

4E4172

Roll No

Total No. of Pages : **7****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

rtuonline.com

ersahilkagyan.com*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. NIL2. 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.

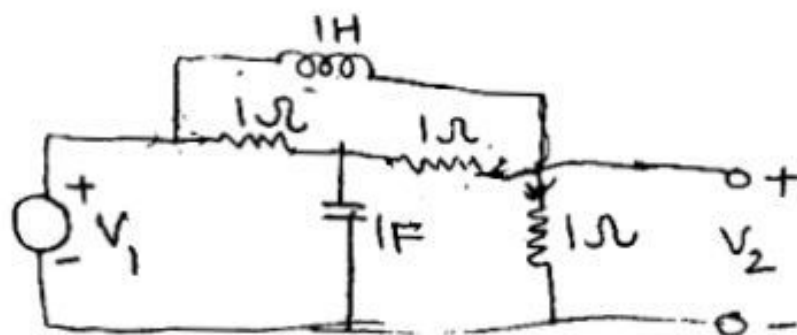


Fig. 1

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.

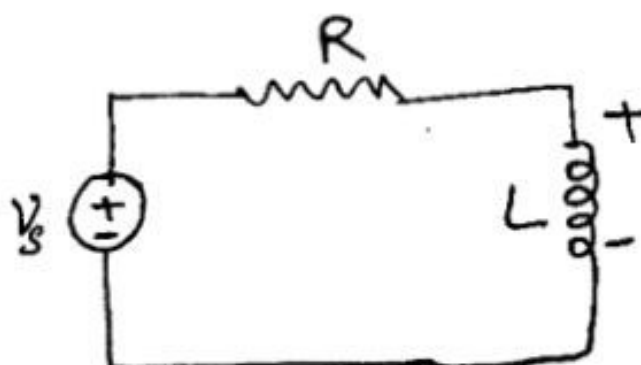


Fig. 2

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

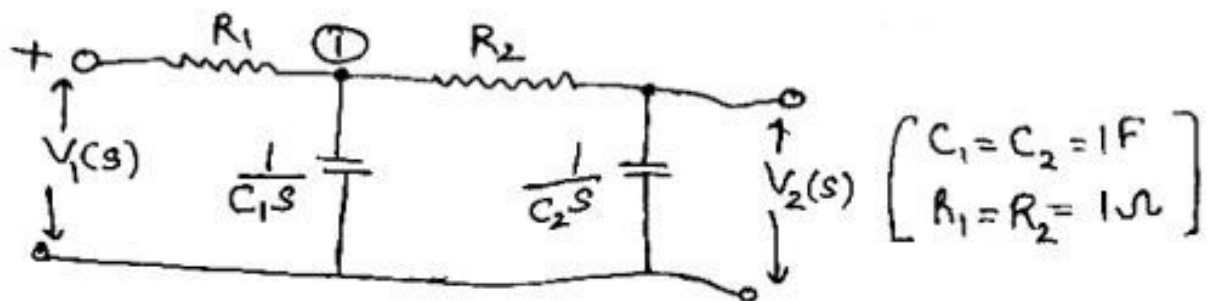


Fig. 3

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.

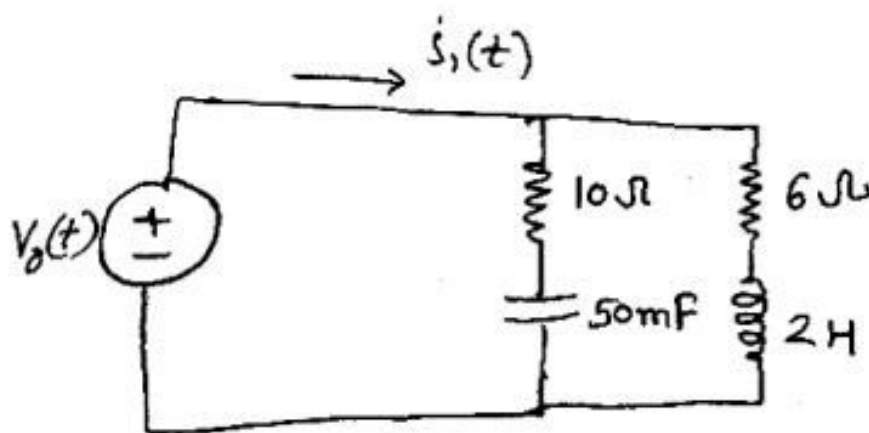


Fig. 4

UNIT - III

3. (a) A function is given by $Z(s) = \frac{(s^2 + 1)(s^2 + 16)}{s(s^2 + 4)}$. 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

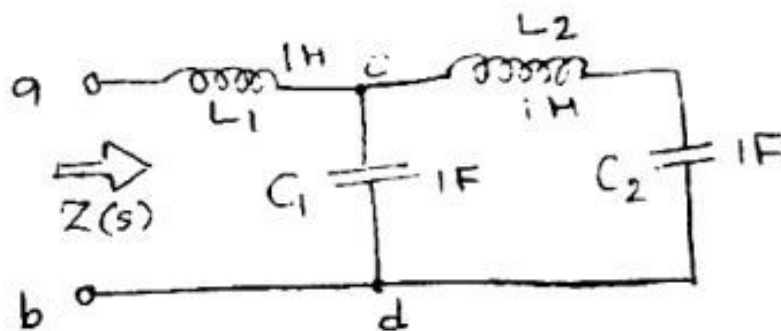


Fig. 5

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.

UNIT - IV

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

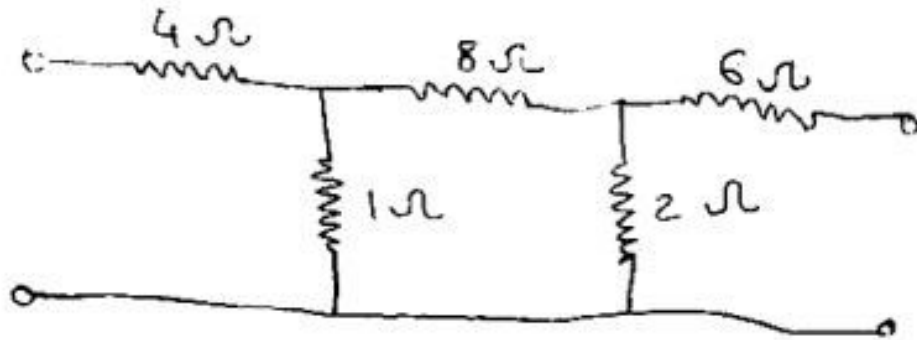


Fig. 6

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.

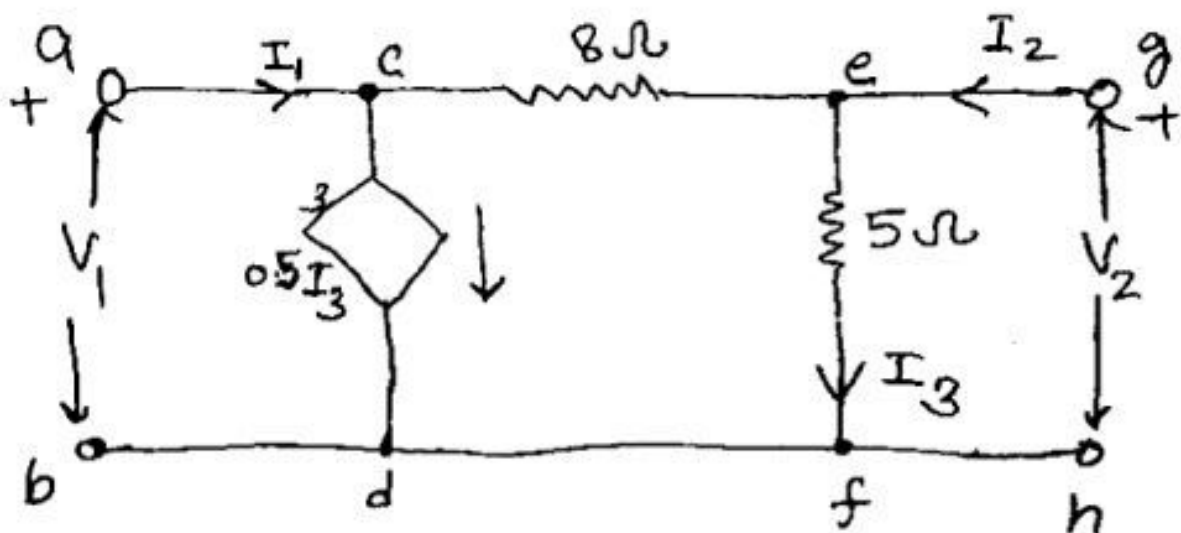
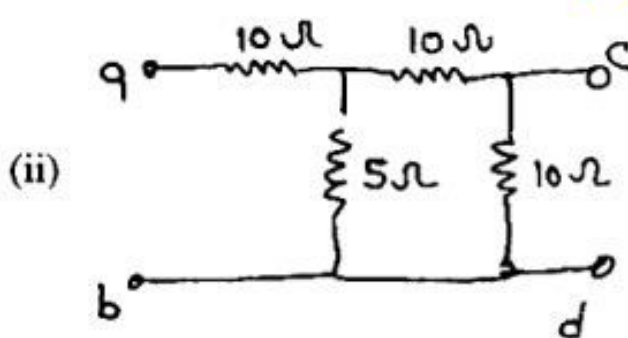
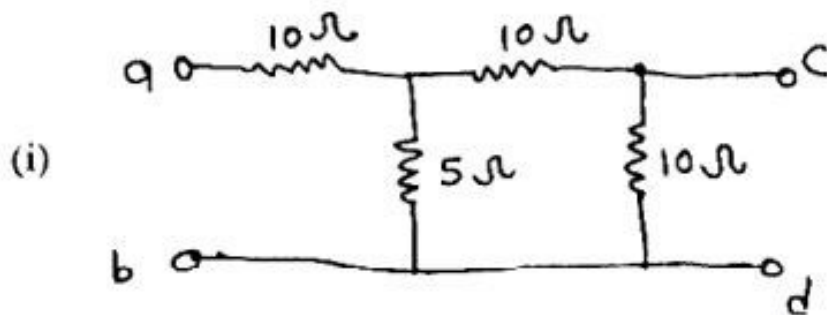


Fig. 7

- 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.



ersahilkagyan.com

rtuonline.com

Fig. 8

8

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

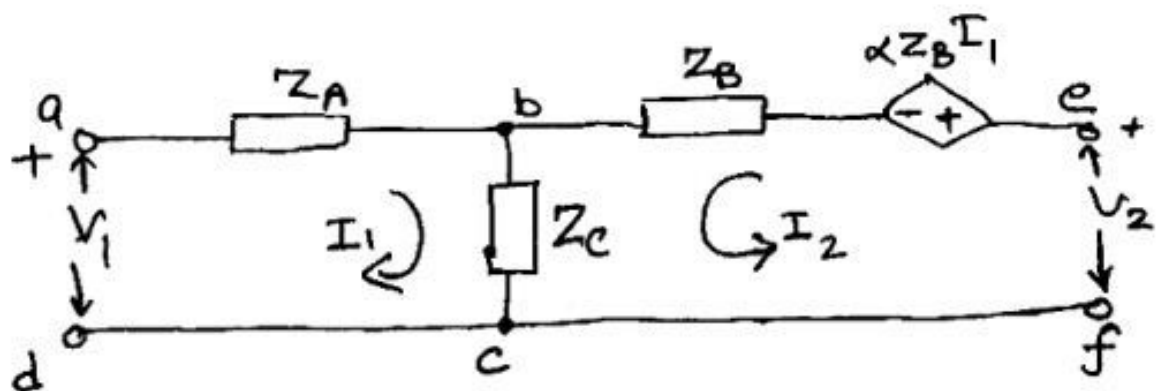


Fig. 9

UNIT - V

- 5 (a) Determine what type of filter is shown in Fig. 10. Calculate the corner of cutoff frequency.
(Take $R = 2\text{ k}\Omega$, $L = 2\text{ H}$ and $C = 2\text{ }\mu\text{F}$)

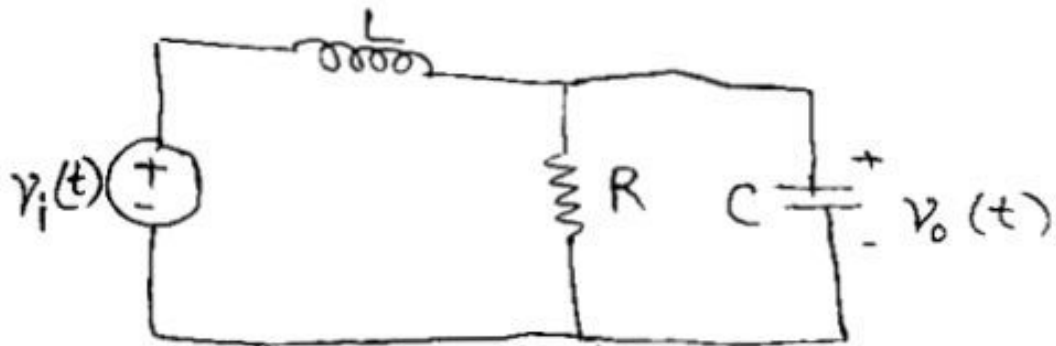


Fig. 10

8

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

8

OR

- 5 (a) Design an m-derived high pass filter having a design impedance of $600\text{ }\Omega$, 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 $L = 45\text{ mH}$ while load resistance is $50\text{ k}\Omega$. Design the BPF.