

3rd Semester Regular / Back Examination 2017-18

NETWORK THEORY

BRANCH: EEE

Time: 3 Hours

Max Marks: 100

Q.CODE: B873

Answer Question No.1 and 2 which are compulsory and any four from the rest.
The figures in the right hand margin indicate marks.

- Q1 Answer the following questions: *multiple type or dash fill up type* (2 x 10)
- A practical current source can also be represented as
 - a resistance in parallel with an ideal voltage source
 - a resistance in parallel with an ideal current source
 - a resistance in series with an ideal current source
 - none of the mentioned
 - If there are 5 branches and 4 nodes in graph, then the number of mesh equations that can be formed are?
 - 2
 - 4
 - 6
 - 8
 - If a resistor R_x is connected between nodes X and Y, R_y between X and Y, R_z between Y and Z to form a delta connection, then after transformation to star, the resistor at node X is?
 - $R_x R_y / (R_x + R_y + R_z)$
 - $R_x R_z / (R_x + R_y + R_z)$
 - $R_y R_z / (R_x + R_y + R_z)$
 - $(R_x + R_y) / (R_x + R_y + R_z)$
 - The dual pair of capacitance is?
 - capacitance
 - resistance
 - current source
 - inductance
 - Reciprocity Theorem is used to find the change in _____ when the resistance is changed in the circuit.
 - Voltage
 - Voltage or current
 - Current
 - Power
 - The expression of power (P_1) at lower half power frequency is?
 - $(I_{max}^2 R) / 8$
 - $(I_{max}^2 R) / 4$
 - $(I_{max}^2 R) / 2$
 - $I_{max}^2 R$
 - The real part of the complex frequency is called?
 - radian frequency
 - neper frequency
 - sampling frequency
 - angular frequency
 - The transform admittance of the inductor is?
 - $1/sL$
 - sL
 - $1/L$
 - L
 - The denominator polynomial in a transfer function may not have any missing

terms between the highest and the lowest degree, unless?

- a) all odd terms are missing
 - b) all even terms are missing
 - c) all even or odd terms are missing
 - d) all even and odd terms are missing
- j) The real parts of the driving point function $Z(s)$ and $Y(s)$ are?
- a) positive and zero
 - b) positive
 - c) zero
 - d) positive or zero

Q2

Answer the following questions: *Short answer type*

(2 x 10)

- a) A parallel RLC circuit has $R=20\text{K}\Omega$, $L=10\text{mH}$ and $C=1\mu\text{F}$. Compute its resonant frequency and Q.
- b) Give a general schematic of a ladder network. Why it is called so?
- c) Express the output impedance of a two port network in terms of ABCD parameter.
- d)

The impulse response of a circuit is $h(t) = \frac{3}{L} e^{-\frac{R}{L}t} u(t)$. Find its step response.

- e) Derive the Q factor of anti-resonant circuit.
- f) If $Z(s) = 0$ for $\sigma = 0$ condition satisfies for Foster second form of RL network. Then L_0 is present or absent? Explain.
- g) What is the Laplace Transform of a unit step function occurring at $t = a$?
- h) Describe the condition for reciprocity and symmetry of h - parameter
- i) Describe the steps of Norton's Theorem? With neat diagram
- j) Find the magnitude of the frequency when the drop across the capacitor in series RLC circuit is maximum.

Q3

- a) Define node and junction of an electric circuit. Using Nodal method analysis, find the current flowing in each branch of the following network as shown in Fig. 1. All resistances are in ohms.

(10)

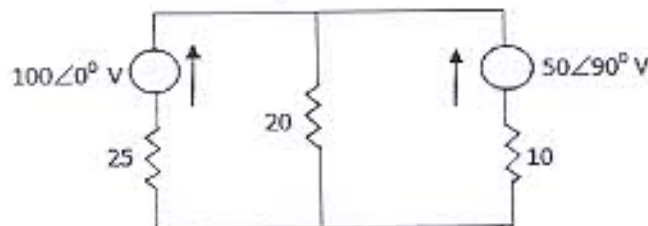


Fig. 1

- b) Show the relationship between Bandwidth, Quality Factor and resonance frequency.

(5)

Q4

- a) Obtain Y- and h- parameter, if the other parameters are given below $A=2$, $B=-1$, $C=3$, and $D=-2$.
- b) Obtain Transmission Line parameter for the network as shown in Fig. 2.

(10)

(5)

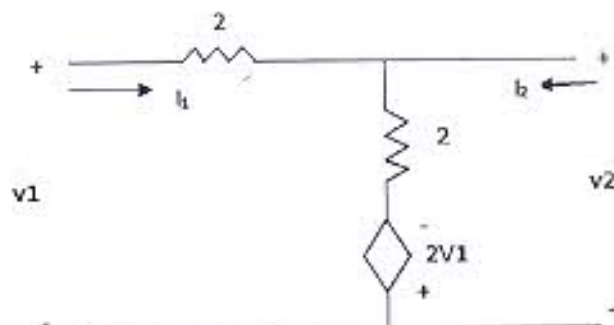


Fig. 2