Marks : 100**

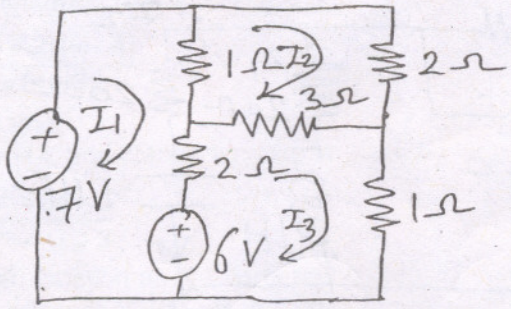
N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) In all solve **five** questions.

1. Solve **all** :—

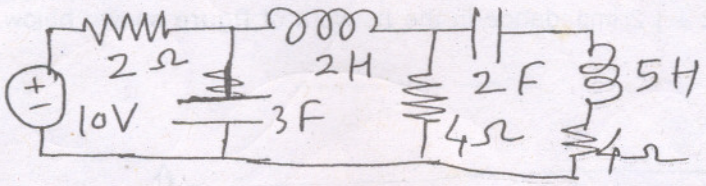
(a) Find Thevenin's resistance equivalent across 1 ohm resistance :— **3**



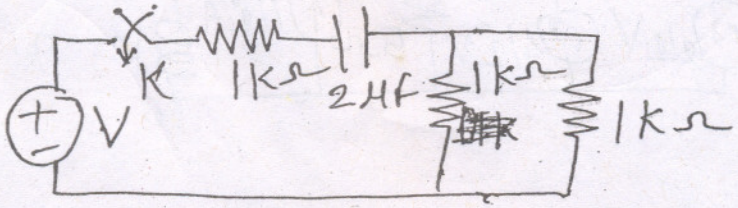
(b) For the circuit shown in **figure**, find I_1, I_2 and I_3 :— **3**



(c) Draw the dual circuit for the network shown below :— **4**

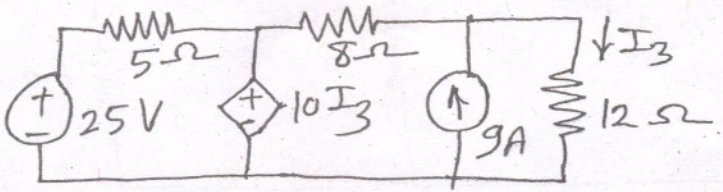


(d) What is the time constant of the circuit ? **4**

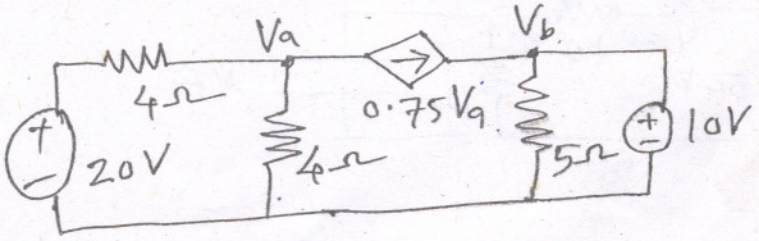


(e) Find the Laplace transform of decaying exponential function. **3**
(f) Explain initial condition for inductor and capacitor. **3**

2. (a) Find current I_3 in the **figure** shown below by Loop Analysis. 10



(b) Using Superposition Theorem determine V_a and V_b for the network shown below :— 10



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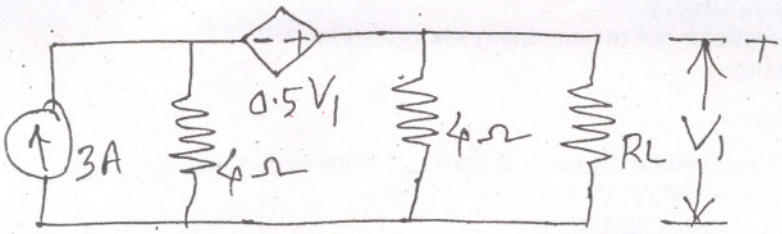
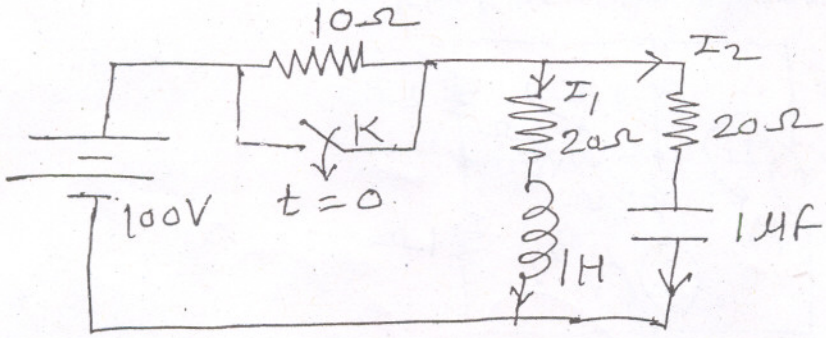
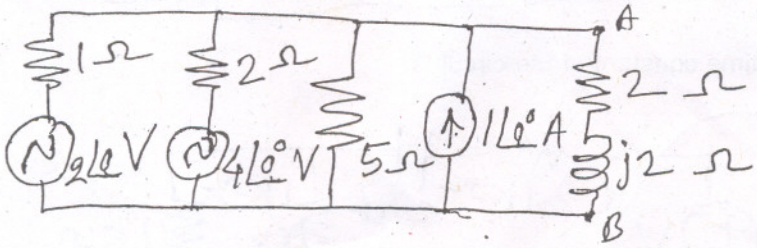
3. (a) Find the value of R_L to get the maximum power. Also find that power :— **10**



(b) In the network given the switch (K) is open for a long time, switch K is closed at t = 0. Determine I_1, I_2, $\frac{dI_1}{dt}$, $\frac{dI_2}{dt}$ at $t=0^+$. **10**

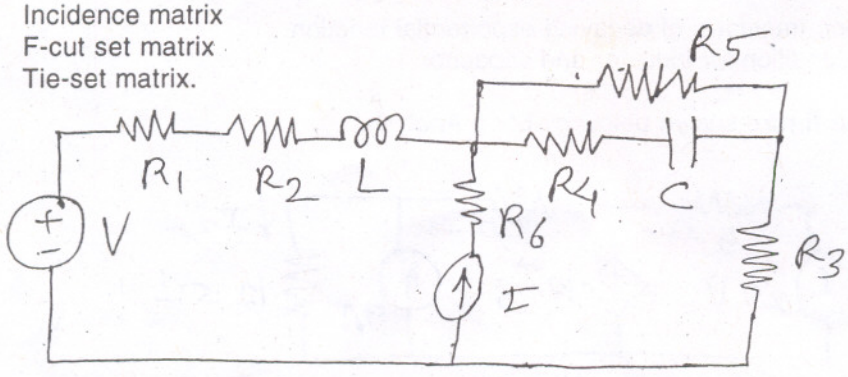


4. (a) Find the current in the 2 + j 2 impedance in the network of **figure** shown below. Use Thevenin's Theorem :— **8**

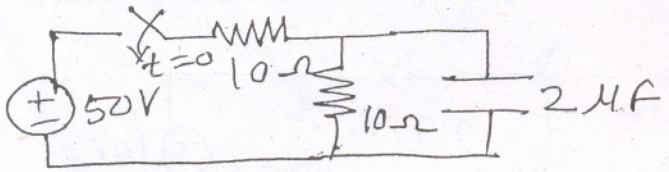


(b) For the circuit shown below. Draw the oriented graph and write :— **12**

(i) Incidence matrix
(ii) F-cut set matrix
(iii) Tie-set matrix.



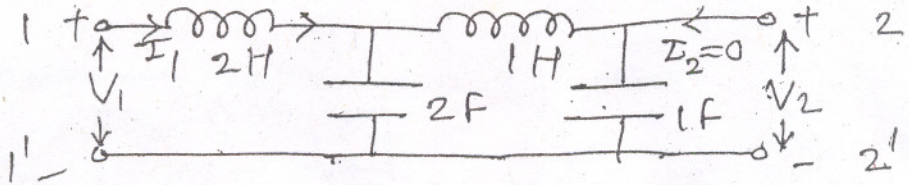
5. (a) In the circuit of **figure** below. Determine V_c (Voltage across capacitor). **10**



(b) Draw Bode plot for — **10**

$$\frac{50\,(1+0\cdot02\,s)}{s\,(1+0\cdot05\,s)}.$$

6. (a) Find the open circuit transfer impedance V_2/I_1 and open circuit voltage ratio V_1/V_2 for the following Ladder network :— 10



(b) Using pole, zero diagram. Find the current response in time domain if :— 10

$$I(s) = \frac{4s(s+1)}{(s+2)(s+5)}.$$

7. (a) Synthesize the following function :— 8

$$Z(s) = \frac{6(s+2)(s+4)}{s(s+3)}$$

Use Foster-II Method.

(b) A deriving point R-L admittance function is given by — 6

$$Y_{RL}(s) = \frac{s^2+6s+8}{s^2+4s+3}.$$

Realize the given function as R-L form using Cauer-I

(c) Synthesize the following $Y_{RL}(s)$ using Cauer-II term — 6

$$Y_{RL}(s) = \frac{(s+1)(s+4)}{s(3s+4)}.$$