Code No: 09A30204 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech II Year I Semester Examinations, June/July-2014
ELECTRIC CIRCUITS
(Common to ECE, ETM)

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

Answer any five questions
All questions carry equal marks
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1.a) Write the volt-ampere relationship of R, L and C elements.
b) Explain the independent and dependent sources.

2.a) Show that the Line voltage = 1.732 times the phase voltage in a balanced star connected system.
b) A symmetrical 400 v, 3-phase, supplies a star connected load with $Z_R = 5\ \Omega$, $Z_Y = j5\ \Omega$ and $Z_B = -j5\ \Omega$. Determine the line currents the phase sequence is RYB.

3.a) Define the following terms:
i) RMS value ii) Average value iii) Form factor iv) Peak factor.
b) Determine the average and effective values of saw-tooth waveform as shown in below Figure 1.

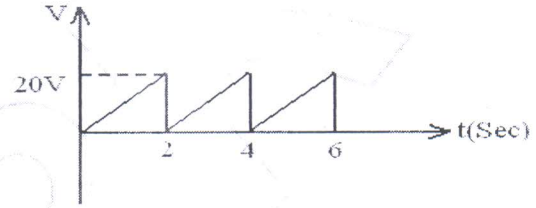

Figure 1

4. A series RLC circuit with R = 3Ω, L = 1H and C = 0.5F, is excited by a unit step voltage. Obtain the expression for I(t) using Laplace Transform method. Assume that the circuit is initially relaxed. Sketch the variation of I(t) and state whether the circuit is over damped, or under damped or critically damped.

5.a) Define and explain self-inductance and mutual-inductance.
b) Two coupled coils of $L_1 = 0.8$ H and $L_2 = 0.2$ H have a coupling coefficient k = 0.9. Find the mutual inductance M.
c) State and explain Faraday's laws of electromagnetic induction.

6.a) State and explain Tellegens theorem.
b) When the load impedance R draws the maximum power? Find the maximum power delivered to the load by using maximum power transfer theorem for the given network shown in Figure 2.

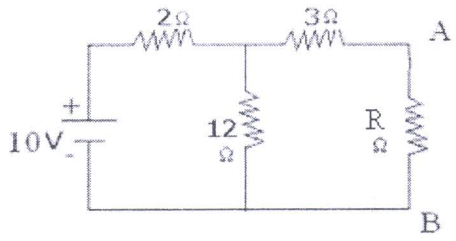

Figure 2

7.a) Define and explain the following with an example:
i) Oriented Graph
ii) Tree of a Graph
iii) Tie set and a basic Tie set
iv) Cut set and a basic Cut set.

b) Find the values of V_1 and V_2 in the network shown in Figure 3 using Nodal method of analysis.

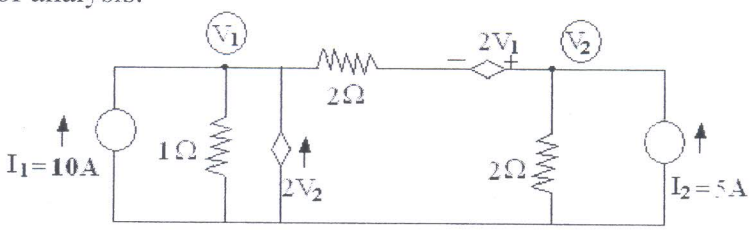

Figure 3

8. Find the current through the capacitor and voltage across 4Ω resistance of the AC network shown in Figure 4 by using superposition theorem.

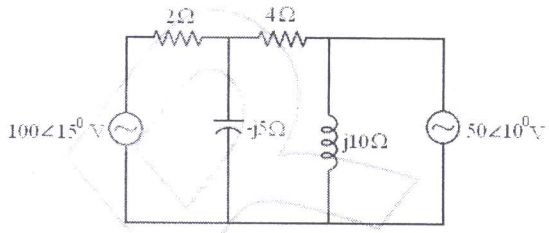

Figure 4

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