Total No. of Questions :5] *[Total No. of Printed Pages :6*

Roll No .....

EE/EI/EX/BM - 305

B.E. III Semester

Examination, June 2014

Network Analysis

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

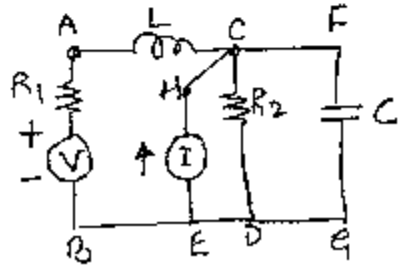
iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) What are the properties of a Tree in a graph. 2

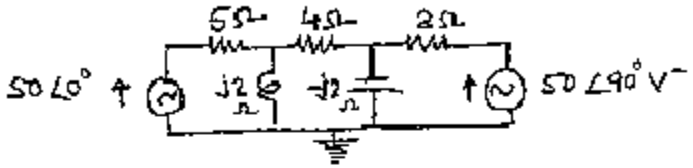
b) Define the term coupling coefficient, K and obtain the relation. 2

c) Draw the graph of the network shown below. 3



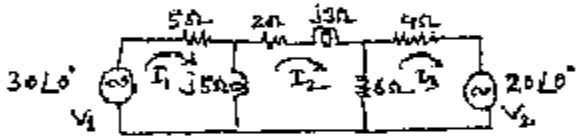
PTO

d) In network given below determine the voltages of nodes A and B with respect to reference node. 7



OR

In the network given below find the current in the $(2 + j3)\Omega$ impedance by mesh method.



due to each of the sources. 7

Unit - II

2. a) State the principle of reciprocity theorem. 2

b) Write the superposition theorem statement? 2

c) Calculate the current I through the 2Ω resister in the network given below by using milliman's theorem. 3

PTO

b) The transform current $I(s)$ in a network be given by the following equations :

$$I(s) = \frac{2s}{(s+1)(s+2)}$$

plot the poles and zeros in the s-plane. 2

c) The denominator polynomial of transfer function for a network is as below:

$Q(s) = s^3 + 2s^2 + 3s + A$

Where A is adjustable.

Find the values of A for which the network is stable. 3

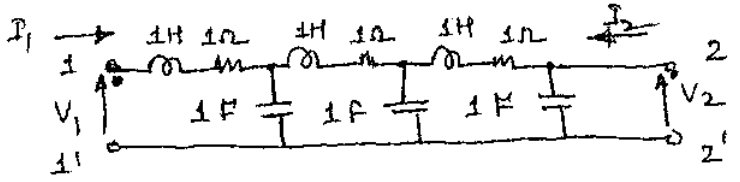
d) The Z-parameters of a 2-port network are :

$Z_{11} = 10\Omega$; $Z_{12} = Z_{21} = 5\Omega$; $Z_{22} = 8\Omega$.

Compute the Y and ABCD parameters of the network. 7

OR

Find the open circuit driving point impedance at port 1 of the following two port network. 7



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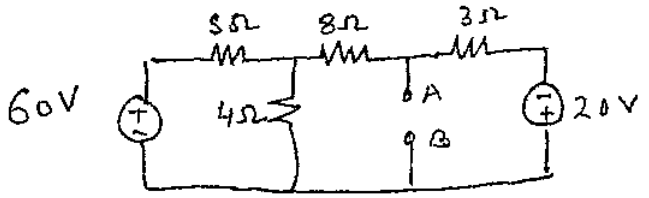
d) Obtain Norton's equivalent circuit at terminals AB of the network shown below. 7

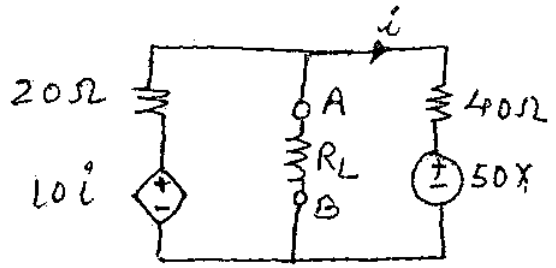


OR

In the network shown below. 7

i) Determine the value of R_L to which the maximum power can be delivered.

ii) Calculate the voltage across R_L then terminal A being positive.



Unit - III

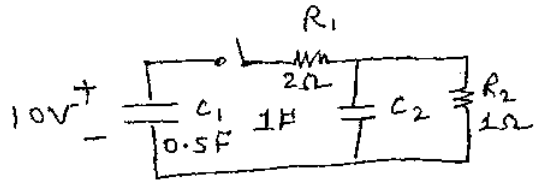
3. a) Explain the ramp function. 2

b) Find the value of $i(0+)$ using initial value theorem for the Laplace transform given below, $I(s) = \frac{2s+3}{(s+1)(s+3)}$

Verify the result by solving for $i(t)$. 2

c) In the given network C_1 is charged to 10 volts in the polarity shown. Capacitor C_2 is initially uncharged. At time t = 0, switchs is closed. 3

Using Thevenin's theorem find the current in resistor R_2.



d) Using Laplace transformation, solve the following differential equations :

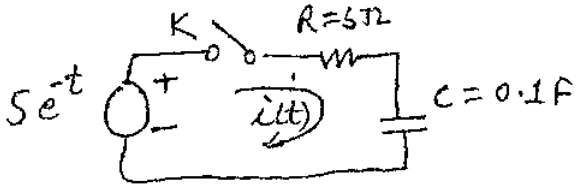
$$\frac{d^2i}{dt^2} + 4\frac{di}{dt} + 8i = 8\,u(t)$$

Given that $i(0_+) = 3$ and $\frac{di}{dt}(0_+) = -4$. 7

OR

A exponential voltage $v(t) = 5e^{-t}$ is applied at time $t = 0$ to a series RC circuit comprising resistor $R = 5\Omega$ and capacitor $c = 0.1$ farad.

Using Laplace transformation obtain the complete particular solution for the current $i(t)$ through the circuit. Assume zero charge across the capacitor before application of the driving voltage. 7



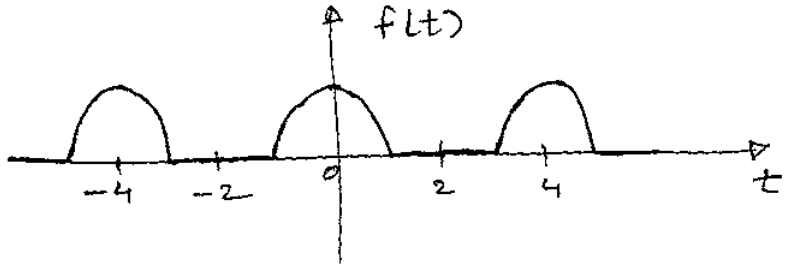
Unit - IV

4. a) What do you mean line spectrum? Explain in brief with the help of sawtooth wave. 2

b) Give half wave and quarter wave symmetry, with example. 2

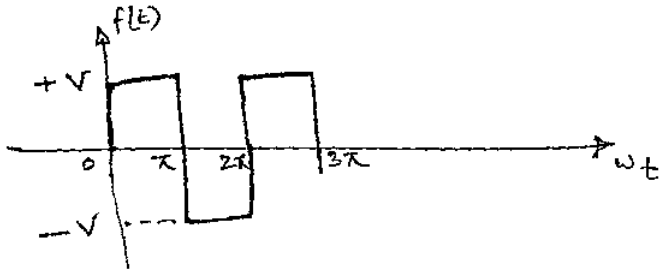
c) Differentiate between odd and even symmetries with examples. 3

d) Find the trigonometric Fourier series for the function shown below. 7



OR

Find the exponential Fourier series for the square wave below and sketch the line spectrum. 7



Unit - V

5. a) Verify whether the following expression for driving point impedance Z(s) is suitable for representing a passive one port network.

$$Z(s) = \frac{s^4 + 2s^3 - 2s + 1}{s^3 + s^2 - 2s + 12}$$ 2