Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech (Honours) Degree Examination June 2023 (2021 Admission)

Course Code: EET292

Course Name: NETWORK ANALYSIS AND SYNTHESIS

Max. Marks: 100 Duration: 3 Hours

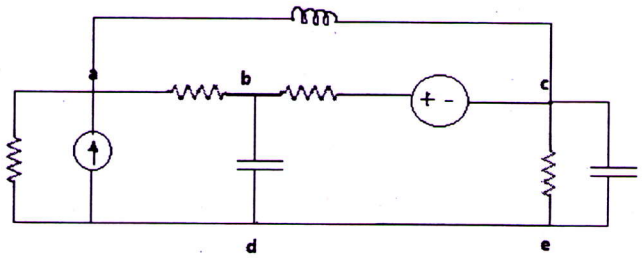
PART A

(Answer all questions; each question carries 3 marks) Marks

1 Describe the following terms 3

a) Tree b) Co-Tree c) Twig d) link e) Cut-set f) Tie-set

2 For the given circuit draw the graph, one tree and its co-tree 3



3 Explain the concept of duality with the help of a suitable example 3

4 State Tellegen's theorem. write two applications 3

5 Derive image impedance of an LTI two port network in terms of ABCD parameters 3

6 Draw the ideal response of (a) Low pass filter (b) high pass filter filter (c) Band Pass filter (d) Band stop filters 3

7 Write the properties of positive real function 3

8 Write the necessary and sufficient condition for positive real function 3

9 Draw the Foster and Cauer Form of LC networks 3

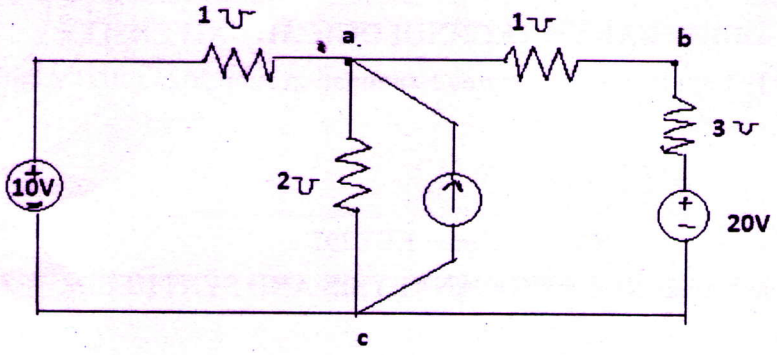
10 How can a circuit is realized from the network function using Cauer Form. 3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

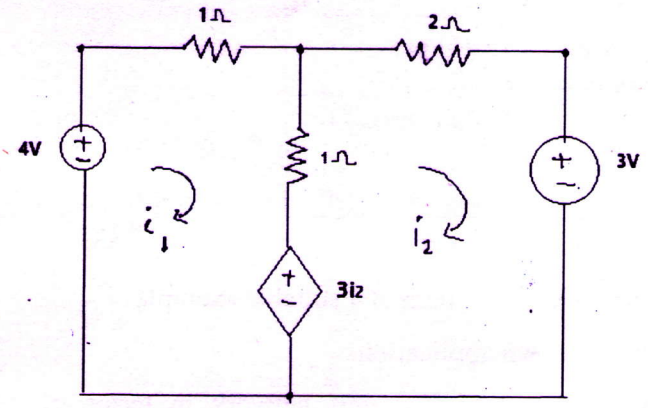
11 a) For the network shown draw the oriented graph, also write the node equation 10



b) A reduced Incident matrix of a graph is given by $\begin{bmatrix} 1 & 1 & 0 & 0 & 0 & 1 \\ 0 & -1 & 1 & -1 & 0 & 0 \\ -1 & 0 & -1 & 0 & -1 & 0 \end{bmatrix}$ 4

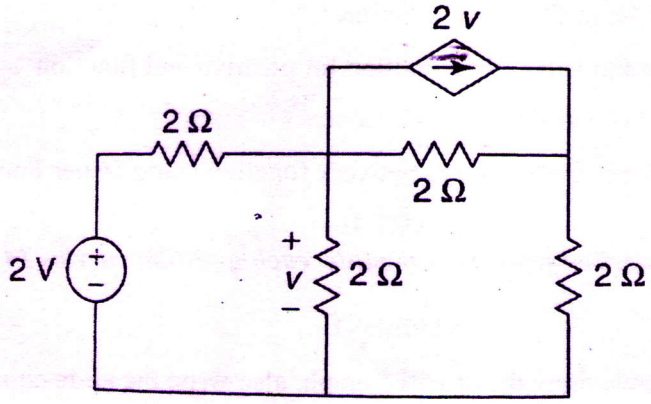
Obtain the number of possible trees

12 a) For the network given using loop method of analysis, determine the currents in all the branches , indicating their direction 14

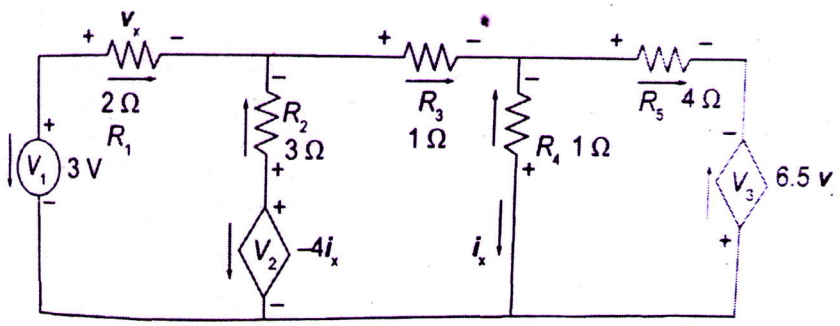


Module -2

13 a) For the network shown obtain the equilibrium equation on node basis and calculate 'v' 14



14 a) Find the power delivered by each dependent source in the given circuit 14



Module -3

15 a) Derive the characteristic impedance and propagation constant of symmetric T and PI networks under sinusoidal steady state 10

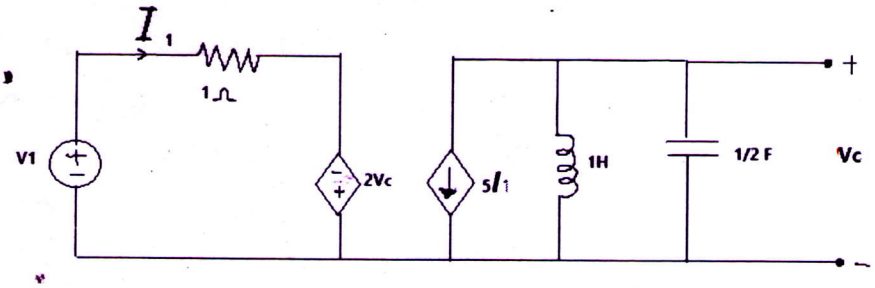
b) What is constant- K and m-derived filters 4

16 a) Design a low pass filter (both π and T-networks) having a cut-off frequency of 1KHz to operate with terminated load resistance of 200Ω 5

b) Design T and π network of m-derived high pass filter having nominal characteristic impedance $R_0 = 900\Omega$, cut off frequency $f_c = 2$ KHz and infinite attenuation(or resonant) frequency $f_\infty = 1.8$ KHz 9

Module -4

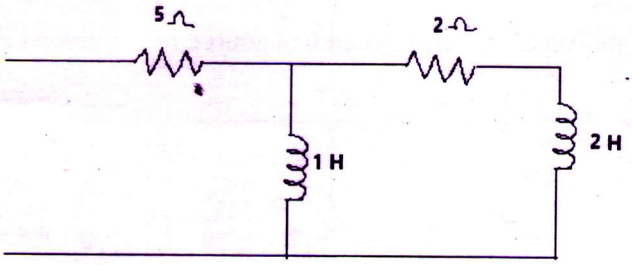
17 a) For the network shown, draw the pole-zero plot of $\frac{V_c}{V_1}$ 9



b) Determine the range of β such that the polynomial 5

$P(s) = S^4+s^3+4s^2+\beta s+3$ is Hurwitz

18 a) The transfer function of the network is given by $T(s) = \frac{1}{1+sCR}$ find its impulse response. Also obtain the pole- zero plot in the s- plane of the driving point impedance function for the network shown. 7



b) Verify the given function is positive real function 7

$$F(s) = \frac{S^3 + 6S^2 + 7S + 3}{S^2 + 2S + 1}$$

Module -5

19 a) An impedance function is given by 10

$Z(s) = \frac{(s+1)(s+4)}{s(s+2)(s+5)}$ find the R-C representation of Foster I and II forms

b) Synthesize $Z(s) = \frac{(s+1)(s+3)}{s(s+2)}$ in Cauer's I form 4

20 a) If $Z(s) = \frac{(s+4)(s+6)}{(s+3)(s+5)}$ find Cauer- I and II form 10

b) What are the properties of R-C impedance or R-L admittance functions 4

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