Total No. of Questions : 8]

SEAT No. :

P1007

[Total No. of Pages : 4

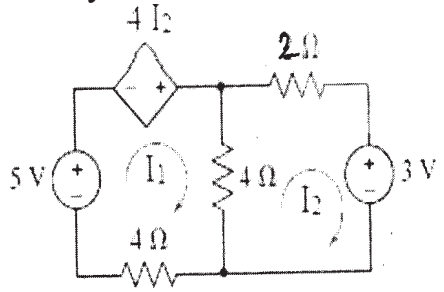
[4457]-184
S.E. (E & TC / Electronics)
NETWORK THEORY
(2012 Course) (Semester - I) (204183)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Apply mesh analysis and determine the currents I_1 and I_2. **[6]**



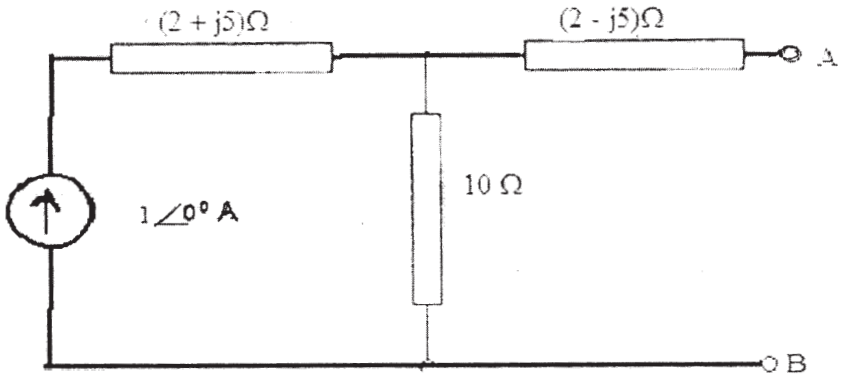
b) Explain the following terms with example: **[6]**

i) Oriented graph.
ii) Tieset matrix.
iii) f-cutset matrix.

OR

Q2) a) Consider the circuit given below: **[6]**

i) Obtain Thevenin's equivalent circuit.
ii) What load should be connected between terminals A-B for maximum power- transfer to the load?
iii) Calculate the maximum power transferred to the load.



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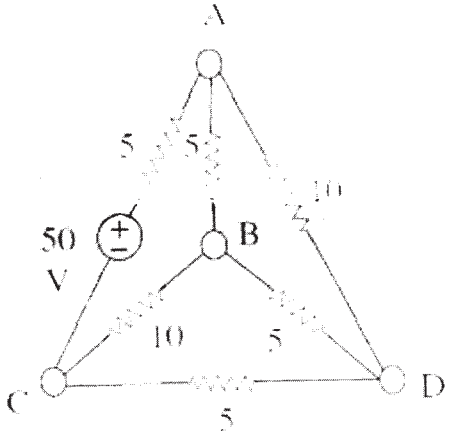
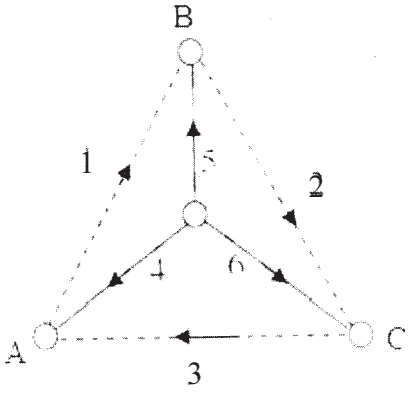
b) For the circuit and its graph shown below: **[6]**

i) Write a tie-set schedule for the tree [4, 5, 6].

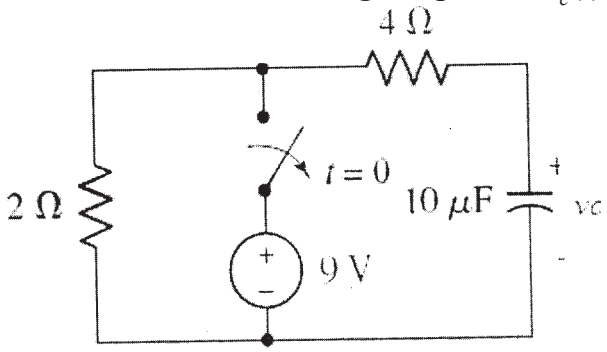
ii) Find the branch-impedance matrix.

iii) Obtain the loop impedance matrix.





Q3) a) For the circuit shown below, find the voltage v_c at $t = 200\,\mu$ s. Find the expression for the current through capacitor $i_c(t)$ **[6]**

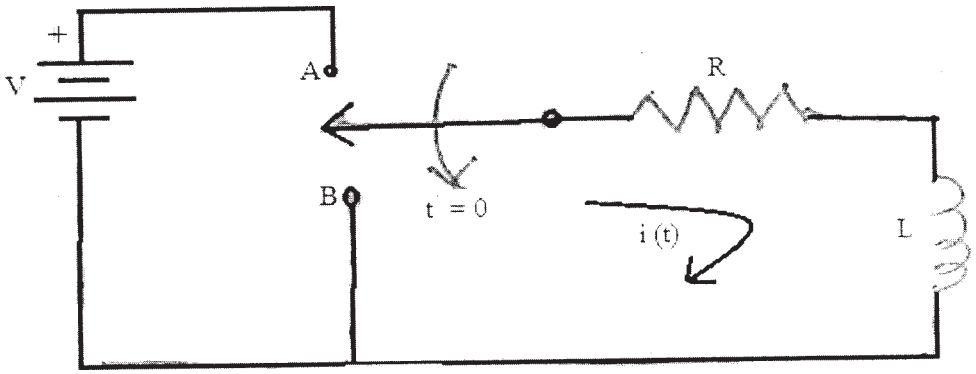


b) Define the term Quality factor.

Prove for a series RLC resonant circuit $f_0 = \sqrt{f_1 f_2}$. **[6]**

OR

Q4) a) Derive the expression for the current $i(t)$ for the series RL circuit shown below. **[6]**



b) A series resonant circuit has a bandwidth of 100Hz and contains a 20 mH inductance and a 20 μ F capacitance. Determine: **[6]**

i) f_0

ii) Q_0 and

iii) Impedance Z at resonance.

Q5) a) For any symmetrical network, prove that the characteristics impedance Z_0 is the geometric-mean of open & short circuit impedances. **[6]**

b) Design a constant-k T-type low pass filter with following specifications:
Design resistance $R_0 = 560\,\Omega$ and cut-off frequency f_c = 2KHz.
Also determine the frequency at which the attenuation offered by the filter is 17.372dB. **[7]**

OR

Q6) a) Design a symmetrical π attenuator with following specifications:
Attenuation = 6dB and characteristic resistance of 6 dB.
Draw a neat diagram of the properly terminated attenuator showing the component values. **[6]**

b) Answer the following: **[7]**

i) State the limitations of prototype filters.

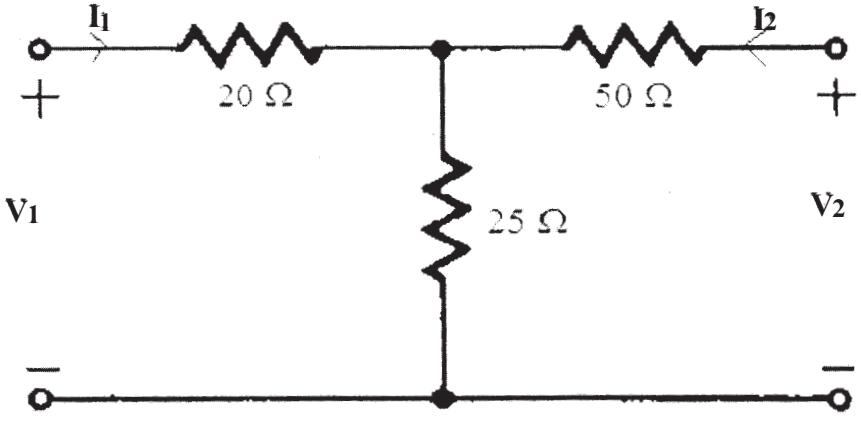
ii) Explain how these limitations are overcomed using m-derived filters.

iii) Draw the block diagram of composite filters.

iv) Advantages of composite filters.

Q7) a) Find z-parameters for the two-port network shown below. **[6]**

State whether the network is symmetrical/reciprocal.



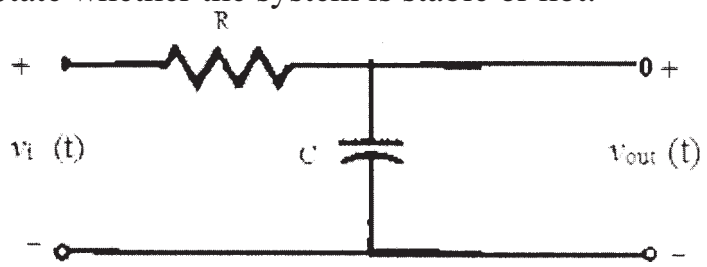
b) Consider the RC network shown below. **[7]**

i) Draw the s-domain equivalent circuit.

ii) Find the transfer function $H(s)=\frac{V_{out}(s)}{V_i(s)}$.

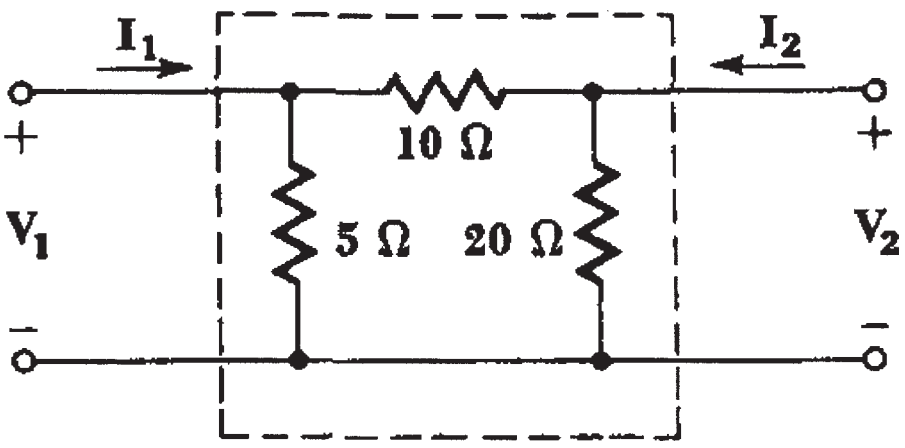
iii) Find the poles and zeros of the function H(s) and

iv) State whether the system is stable or not.



OR

Q8) a) Find the four short circuit admittance parameters for the resistive two port network. Determine whether the network is symmetrical/reciprocal. **[6]**



b) State and explain: **[7]**

i) Driving point functions for one port networks.

ii) Driving point and transfer functions for two port networks.