



B.E DEGREE EXAMINATIONS: MAY 2015

(Regulation 2013)

Third Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U13EET301: Network Theory

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Consider the network graph shown in Fig. 1, which one of the following is NOT a tree of this graph?

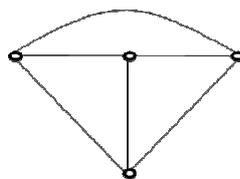
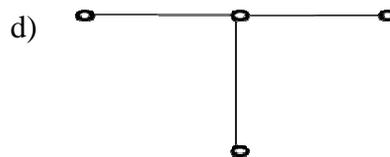
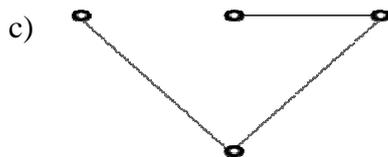
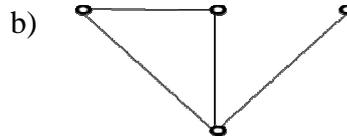
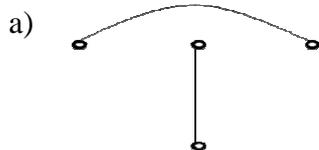


Fig. 1



2. A network has 7 nodes and 5 independent loops. The number of branches in the network is
3. An inductor in the s-domain consists of
- a) Current source in series with an inductor b) Voltage source in parallel with an inductor
- c) Voltage source of LI_0 in series with an inductor d) Current source of I_0/s in series with an inductor
4. In RLC Series transient circuit, if $(R/2L)^2 > 1/LC$, then the roots are and response will be.....
5. The driving Point impedance $Z(s)$ of a network has the pole-zero locations as shown in Fig. 2. If $Z(0)=3$, the $Z(s)$ is

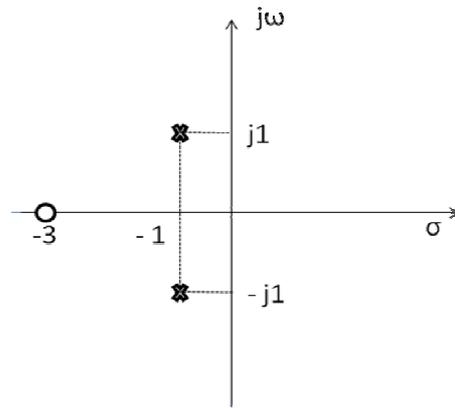


Fig. 2

a) $\frac{3(s + 3)}{s^2 + 2s + 3}$

b) $\frac{2(s + 3)}{s^2 + 2s + 2}$

c) $\frac{3(s - 3)}{s^2 - 2s - 2}$

d) $\frac{2(s - 3)}{s^2 - 2s - 3}$

6. For a two-port network, the three transmission parameters are given by $A = \frac{6}{5}$, $B = \frac{17}{5}$ and $C = \frac{1}{5}$, the value of D is

7. In an m-derived low pass filter, the value of m is

a) $\sqrt{1 - \left(\frac{f_{\infty}}{f_c}\right)^2}$

b) $\sqrt{1 - \left(\frac{f_c}{f_{\infty}}\right)^2}$

c) $\sqrt{1 + \left(\frac{f_{\infty}}{f_c}\right)^2}$

d) $\sqrt{1 + \left(\frac{f_{\infty}}{f_c}\right)^2}$

8. An ideal filter should have attenuation in the pass band.

9. The pole zero pattern of a particular network is shown in Fig. 3. It is that of an

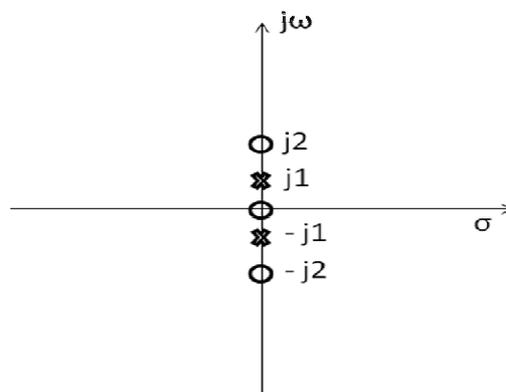


Fig. 3

a) LC Network

b) RC Network

c) RL Network

d) RLC Network

10. In the first Foster form, the presence of first element capacitor C_0 indicates pole at

PART B (10 x 2 = 20 Marks)

(Not more than 40 words)

11. List out the properties of Tree.
12. Define Twigs and links.
13. Draw the Transient response of series RL circuit which is excited by DC Source.
14. Differentiate between natural response and forced response.
15. Write the significance of pole and zero in driving point impedance.
16. Determine the image parameters of the T network shown in Fig. 4.

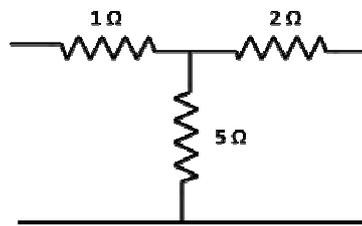


Fig. 4

17. What are the disadvantages of Constant-k filters?
18. Draw the structure of m-derived π -section low-pass filter.
19. Test whether the polynomial $P(s) = s^4 + s^3 + 5s^2 + 3s + 4$ is Hurwitz.
20. List out any four properties of Positive Real Function.

PART C (5 x 14 = 70 Marks)

(Not more than 400 words)

Q.No. 21 is Compulsory

21. Derive and plot the voltage and current response of series RC circuit for DC Excitation. Also obtain the power expression of resistor and capacitor.

22. a) i. The reduced incidence matrix of an oriented graph is

$$A = \begin{bmatrix} 0 & -1 & 1 & 0 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

(1) Draw the graph

(2) How many trees are possible for this graph?

(10)

(3) Write the tieset and cut set matrices.

- ii. With suitable example, define and list out the properties of path and loop of network. (4)

(OR)

- b) For given network shown in Fig. 5, write down the tieset matrix and obtain the network equilibrium equation in matrix form using KVL. Calculate the loop currents and branch currents.

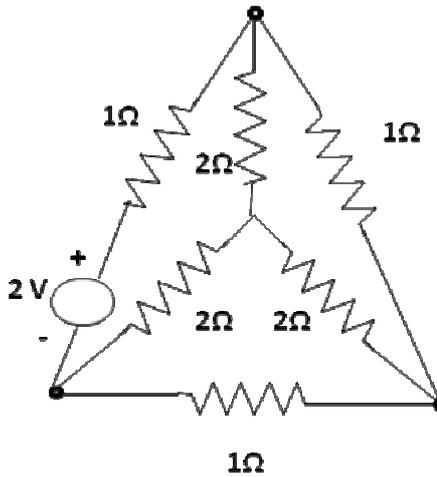


Fig. 5

23. a) i Discuss the properties of driving point function of network. (7)
- ii Determine driving point impedance $Z(s)$ of network shown in Fig. 6. Also find the pole and zeros of $Z(s)$ and plot them on s -plane (7)

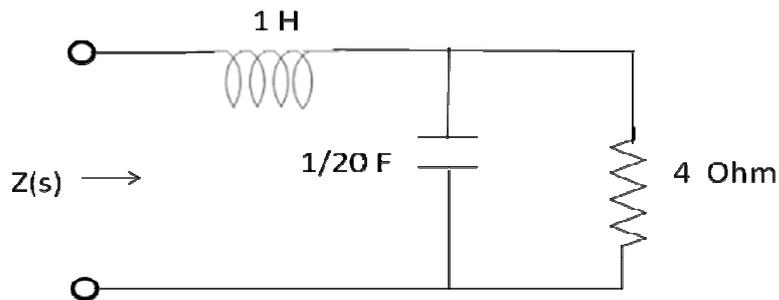


Fig. 6

(OR)

- b) i Obtain the ABCD parameter for network shown in Fig. 7.

(7)

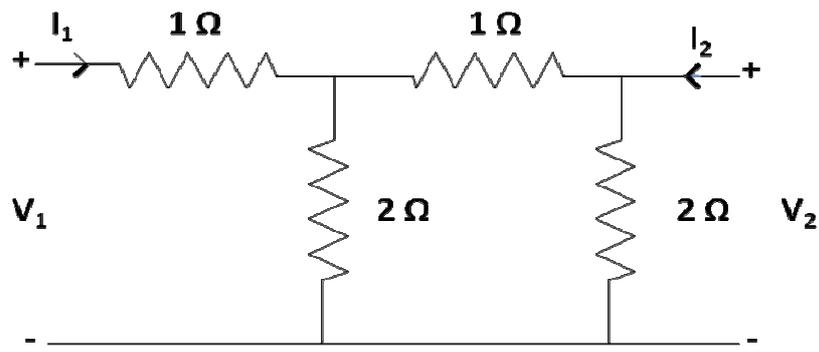
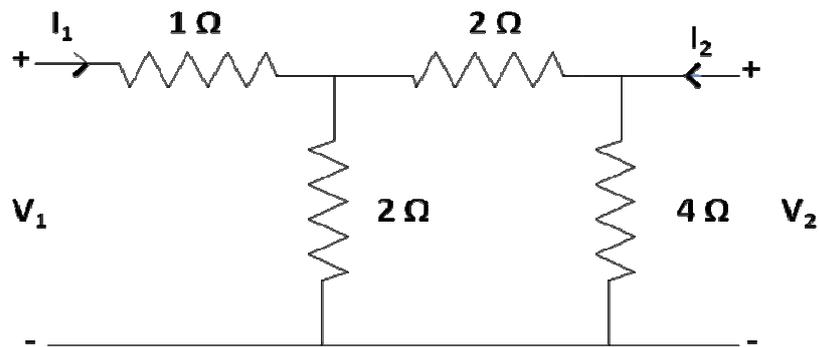


Fig. 7

- ii Determine the Y-parameter for the network shown in Fig. 8. Determine whether the network is symmetrical and reciprocal.



(7)

Fig. 8

24. a) A low pass filter is composed of a symmetrical π section. Each series branch is a 0.02H inductor and shunt branch is a 2 μ F capacitor.

Find

- (1) Cut off frequency
- (2) Nominal impedance
- (3) Characteristic impedance at 200Hz and 2000 Hz
- (4) Attenuation at 200 Hz and 2000 Hz
- (5) Phase shift constant 200Hz and 2000 Hz.

(OR)

- b) i From the first principle, derive the design equation for a symmetrical T type attenuators in terms of R_0 and attenuation D decibels. (8)
- ii Design a T-Type attenuator to give an attenuation of 60dB and characteristic impedance of 500 Ω . (6)

25. a) An impedance function has the pole-zero diagram as shown in Fig. 9. Find the impedance function such that $Z(-4) = \frac{3}{4}$ and realize in Cauer I and Foster II forms.

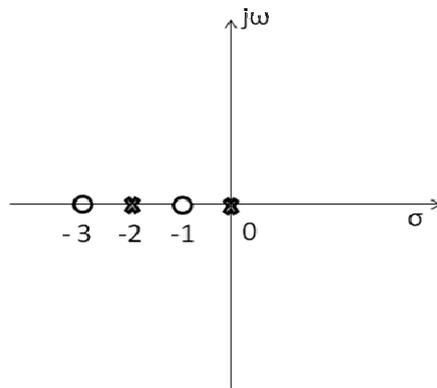


Fig. 9

(OR)

- b) Realize the Cauer form I and II of the following Impedance function

$$Z(s) = \frac{4(s^2 + 1)(s^2 + 9)}{s(s^2 + 4)}$$
