**QP Code : 30699**

(3 Hours) [Total Marks : 80

N. B. : (1) Question No. **1** is **compulsory**.
      (2) Attempt any **three** questions from remaining questions.
      (3) Use Smith chart wherever required.
      (4) Assume suitable data if required.

1. (a) Test for following polynomial using continued fraction expansion only   20
$P(s) = s^5 + 12s^4 + 45s^3 + 60s^2 + 44s + 48$

   (b) Obtain transmission parameters (ABCD) in terms of z-parameters.

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

   (d) Obtain S-domain (Laplace Transform) equivalent circuit diagram of an inductor and capacitor with initial condition.

2. (a) Calculate voltage across the resister 6Ω using source shifting technique.   10
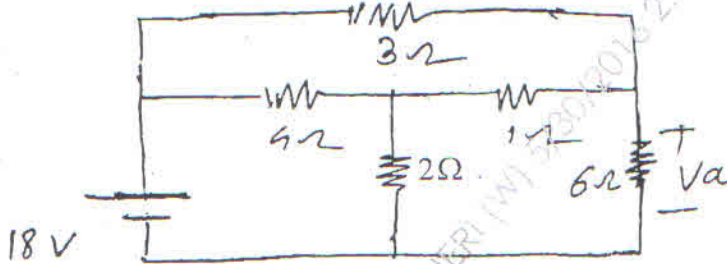
   (b) Compare and obtain Foster-I and Foster-II form using example of RC circuit   10
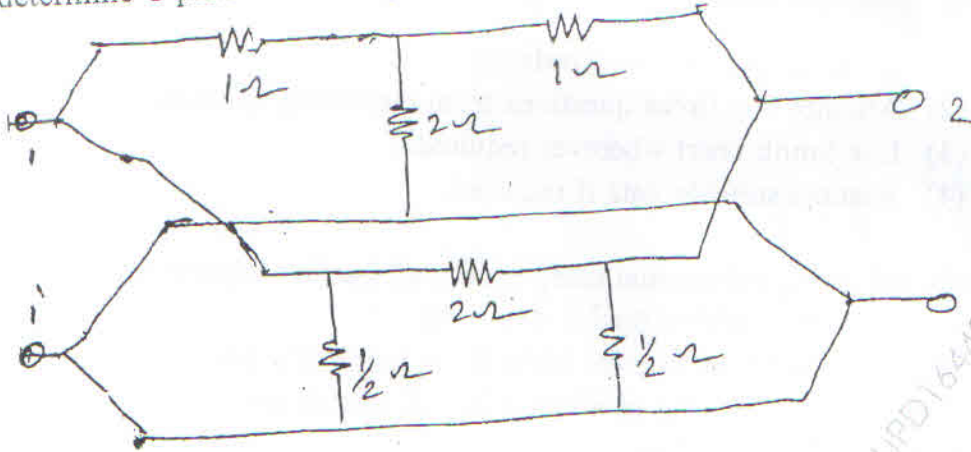$$Z(s) = \frac{(s+1)\ (s+6)}{s(s+4)\ (s+8)}$$

3. (a) Design a short circuit shunt stub match for $Z_L = 450 - 600j(\Omega)$. For a line of $Z_0 = 300(\Omega)$ and $f = 20$ MHz. Use Smith chart   10

   (b) In the circuit shown determine current I_1 and I_2 when switch is closed at t=0   10

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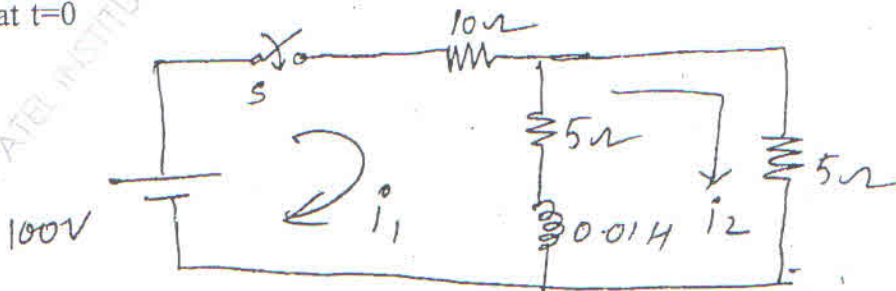
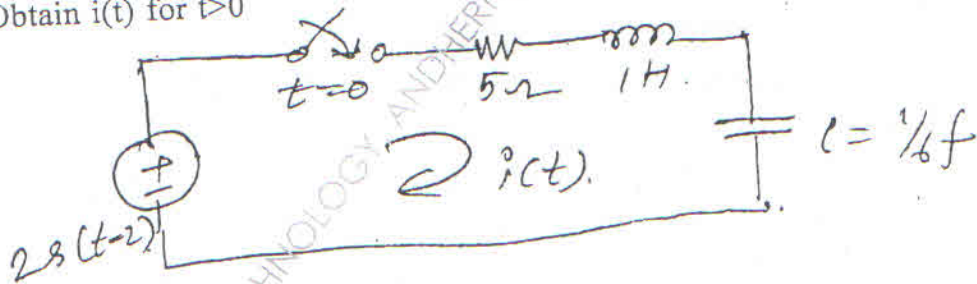4. (a) determine Y-parameter using interconnection of two port networks   10

(b) Check for positive real function test   5

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

(c) Compare Cauer-I and Cauer-II form of LC network   5
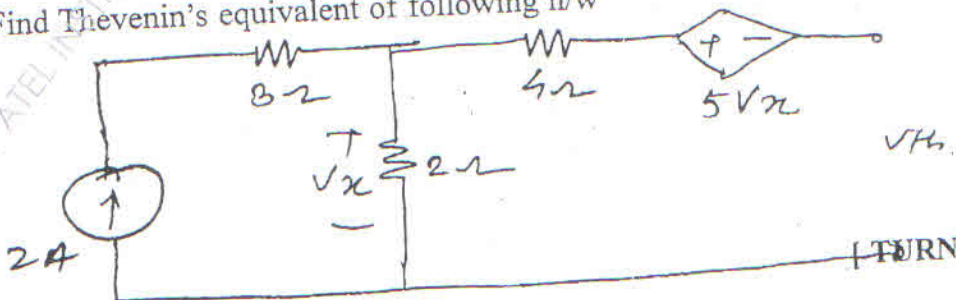
$$Z(s) = \frac{2(s^2 + 1)(s^2 + 4)}{s(s^2 + 2)}$$

5. (a) Obtain i(t) for t>0   10

where r(t) is a ramp signal

(b) Derive an expression for characteritic equation of a transmission line.   10
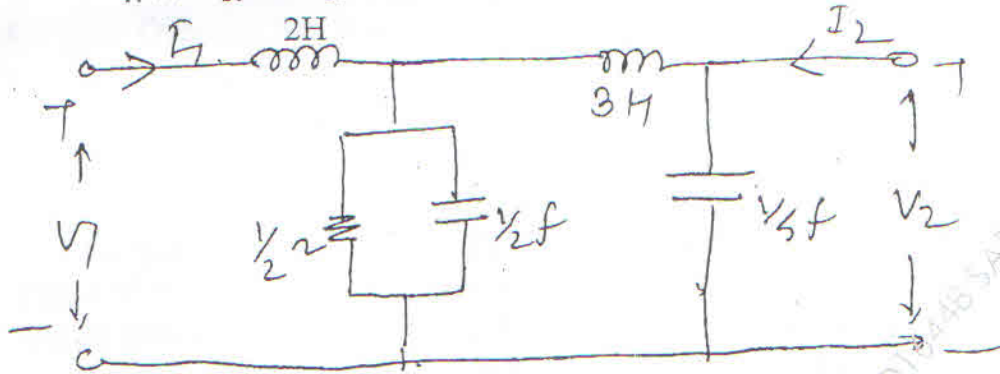   Also obtain 'α', 'β' and 'γ' of the line.

6. (a) Find Thevenin's equivalent of following n/w   8

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(b) Explain various types of filters. 4

(c) Obtain $Z_{11}(s)$, $Z_{21}(s)$, $G_{21}(s)$ for the ladders n/w. 8