Code No: 113BW

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, May/June - 2015
ELECTRICAL CIRCUITS
(Common to EEE, ECE)

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

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A **(25 Marks)**

1.a)	Define Kirchhoff's current law with example.	[2M]
b)	Write short notes on super mesh analysis.	[3M]
c)	Define RMS value for periodic waveforms.	[2M]
d)	Write short notes on power factor.	[3M]
e)	Define resonance in electric circuits.	[2M]
f)	Write short notes on dot convention.	[3M]
g)	Define tree.	[2M]
h)	Write short notes on Duality.	[3M]
i)	Define superposition theorem.	[2M]
j)	Explain the condition for the maximum power transfer in AC networks.	[3M]

PART - B **(50 Marks)**

2.a) Explain the properties of inductor and capacitor.
b) Find the voltage 'V' in the circuit shown in the figure 1 below using Mesh analysis?

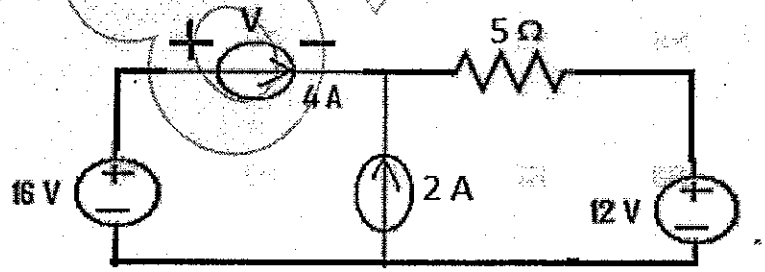

Figure: 1

c) A voltage source of 20V having an internal resistance of 1Ω is connected to a load resistor of resistance 10Ω. Find the current in and voltage across the load resistance. [3+3+4]

OR

3.a) Explain different types of dependent sources.
b) Find the current 'I' in the circuit shown in the figure 2 below using Nodal analysis.

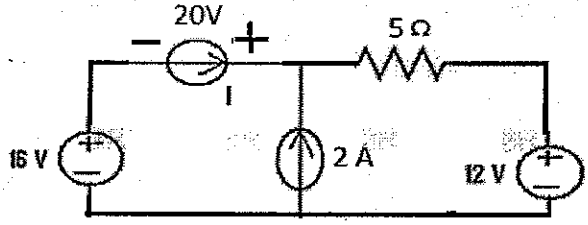

Figure: 2

c) A current source of 10A having an internal resistance of 100Ω is connected to a load resistor of resistance 10Ω. Find the current in and voltage across the load resistance. [3+3+4]

4.a) Derive the expression for the RMS value of a sinusoidal waveform.

b) For a load, $V_{rms} = 100 \angle 80^0$ V and $I_{rms} = 6.8 \angle 35^0$ A. Determine Complex power, real power and power factor.

c) A 300V, 50 Hz supply is connected to a lamp having a rating of 200V, 200W in series with a pure inductance L, such that the total power consumed is the same. Find the value of L. [3+4+3]

OR

5.a) Derive the expression for the average value of a triangular waveform.

b) Find the value of parallel capacitor needed to correct a load of 60kW at 0.8 lagging power factor to unity power factor. Assume the load is supplied by a 230V, 50 Hz line.

c) A sinusoidal source supply 5KVAR reactive power to load $Z=80 \angle -30^0$. Determine power factor and apparent power delivered to the load. [3+4+3]

6.a) Draw the locus diagram of series RC circuit and explain.

b) For a series resonant circuit of the elements R = 8 kΩ, L = 20 mH and C = 80 nF, find resonant frequency and quality factor.

c) A cast steel ring has a mean diameter of 150 mm and a cross sectional area of 200 mm^2. Calculate the MMF required to produce a flux of 200 mWb in the ring. Assume the relative permeability of the cast steel as 800. [3+3+4]

OR

7.a) Draw the locus diagram of parallel RL circuit and explain.

b) For a parallel resonant circuit of the elements R = 10 kΩ, L = 20 mH and C = 150 nF, find lower and upper cut off frequencies.

c) A steel magnetic circuit has a uniform cross sectional area of 4 cm^2 and a length of 25 cm. A coil of 200 turns is wound uniformly over the magnetic circuit. Calculate the current in the coil so that the flux produced is 0.5 mWb. Assume the relative permeability of the cast steel as 800. [3+3+4]

8.a) Define graph, sub graph and degree of vertex with an example.

b) Draw the graph for a parallel RLC circuit and determine tieset matrix for the graph by taking necessary assumptions.

c) Explain the nodal method for analysis of networks. [3+4+3]

OR

9.a) Define connected graph, loop and path with an example.

b) Draw the graph for a series RLC circuit and determine cutset matrix for the graph by taking necessary assumptions.

c) Draw the dual network for a parallel RLC circuit. [3+4+3]

10.a) Explain Norton's theorem with example.
b) State and explain Tellegen's theorem.
c) Determine the current in the voltage source as shown in the figure 3 below using Thevenin's theorem. [3+3+4]

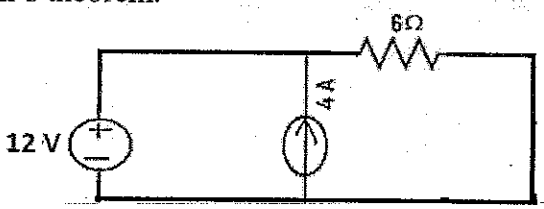

Figure: 3

OR

11.a) Explain Thevenin's theorem with example.
b) State and explain the compensation theorem.
c) Determine the current in the voltage source as shown in the figure 4 below using Norton's theorem. [3+3+4]

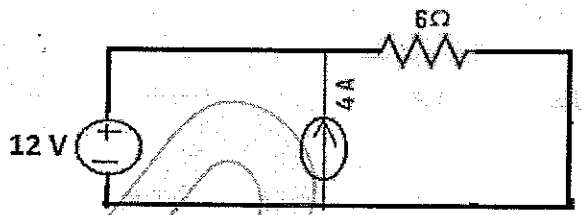

Figure: 4

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