Roll No

Total No. of Pages : 7

4E4172

4E4172

B. Tech. IV-Sem. (Main) Exam; April-May 2017

Electrical Engineering

4EE2AC Circuit Analysis - II

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

Instructions to Candidates :-

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams **must** be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used calculated **must** be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

1. NIL 2. NIL

UNIT - I

1 (a) Describe the necessary properties for transfer function. **8**

(b) Explain with reasons, why the following expression for the driving point impedance $Z(s)$ is not suitable for representing a passive network.

$$Z(s) = \frac{S^4 - S^3 - 2S^2}{S+5}$$

8

OR

1 (a) Describe the necessary properties of driving point functions. 8

(b) Find the transfer function of the network shown in Fig. 1. Also sketch pole zero configuration.

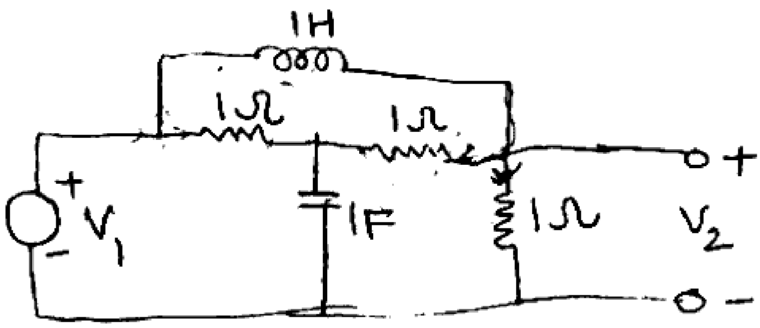

Fig. 1

8

UNIT - II

2 (a) Obtain the transfer function $\frac{V_o}{V_s}$ of the RL circuit in Fig. 2, assuming $V_s = V_m \cos \omega t$. Sketch its frequency response.

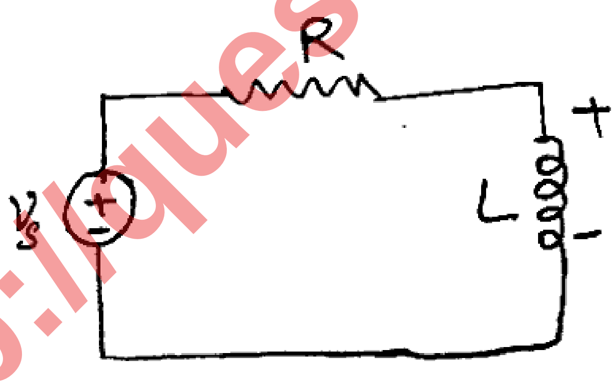

Fig. 2

8

(b) Find G_{21} (s) for the network shown in **Fig. 3**, when V_1 (s) is the applied voltage at the input terminals.

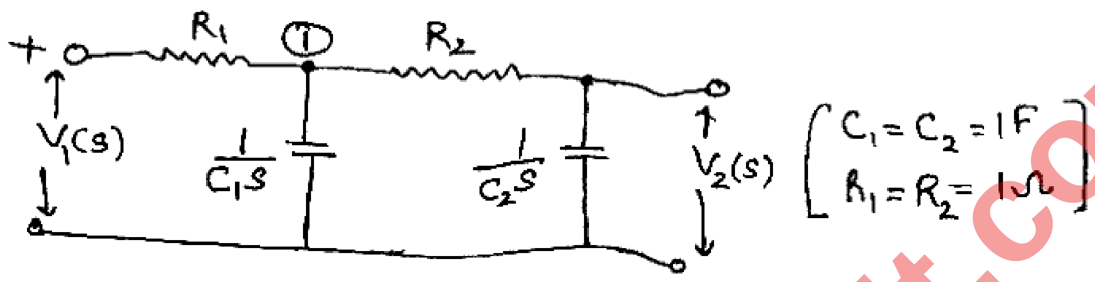

Fig. 3

8

OR

2 (a) Check the stability of the following system expressed of the polynomial $P(s) = S^3 + 2S^2 + 2S + 40$.

Apply Routh-Hurwitz criterion.

8

(b) Find the transfer function $\frac{V_o(w)}{I_i(w)}$ for the circuit in **Fig. 4**. Obtain its zeros and poles.

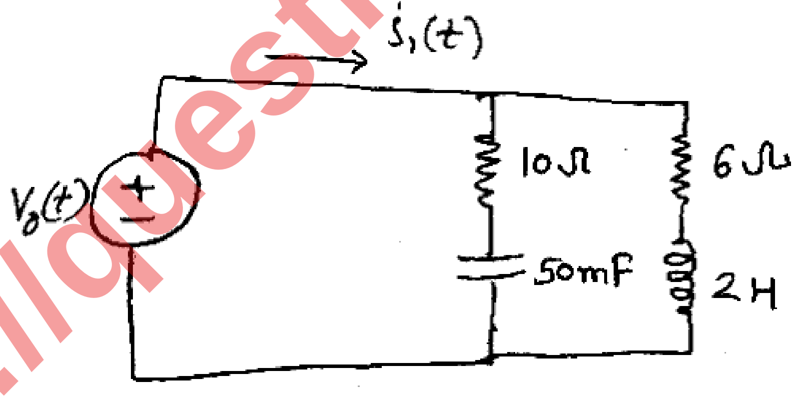

Fig. 4

8

UNIT - III

3. (a) A function is given by $Z(s)=\dfrac{(S^2+1)(S^2+16)}{S(S^2+4)}$. Realise it in the first and second form of Foster LC forms.

8

(b) An impedance function of LC network is given by

$$Z(s)=\frac{12S^3+4S}{3S^4+10S^2+2}$$

Synthesize the function to draw the Cauer-2 network.

8

OR

3 (a) Find the driving port impedance in Laplace form of the given network across a–b in **Fig. 5**

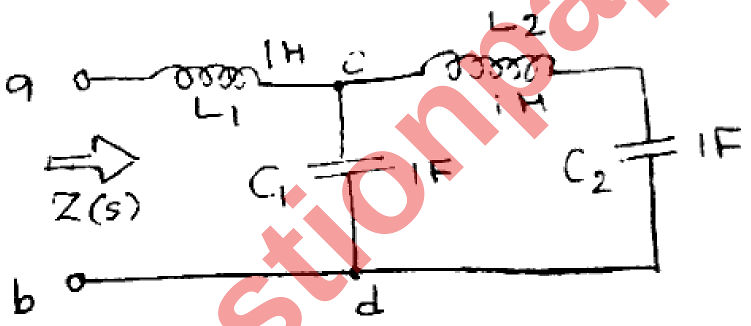

Fig. 5

8

(b) The driving port impedance of a one port reactive network is given by

$$Z(s)=\frac{S(S^2+4)}{(S^2+1)(S^2+16)}$$

Obtain the Foster forms of LC network realization.

8

UNIT - IV

4 (a) Find the transmission parameters for the circuit in Fig. 6.

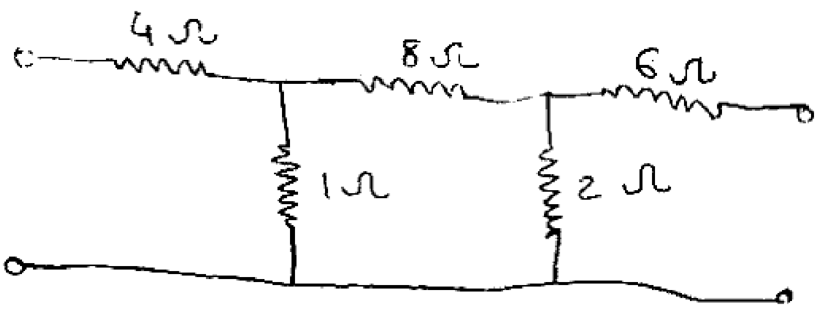

Fig. 6

8

(b) A π (Pie) network has been shown in Fig. 7 where $(0.5\, I_3)$ is the controlled current source. Obtain the Z-parameters for the π circuit model.

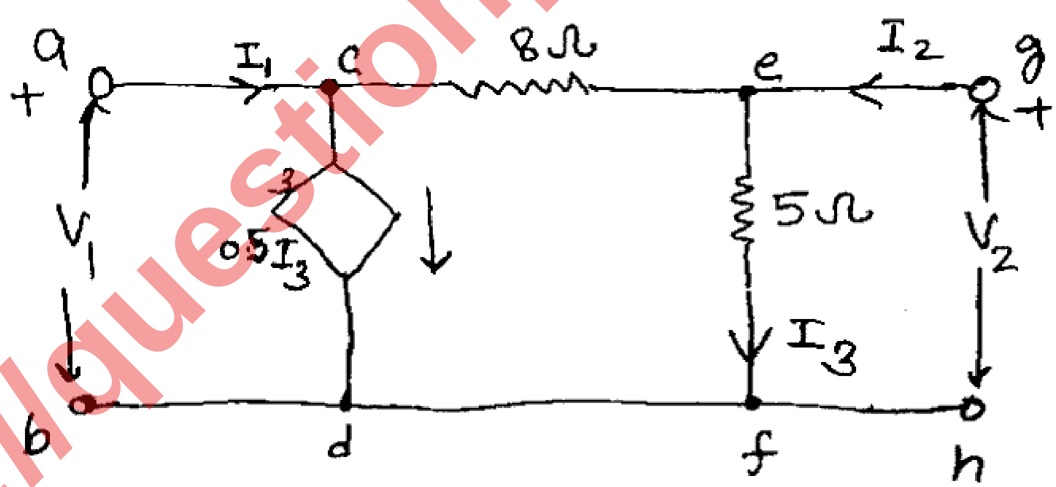

Fig. 7

8

OR

4 (a) Two networks have been shown in Fig. 8. Obtain the transmission parameters of the resulting circuit when both the circuits are in cascade.

(i)

(ii)

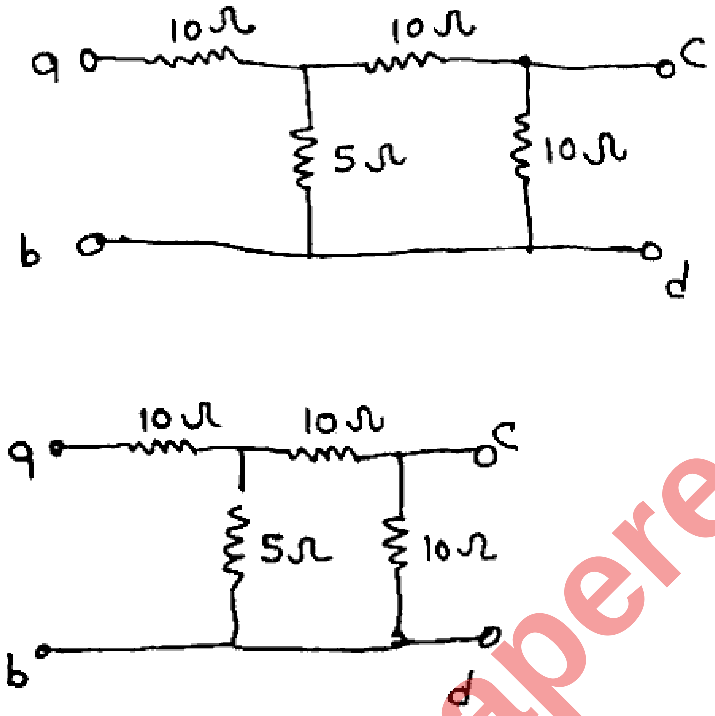

Fig. 8

8

(b) For **Fig. 9** obtain Z parameters and show that the network is not reciprocal.

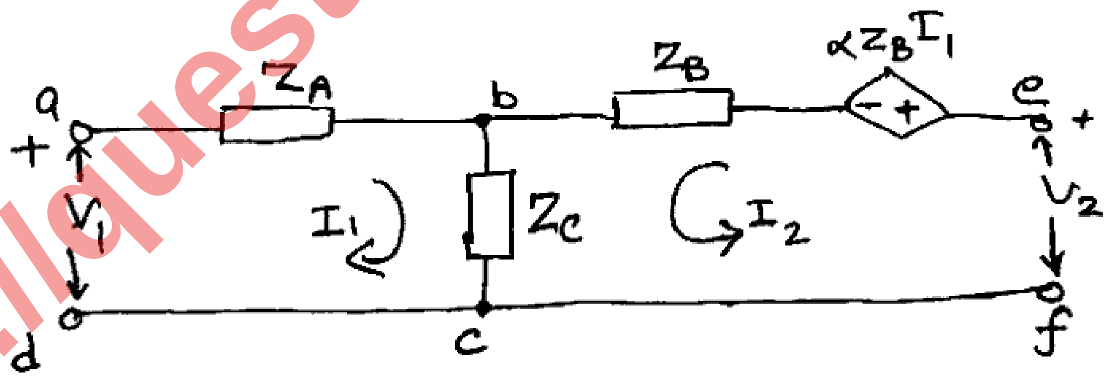

Fig. 9

8

UNIT - V

5 (a) Determine what type of filter is shown in **Fig. 10**. Calculate the corner of cutoff frequency.

(Take $R = 2\,k\Omega$, $L = 2H$ and $C = 2\,\mu F$)

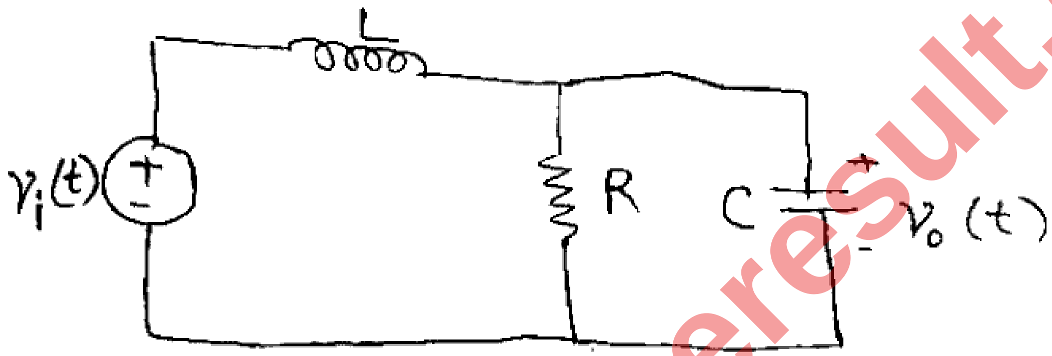

Fig. 10

8

(b) Design a constant K-high pass filter having $f_c = 4\,kHz$ and design impedance $R_0 = 600\,\Omega$ (π - section)

8

OR

5 (a) Design an m-derived high pass filter having a design impedance of $600\,\Omega$, cut off frequency 5 kHz and m = 0.35. Also determine the frequency of infinite attenuation.

8

(b) A series LCR type BPF is to work with cut-off frequencies 23 kHz and 25 kHz. Assume L = 45 mH while load resistance is 50 kΩ. Design the BPF.

8