Code No: 133BJ

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year I Semester Examinations, September/October - 2023
NETWORK ANALYSIS
(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A
(25 Marks)

1.a) Define self-inductance. [2]
b) What is coefficient of coupling? [3]
c) Define resonance in electrical circuits in detail, [2]
d) Derive the current of the series RLC circuit subjected to sinusoidal voltage v(t) considering the circuit as underdamped [3]
e) What are the RMS and Average value of sinusoidal waveform? [2]
f) Find the replace transform of i) unit step function ii) unit impulse function iii) unit exponential function. [3]
g) Let the transform current I(s) in a network is given by the following equation $I(s)=\frac{2}{(s+3)(s+5)}$. Plot the poles and zeros in the s plane. [2]
h) A two-port network has the following z parameters Z_{11}= 10 ohms, Z_{12}= Z_{21}= 5 ohms, Z_{22}= 12 ohms. Compute the ABCD parameters for the same network [3]
i) Give the design equations of symmetrical Π attenuator. [2]
j) State and explain Foster's reactance theorem. [3]

PART – B
(50 Marks)

2. For the given resistance network (Figure 1) write a cut set matrix schedule and equilibrium equations on the voltage basis. Hence obtain the values of branch voltages and branch currents. Given that R_1=5 ohms, R_2=5 ohms, R_3=R_4=R_6=R_5=2 ohms. [10]

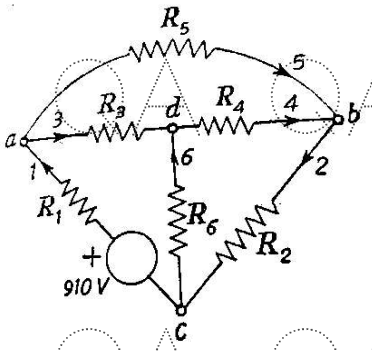

Figure 1

OR

3. For the given resistive network (Figure 2) write a tie set schedule and obtain equilibrium equations on the current basis. Solve these equations and hence calculate the values of branch voltage and branch currents. [10]

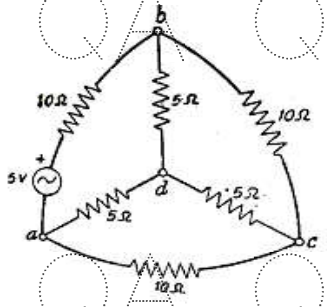

Figure 2

4. In the circuit shown in the following figure 3, the capacitor C_1 is initially charged to the voltage V_0. At time t=0, the switch K is closed. Obtain the expressions for the (a) current and (b) charge across C_2, as the function of time. If $C_1=C_2=1\mu F$, $V_0=10$ volts and R=10 ohms, calculate after the time t = 10μsec (i) current (ii) voltage across R (iii) charge across C_1 and (iv) voltage across C_2. [10]

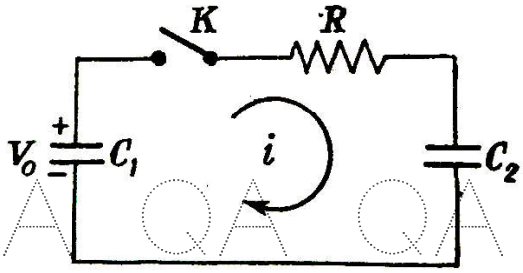

Figure 3

OR

5. In the given circuit in figure 4 the relay is adjusted to get operated at current of 7mili Amps. Switch K is closed at time t=0. It is found that the relay operates a t=0.2 sec. Find (a) inductance L of the relay coil and (b) Equation for the current i(t). [10]

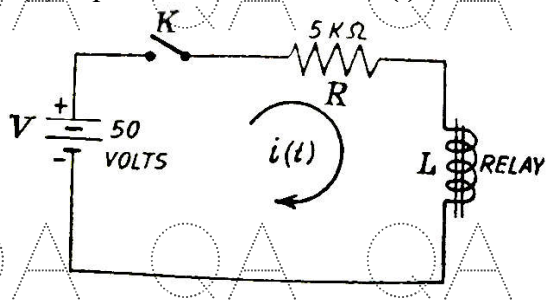

Figure 4

6. A half cycle of the sine wave (Figure 5) of amplitude 10 volts periodic time 2Π seconds, extending from t=Π seconds to 2Π seconds is applied to the series RLC circuit consisting of the resistance R= 12 ohms and inductor L= 2 H and capacitor C=0.1 F. Find the current i(t) [10]

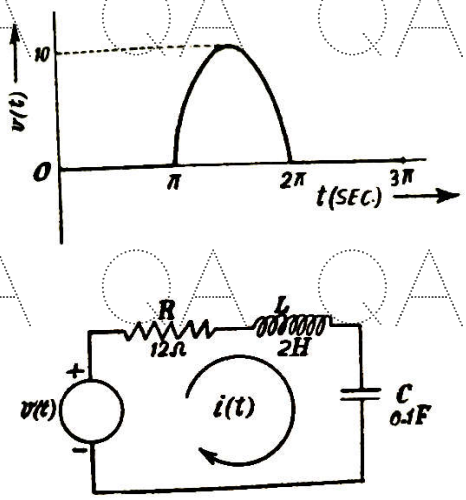

Figure 5

OR

7. A voltage pulse (Figure 6) of magnitude 8 volts and duration 2 seconds extending from t = 2sec to t = 4 seconds is applied to the series R-L network consisting of R=2 ohms and L= 1 henry. Obtain the current i(t). Also calculate the voltage across inductor L and resistor R. [10]

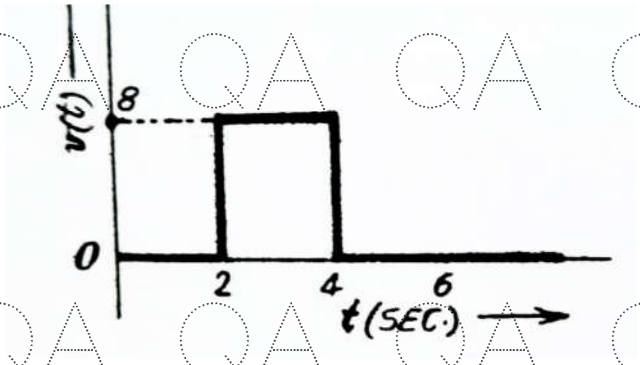

Figure 6

8. Find the Z parameters for the network shown in the Figure 7. [10]

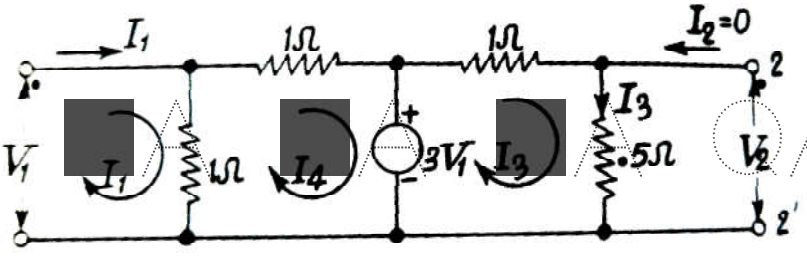

Figure 7

OR

9. Derive the expression for ABCD parameters and Z parameters for the T section network shown in the figure 8 [10]

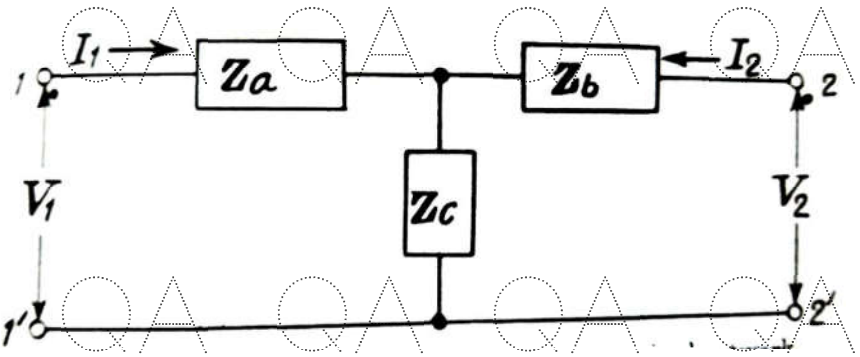

Figure 8

10. Discuss the design procedure of constant k-low pass filter. [10]

OR

11. Discuss the design procedure of constant k-high pass filter. [10]

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