

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Backlog), May 2019

B. Tech in Electrical Engineering, Semester IV

Roll No.....

EE402: Network Theory-II

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

10

- i. As the poles of a network shift away from the x axis, the response
 - (a) Remains constant
 - (b) Becomes less oscillating
 - (c) Becomes more oscillating
 - (d) None of these
- ii. Two two-port networks are connected in cascade. The combination is to be represented as a single two-port network. The parameters are obtained by multiplying the individual.
 - (a) z-parameter
 - (b) h-parameter
 - (c) y-parameter
 - (d) ABCD parameter

iii. The short-circuit admittance matrix of a two-port network is $\begin{bmatrix} 0 & -\frac{1}{2} \\ \frac{1}{2} & 0 \end{bmatrix}$. The two-port network is

- (a) Non-reciprocal and passive
 - (b) Non-reciprocal and active
 - (c) Reciprocal and passive
 - (d) Reciprocal and active
- iv. The poles and zeros of a driving-point function of a network are simple and interlace on the negative real axis with a pole closest to the origin. It can be realized
 - (a) By an LC network
 - (b) As an RC driving point impedance
 - (c) As an RC driving point admittance
 - (d) Only by an RLC network
 - v. The number of roots of $s^3 + 5s^2 + 7s + 3 = 0$ in the left half of the s -plane is
 - (a) Zero
 - (b) One
 - (c) Two

- (d) three
- vi. The first critical frequency nearest to the origin of the complex frequency plane for an RL driving-point impedance function will be
- a zero in the left-half plane
 - a zero in the right-half plane
 - a pole in the left-half plane
 - a pole in the right-half plane
- vii. An RC driving point impedance function has zeros at $S=-2$ and $S=-5$. The admissible poles for the functions would be
- $s=0, s=-6$
 - $s=-1, s=-3$
 - $s=0, s=-1$
 - $s=-3, s=-4$
- viii. The impedance matrices of two two-port networks are given by $\begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$ and $\begin{bmatrix} 15 & 5 \\ 3 & 25 \end{bmatrix}$. If these two networks are connected in series, the impedance matrix of the resulting two-port network will be
- $\begin{bmatrix} 3 & 5 \\ 2 & 25 \end{bmatrix}$
 - $\begin{bmatrix} 18 & 7 \\ 7 & 28 \end{bmatrix}$
 - $\begin{bmatrix} 15 & 2 \\ 5 & 3 \end{bmatrix}$
 - admittance
- ix. The driving point impedance $Z(s) = \frac{s+3}{s+4}$ behaves as
- a resistance of 0.75Ω at low frequencies
 - a resistance of 1Ω at high frequencies
 - both (a) and (b)
 - none of the above
- x. For a two-port symmetrical bilateral network, if $A=3$ and $B=1$, the value of the parameter will be
- 4
 - 6
 - 8
 - 16

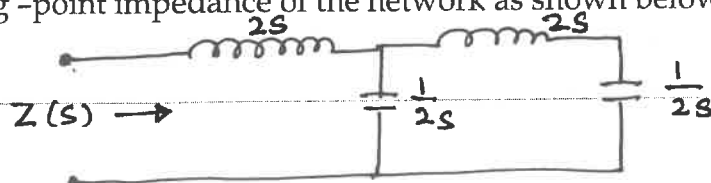
Q.2 Discuss all the properties of positive real functions. What are the necessary and sufficient conditions for positive real functions. 5

Q.3 Discuss the time-domain behavior of a system from the locations of its poles in the S-plane. 5

Q.4 Obtain the pole-zero plot of the following functions 5

- $F(s) = \frac{s(s+2)}{(s+1)(s+3)}$
- $F(s) = \frac{s(s+1)}{(s+2)^2(s+3)}$
- $F(s) = \frac{s(s+2)}{(s+1+j1)(s+1-j1)}$
- $F(s) = \frac{s^2+4}{(s+2)(s^2+9)}$

Q.5 Determine the driving -point impedance of the network as shown below. 5



Q.6 Test whether the following polynomials are Hurwitz. 10

(a) $P(s) = s^4 + s^3 + 5s^2 + 3s + 4$

(b) $P(s) = s^3 + 4s^2 + 5s + 2$

You may use any method of your choice

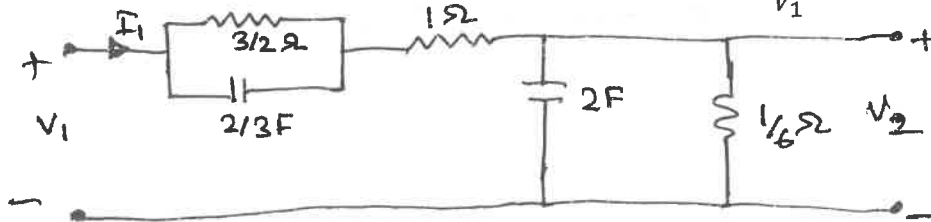
Q.7 Determine the foster form of realization of the RC impedance function. 10

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

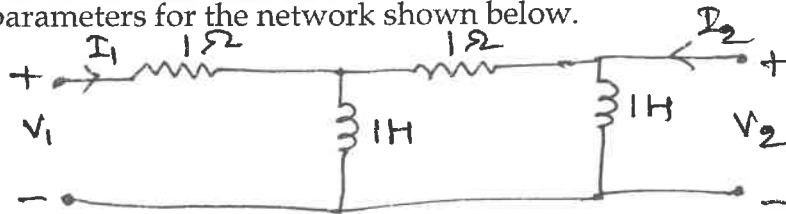
Q.8 Determine the cauer forms of the RC impedance function 10

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

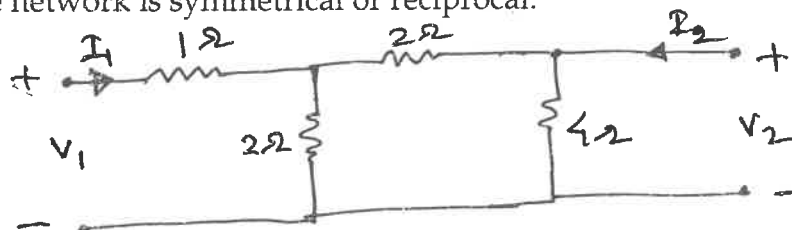
Q.9 For the network shown below, determine the transfer function $\frac{I_2}{V_1}$ 10



Q.10 Find Z-parameters for the network shown below. 10



Q.11 Determine the Y-parameters for the network shown below. Also determine whether the network is symmetrical or reciprocal. 10



Q.12 Write short notes on 10

(a) Restrictions on pole and zero locations for driving point functions

(b) Restrictions on pole and zero locations for transfer functions

All the Best!!!

