

Printed Pages : 7

EEE402

Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0208

Roll No.

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B. Tech.

(SEM. IV) THEORY EXAMINATION 2010-11

NETWORK ANALYSIS AND SYNTHESIS

Time : 3 Hours

Total Marks : 100

Note :- Attempt *all* questions. Each question carries equal marks.

1. Answer any **THREE** parts of the following :—

 $(3 \times 6^{2/3} = 20)$

(a) Define the following terms :—

(i) Tree

(ii) Co-tree

(iii) Cutset

(iv) Incidence matrix

(v) Planer and non-planer graph.

(b) A reduced incidence matrix of a graph is given by

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

Obtain and draw number of possible trees.

aktuonline.com (c) Define f-cutset matrix and develop the f-cutset matrix of network shown in Fig. 1 (c).

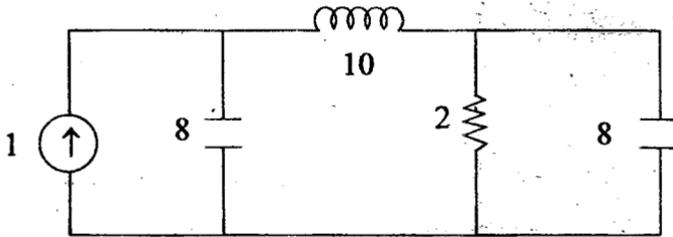


Fig. 1 (c)

- (d) Show that f-cutset and f-loop matrix are orthogonal to each other.
- (e) Draw graph of the network shown in Fig. 1 (e). Also write down tie set matrix.

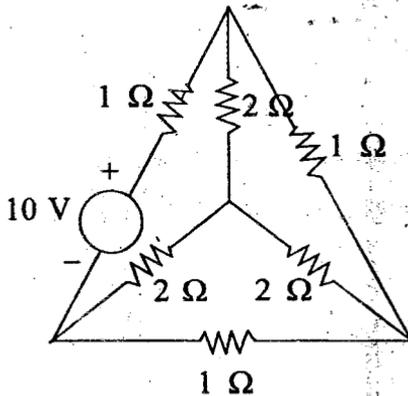


Fig. 1 (e)

2. Answer any **THREE** parts of the following :—

$$(3 \times 6^{2/3} = 20)$$

- (a) Define Thevenin's theorem and Superposition theorem. Also enlist limitations of each.
- (b) State maximum power transfer theorem. Also prove that in any network efficiency of the system will be 50% at maximum power transfer condition.
- (c) Determine the current through the branch AB of the network shown in Fig. 2 (c) using Millman's theorem.

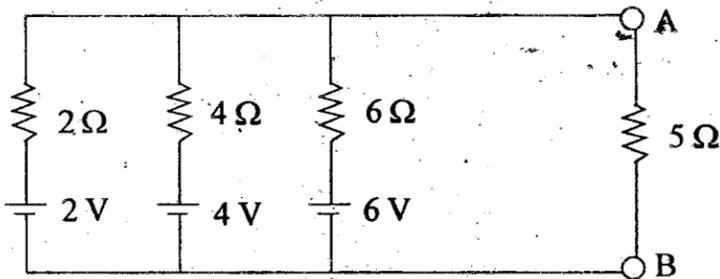


Fig. 2 (c)

Write advantages of star-delta transformation analysis. Also find out the values of resistance R_1 , R_2 and R_3 in a network shown in Fig. 2 (d) using star-delta transformation.

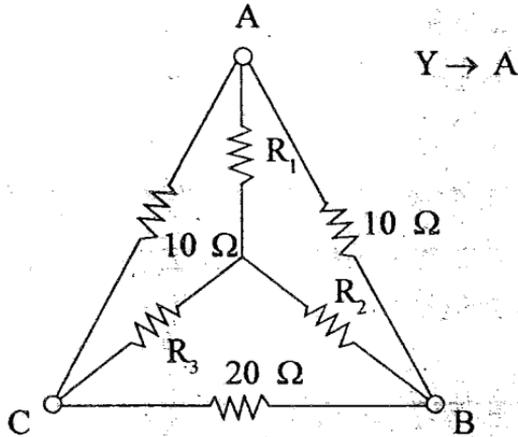


Fig. 2 (d)

(e) Using superposition theorem, determine the current flowing through AB in 2Ω resistor.

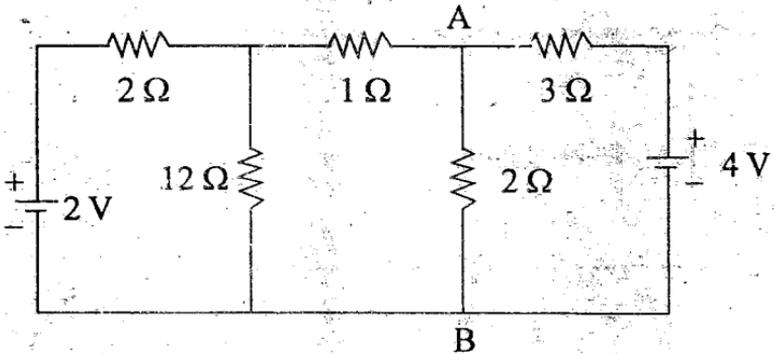


Fig. 2 (e)

(2×10=20)

- (a) If 2 two-port networks are connected in parallel, show that resultant Y-parameters are the sum of corresponding Y-parameters of 2 networks.
- (b) For a two-port network, Z-parameters are $Z_{11} = 50 \Omega$, $Z_{12} = Z_{21} = 25 \Omega$ and $Z_{22} = 30 \Omega$.
Compute ABCD parameters of network.
- (c) Obtain z-parameters of the network shown in Fig. 3 (c).

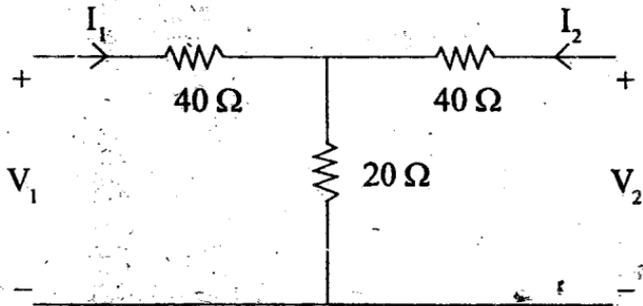


Fig. 3 (c)

4. Answer any **TWO** parts of the following :—

(2×10=20)

- (a) Explain Routh-Hurwitz criterion for stability assessment of the system. Also check stability of the system with characteristic equation :

$$2s^5 + s^4 + 6s^3 + 3s^2 + s + 1 = 0.$$

$$I(s) = \frac{5s}{(s+1)(s^2 + 4s + 8)}$$

and hence obtain time-domain response of the system.

- (c) Calculate open-circuit transfer impedance V_2/I_1 and open-circuit voltage ratio V_2/V_1 for a ladder network shown in Fig. 4 (c).

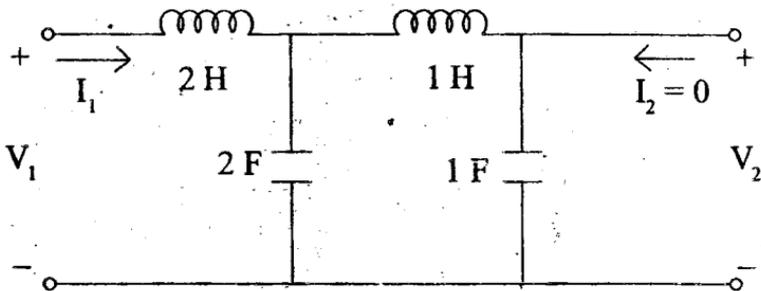


Fig. 4 (c)

5. Answer any TWO parts of the following :—

(2×10=20)

- (a) Define positive real function. Also write conditions for positive realness of the function.

Check given polynomial $P(s)$ is Hurwitz or not ?

Where

$$P(s) = s^7 + 2s^6 + 2s^5 + s^4 + 4s^3 + 8s^2 + 8s + 4.$$

- (b) Explain the advantages of active filter in comparison to passive filter.

Also realise the network $Y(s)$ using Cauer I and II form, where

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

- (c) Determine cut-off frequency of each high-pass filters shown in Fig. 5 (c) (i) and 5 (c) (ii).

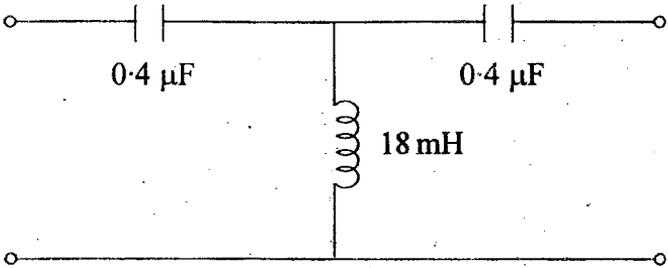


Fig. 5 (c) (i)

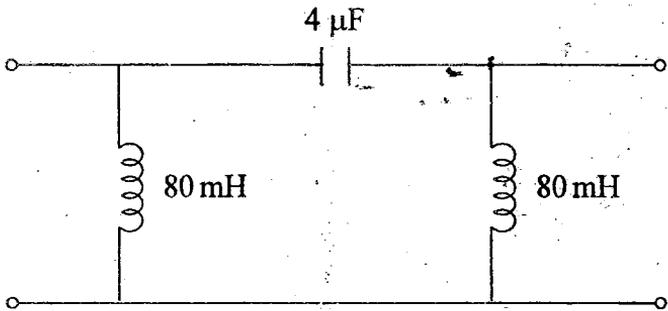


Fig. 5 (c) (ii)