Reg No.:_____ Name:_____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech (Hons) Degree Examination July 2021 (2019 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	What are the properties of incidence matrix associated with graph theory?	3
2	Explain the following terms i) Tree ii) Oriented graph iii) Twig	3
3	Obtain the relationship between branch current matrix and loop current matrix.	3
4	State and explain Tellegen's theorem.	3
5	What is propagation constant? Obtain the propagation constant of π network.	3
6	What is constant k low pass filter? Obtain its frequency response.	3
7	Explain what is meant by poles and zeros of a network function?	3
8	List the properties of positive real functions	3
9	What are the properties of LC immittance functions	3
10	What is the network interpretation of removal of a pole at origin for an impedance function?	3

PART B

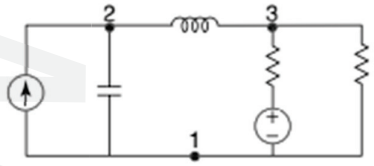
(Answer one full question from each module, each question carries 14 marks)

Module -1

11 a) The reduced incidence matrix of an oriented graph is given below. Draw the graph. 7

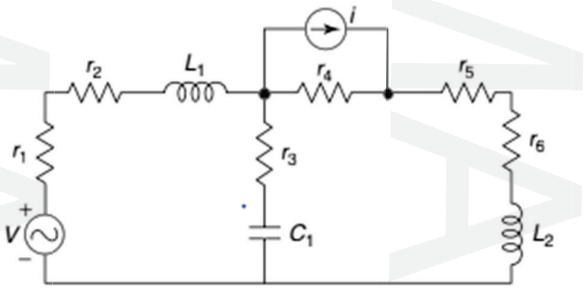
$$A=\begin{bmatrix} 0 & -1 & 1 & 1 & 0 \\ 0 & 0 & -1 & -1 & -1 \\ -1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

b) How many trees are possible for the graph of the network of Fig.? 7



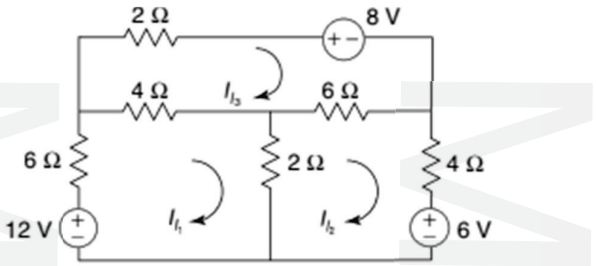
12 i) State and express Kirchoff's Voltage law in topological form 14

ii) For the circuit shown in Fig. Draw the oriented graph and write (a) incidence Matrix (b) tie set matrix

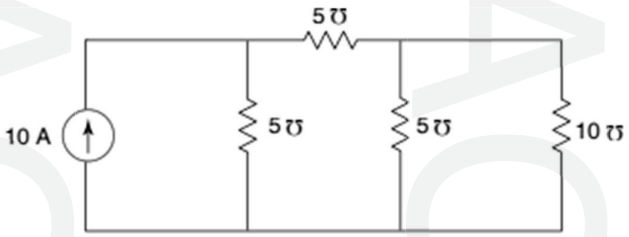


Module -2

13 For the network shown in Fig. , write down the tie set matrix and obtain the network equilibrium equation in matrix form using KVL. Calculate loop currents. 14



14 For the network shown in Fig. obtain equilibrium equation on node basis. 14



Module -3

15 a) Obtain the characteristic impedance of a T network 8

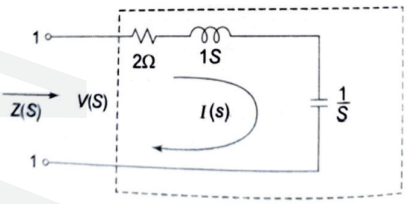
b) The ABCD parameters of a network are given as A= $\frac{6}{5}$, B= $\frac{17}{5}$, C= $\frac{1}{5}$& D= $\frac{7}{5}$. Find the image parameters and propagation constant. 6

16 a) Design a constant –k high pass filter having cut off frequency of 1000Hz with a load resistance of 600 Ω 8

b) Explain functionality of an attenuator and its various types? 6

Module -4

17 a) Determine the driving point impedance of the network shown in figure and hence plot the poles and zeros in the s plane 8



b) What are the transfer functions of a two port network? Explain. 6

18 a) Test whether the following polynomials are Hurwitz or not 6

i) $S^4+7S^3+6S^2+21S+8$

ii) S^5+S^3+S

iii) $S^4+S^3+5S^2+3S+4$

b) Check whether the following functions are positive real or not. 8

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

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

Module -5

19 Realize following RL impedance function in Foster-I and Foster-II form. 14

$$\frac{Z(s)}{S}=\frac{(S+1)(S+4)}{S(S+5)(S+3)}$$

20 a) Realize the Cauer I and II form of the following LC function 10

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

b) Test whether the following functions are either RL RC or LC impedence functions 4

i) Z(s) $=\frac{4(S+1)(S+3)}{S(S+2)}$

ii) Z(s) $=\frac{2(S+1)(S+3)}{(S+2)(S+6)}$

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