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C22

B. Tech. EXAMINATION, 2020

(Third Semester)

(B Scheme) (Re-appear Only)

(ECE)

EE211B

NETWORK ANALYSIS AND SYNTHESIS

Time : 2½ *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. Find the Laplace transforms of the following functions :

   (a) $e^{-at}\ U(t)$

   (b) $e^{-at}\ U(t - b)$

   (c) $e^{-a(t - b)}\ U(t - b) = e^{ab} \, . \, e^{-at}\ U(t - b)$

   (d) $e^{-a(t - b)}\ U(t - c) = e^{ab} \, . \, e^{-at}\ U(t - c)$.

2. Find the response of the system whose system function H(s) = Y(s)/X(s) = 1/s +1 for the input :

   (i) $x(t) = \delta(t)$ (i.e. impulse response)

   (ii) $x(t) = e^{-2t}$.

3. Show that the overall transmission parameter matrix for cascaded Two 2-port networks is simply the matrix products of transmission parameters for each individual 2-port network in cascade.

4. A two-port T-network has open circuit impedances Z_{10} = 900 ohm, Z_{20} = 900 ohm and short circuit impedance Z_{1s} = 650 ohm. Determine the parameters of the T-network.

5. (a) Design a low pass filter (both π(*pi*) and T-networks) having a cut-off frequency of 1 kHz to operate with a terminated load resistance of 200 ohms.

(b) Find the frequency at which this filter offers attenuation of 19.1 dB.

6. The reduced incidence matrix of a graph is given by :

$$\begin{array}{c|c} \text{Nodes\textbackslash Branches} & \begin{matrix} 1 & 2 & 3 & 4 & 5 & 6 \end{matrix} \\ \begin{matrix} a \\ b \\ c \end{matrix} & \begin{bmatrix} 0 & 1 & 0 & -1 & -1 & 1 \\ 0 & -1 & 1 & 0 & 1 & 0 \\ 1 & 0 & -1 & 0 & 0 & 0 \end{bmatrix} \end{array}$$

Draw the oriented graph. Select a tree and find *f*-cut set matrix.

7. Test the following polynomial for its Hurwitz Character :

$$P(s) = s^8 + 3s^7 + 10s^6 + 24s^5 + 35s^4 + 57s^3 + 50s^2 + 36s + 24 \cdot$$

8. An impedance is given by :

$$Z(s) = \frac{8\left(s^2+1\right)\left(s^2+3\right)}{s\left(s^2+2\right)\left(s^2+4\right)}$$

Realize the network in (i) Foster-I form and (ii) Cauer-II form.