SE | Sem III (CBSGS) | ETRX

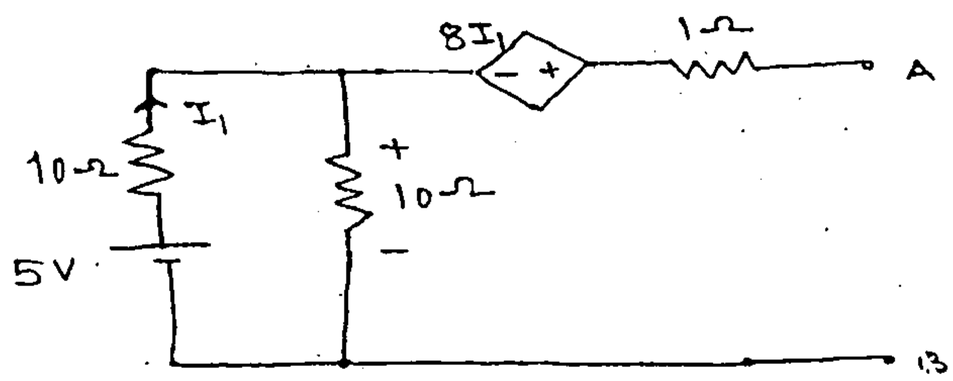
Circuit Theory 01|06|15

QP Code : **4821**

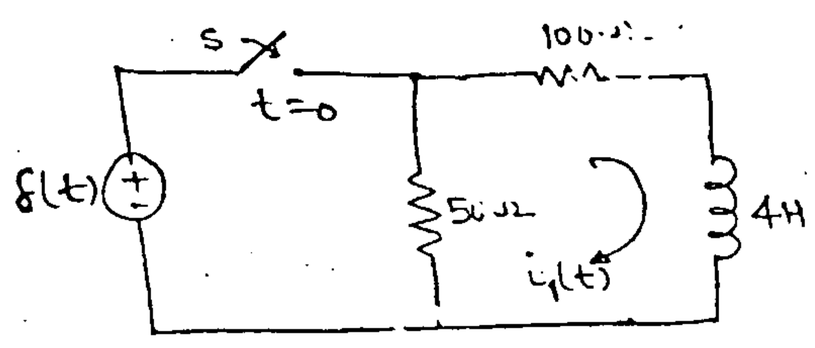
(3 Hours) [Total Marks : 80

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions from remaining.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable data if required.
(5) Use smith chart for transmission line problem.

1. (a) Find the thevnin's equivalent network for terminals A and B. **4**



(b) For the network shown, the switch is closed at t = 0. Find the current $i_1(t)$ for t > 0 **4**

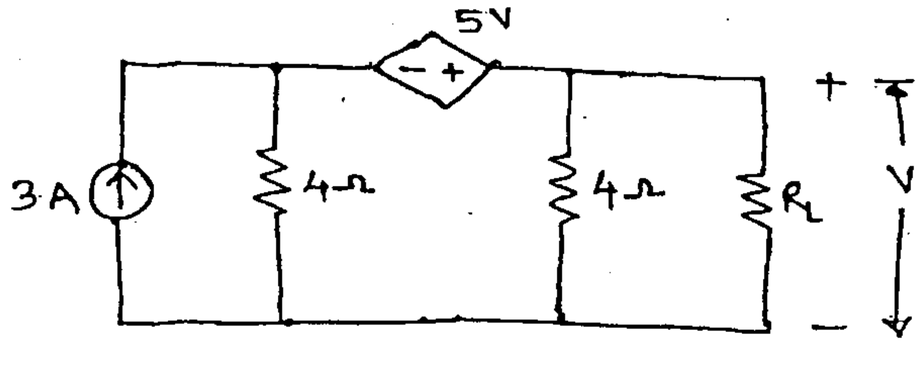


(c) State the condition for reciprocity of h-parameter and prove it. **4**

(d) Obtain S-domain equivalent circuit of an inductor and capacitor having non-zero initial conditions. **4**

(e) What are scattering parameters. State their properties. **4**

2. (a) In the given network, what will be the R_L to get maximum power delivered to it. Calculate power. **8**



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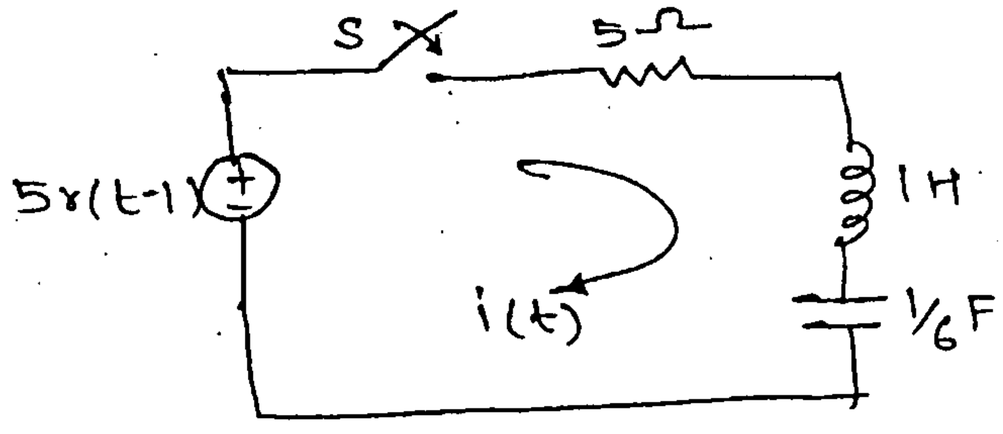
(b) For the network shown, determine the current i(t) when the switch is closed at t = 0 with zero initial conditions. 8



(c) List the types of damping in series R-L-C circuit and mention the condition for each damping. 4

3. (a) Design a single stub match for a load of (150 + j232.5) Ω for 75Ω transmission line at 500 MHz using smith chart. 8

(b) Define T-parameters and relate them to other parameter as indicated. 6

(i) A and C in terms of z-parameters

(ii) B interms of y-parameter

(c) Compare Foster form-I and Foster from-II of an L.C. network. 6

$$Z(s) = \frac{6s(s^2+4)}{(s^2+1)(s^2+64)}$$

4. (a) Check the positive real functions – 8

(i) $F(s) = \frac{s^2+6s+5}{s^2+9s+14}$ and

(ii) $F(s) = \frac{s^3+6s^2+7s+3}{s^2+2s+1}$

(b) Derive an expression for characteristic equation of a transmission line. Also obtain α, β and γ of the line. 8

(c) What are standing waves. Define reflection coefficent and V.S.W.R. of a transmission line. 4

5. (a) Test wheather the following polynomials are Hurwitz, use continuous fraction expansion 10

(i) $s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4$

(ii) $s^4 + 2s^2 + 2$

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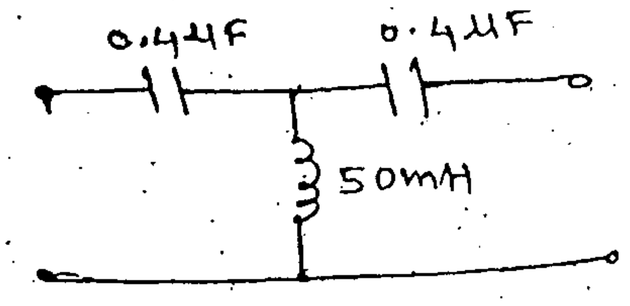
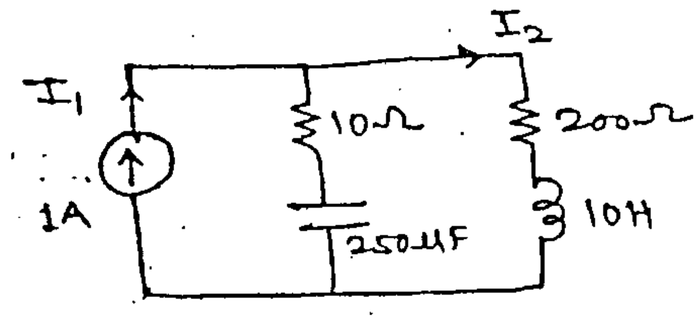
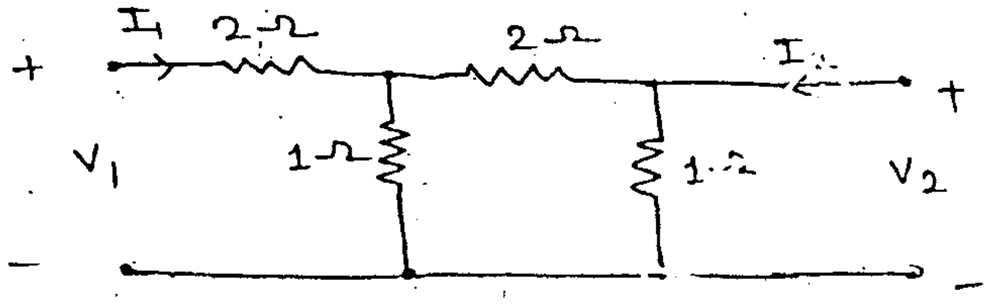
(b) Find the characteristic impedances, cut off frequency and passband frequency for given network. 5



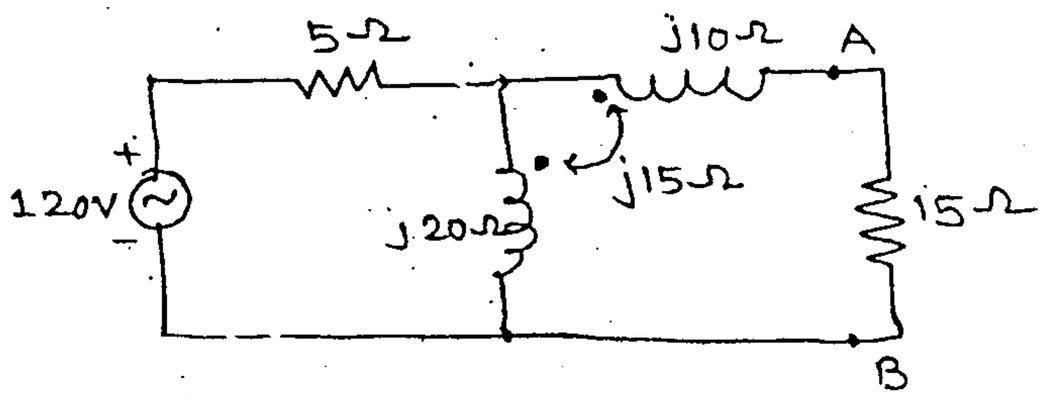
(c) Obtain pole-zero plot for I_2/I_1 5



6. (a) Two identical sections of the network shown are connected in cascade manner. Obtain the transmission line parameters of over all connection. 8



(b) Find the current through 15-Ω resistor 6



(c) Compare Cauer form - I and Cauer form - II of RC Network 6

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