

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination November 2018

B. Tech in EE&ECE Engineering, Semester III

Roll No.....

EE304: Network Analysis and Synthesis

Time: 3 hours

Max. Marks: 80

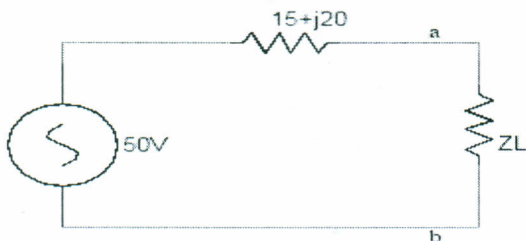
Instructions to students:

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.

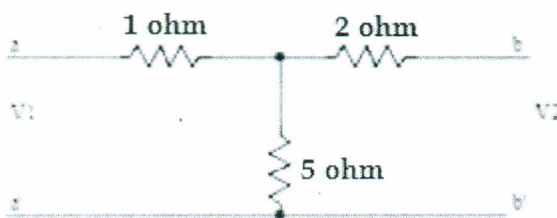
Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

10

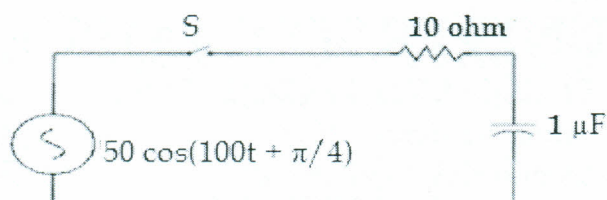
- i. In the circuit shown below, find the value of load impedance for which source delivers maximum power.



- (a) $15 - j20$ (b) $15 + j20$ (c) $20 - j15$ (d) $20 + j15$
- ii. If there are 8 nodes in network, we can get ____ number of equations in the nodal analysis.
- (a) 9 (b) 8 (c) 7 (d) 6
- iii. In a network function if the number of poles (m) are greater than the number of zeros (n), then there will be ____ number of zeros at $s = \infty$.
- (a) $m+n$ (b) $m-n$ (c) m (d) n
- iv. In the circuit shown below, find the transmission parameter A.



- (a) $6/5$ (b) $5/6$ (c) $3/4$ (d) $4/3$
- v. For additive flux of two coils connected in series, the equivalent inductance can be expressed as
- (a) $L_1 + L_2$ (b) $L_1 + L_2 + 2M$ (iii) $L_1 + L_2 - 2M$ (iv) $L_1 + L_2 + M$
- vi. In the circuit shown below, the switch is closed at $t = 0$, applied voltage is $v(t) = 50\cos(102t + \pi/4)$, resistance $R = 10\Omega$ and capacitance $C = 1\mu F$. The complementary function of the solution of 'i' is?

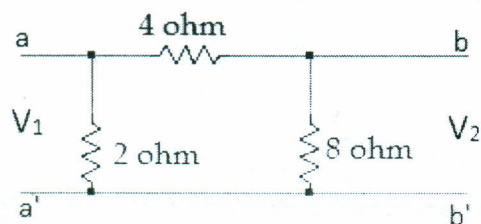


- (a) $i_c = c \exp(-t/10^{-10})$ (b) $i_c = c \exp(-t/10^{10})$
 (c) $i_c = c \exp(-t/10^{-5})$ (d) $i_c = c \exp(-t/10^5)$
- vii. Which of the following expression is true in case of open circuit parameters?
 (a) $V_2 = Z_{21}I_1 + Z_{22}I_2$ (b) $V_2 = Z_{21}I_1 + Z_{22}V_2$
 (c) $I_2 = Y_{21}V_1 + Y_{22}V_2$ (d) $I_2 = Z_{21}V_1 + Z_{22}I_2$
- viii. The coefficients in the numerator polynomial of the transfer function may be?
 (a) must be negative (b) must be positive (c) may be positive (d) may be negative
- ix. Consider the impedance function $Z(s) = (s^2 + 6s + 8)/(s^2 + 3s)$. Find the value of C_1 after performing the second Cauer form.
 (a) $1/2$ (b) $3/8$ (c) $1/4$ (d) $1/8$
- x. Number of twigs in a tree are? Where n - number of nodes
 (a) n (b) $n+1$ (c) $n-1$ (d) $n-2$

Q.2 Short answer type questions (4 questions @ 2.5 marks)

10

- i. Find the Y_{11} and Y_{12} parameters in the circuit shown below.



- ii. What are the properties of incidence matrix?
 iii. Check the positive realness of the following function.

$$F(x) = \frac{(x^2 + 3x + 9)}{(x+5)(x+9)}$$

- iv. What do you understand by the driving point impedance of a two port network? Enumerate the important properties of driving point impedance function of a two port passive network.

Q.3A Find i_0 and i from the circuit of figure 1 using superposition theorem.

05

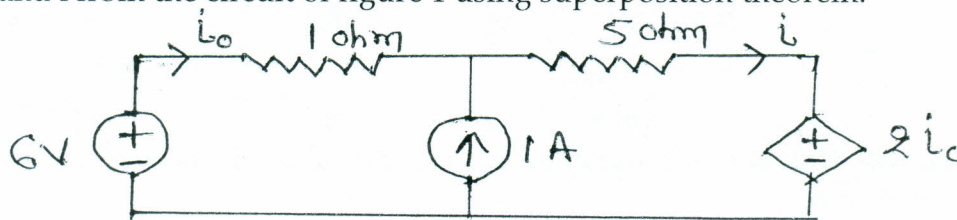


Figure 1.

Q.3B For the circuit shown in figure 2, determine the phasor current I_1 and I_2 .

05

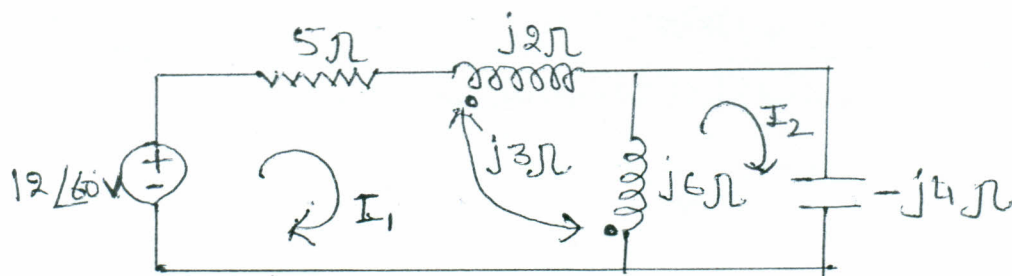


Figure 2.

Q.4A Write down the incidence matrix and cu-set matrix for the network shown in figure 3.

05

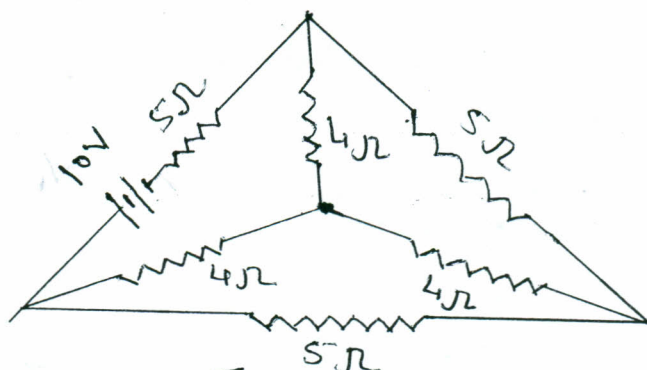


Figure 3.

Q.4B The h parameters of two port network are
 $h_{11} = 35 \text{ ohm}$; $h_{12} = 2.6 \times 10^{-4}$; $h_{21} = 0.98$; $h_{22} = 0.3 \times 10^{-6} \text{ mho}$
 Determine g-parameters.

05

Q.5A Find the transmission parameters of the network shown in figure 4.

05

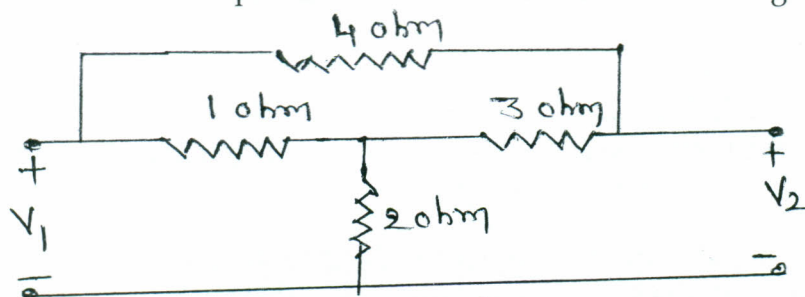


Figure 4.

Q.5B Test whether the following polynomials are Hurwitz

05

(i) $P(s) = s^3 + 2s^2 + 4s + 2$

(ii) $P(s) = s^4 + s^3 + 4s^2 + 2s + 3$

Q.6A Find the response current of a series RL circuit consisting of a resistor $R = 3 \text{ ohm}$ and an inductor $L = 1 \text{ H}$. When unit ramp voltage $u(t-2)$ is applied.

05

Q.6B A two terminal network consists of a coil having an inductance, L and resistance R shunted by a capacitor C . The poles and zeroes of the driving point impedance function of this network are given by:

05

Poles p_1 and $p_2 = -\frac{1}{2} \pm j\frac{\sqrt{3}}{2}$, zero $z_1 = -1$, If $Z(0) = 1$ then determine R , L & C .

OR

- Q.6B For the circuit shown in figure 5, determine the current $i(t)$ when the switch is at the position 2. The switch was moved from position 1 to position 2 at $t = 0$. The switch has been at position 1 for a long time. 05

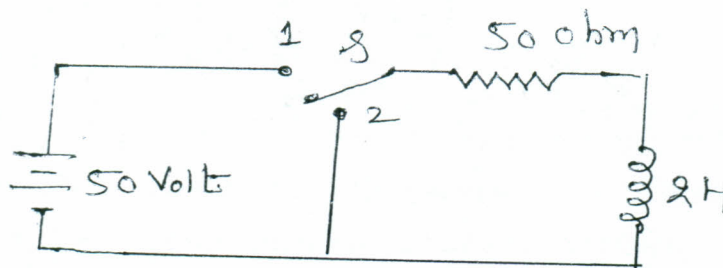


Figure 5.

- Q.7 Find the Z -parameters of the network shown in figure 6. 10

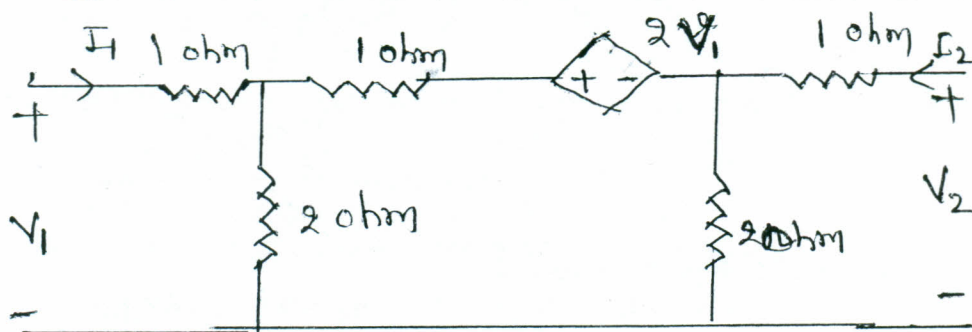


Figure 6.

- Q.8 Synthesize the following $Z(s)$ in Cauer I and Cauer II form. 10

$$F(s) = \frac{4s(s^2+4)}{(s^2+1)(s^2+16)}$$

OR

- Q.8 Consider the network shown in figure 7 using loop method of analysis, determine current in all the branches including their direction using graph theory method. 10

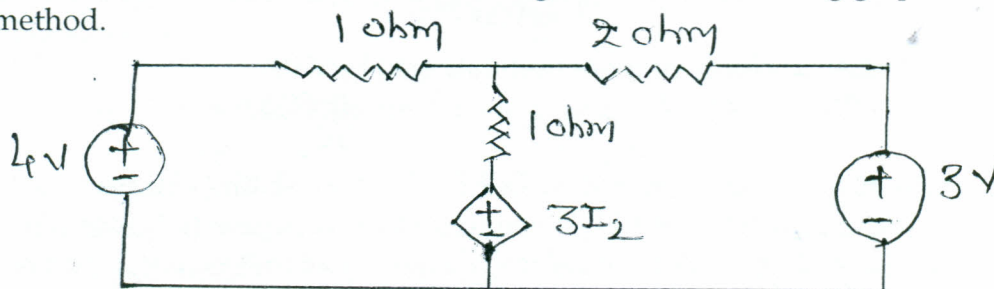


Figure 7.