Total No. of Questions :10] *[Total No. of Printed Pages :6*

Roll No .....

EC - 305

B.E. III Semester

Examination, December 2012

Network Analysis

Time : Three Hours

Maximum Marks : 70/100

Note : 1. *Answer Five questions, selecting One question from each unit.*

2. *All questions carry equal marks.*

Unit - I

1. a) Discuss the properties of an ideal current source and an ideal voltage source.

   b) Explain the 'principle of duality'.

   c) Draw the dual of the network shown in Fig. 1

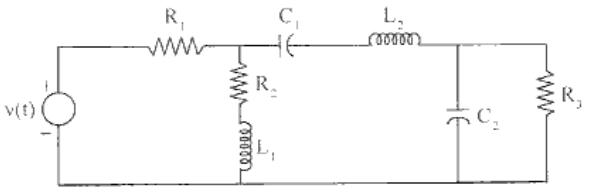

Figure - 1

[2]

OR

2. a) Discuss the properties of series resonant circuits.

   b) In the coupled network of Fig. 2, find the voltage across the 5 ohms resistor. (k – couplin of coefficient)

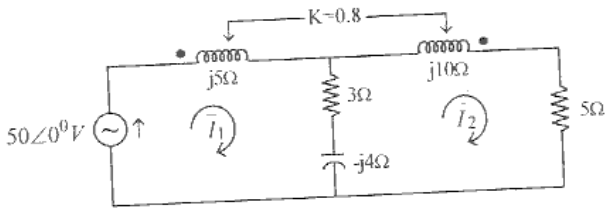

Figure - 2

Unit - II

3. a) Explain the terms, 'tie-set matrix' and 'cut-set matrix' with the help of simple examples.

   b) Using superposition theorem, find the power loss in the 5 ohms resistor of the network of Fig. 3.

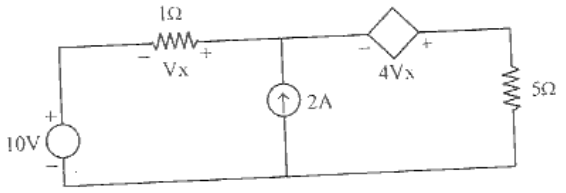

Figure - 3

OR

4. a) State and explain the following:

   i) Reciprocity theorem

   ii) Millman's theorem

   b) Using Thevenin's theorem, find the power in a 1-ohm resistor connected to the terminals A B of the network shown in Fig. 4.

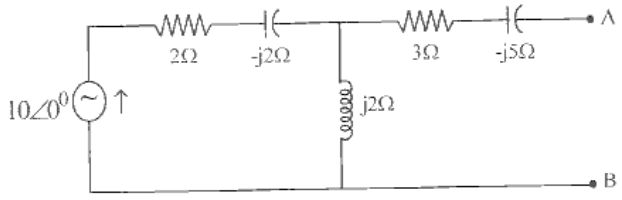

Figure - 4

Unit - III

5. Explain how the initial conditions in networks can be evaluated.

   The network of Fig. 5. reaches a steady state with the switch 'k' open. At $t = 0$, the switch 'k' is closed. Find $i(t)$. Sketch the current wave form and indicate the value of the time constant.

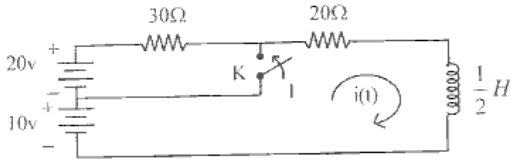

Figure - 5

[4]

OR

6. The network of Fig. 6 contains two voltage sources, $\bar{v}_1$ and $\bar{v}_2$. With $\bar{v}_1 = 30 \angle 0^\circ$ v, determine $\bar{v}_2$ such that the current in (2 + j3) Ω impedance is zero, using mesh-current method.

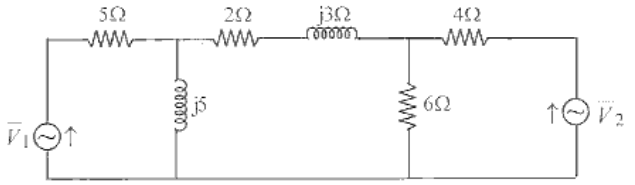

Figure - 6

Unit - IV

7. a) Explain clearly the relationship between impulse, step and ramp functions. Give their standard expressions in time-domain and their laplace transforms.

   b) A ramp-voltage $v(t) = r(t - 2)$ is applied to a series R-C network at $t = 0$, when R = 3 Ω and C = 1 F. Assuming zero initial conditions, find $i(t)$.

OR

8. a) What is half-wave symmetry? Explain with the help of an example.

   b) Find the trigonometric Fourier series for the wave form shown in Fig. 7 and sketch the spectrum.

[5]

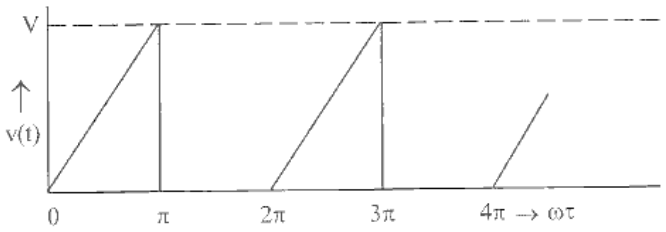

Figure - 7

Unit - V

9. a) Discuss the restrictions on pole and zero locations in s-plane for driving point functions.

b) Find the open-circuit transfer impedance, $\frac{V_2(s)}{I_1(s)}$ and open-circuit voltage ratio, $\frac{V_2(s)}{V_1(s)}$ for the network shown in Fig. 8.

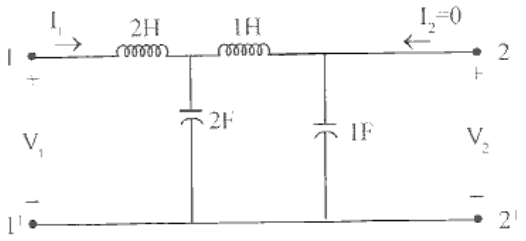

Figure - 8

[6]

OR

10. Define *z* (open-circuit impedance) parameters of two port networks.

Find the '*z*' parameters of the network shown in Fig. 9.

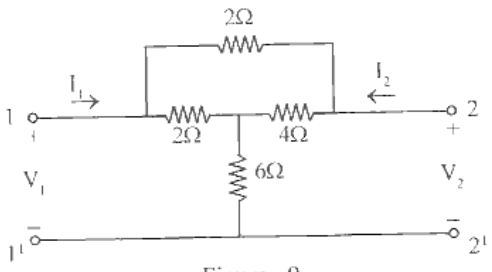

Figure - 9

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