R15

Code No: 123BW

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2016
ELECTRICAL CIRCUITS
(Common to EEE, ECE, ETM)

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 capacitance. What is V-I relation of capacitance?	[2]
b)	What are the properties of super mesh?	[3]
c)	Define RMS value.	[2]
d)	What is the significance of power factor?	[3]
e)	What is resonance?	[2]
f)	What are the circuit variables of a magnetic circuit?	[3]
g)	Define graph.	[2]
h)	Draw a connected graph and explain.	[3]
i)	Define Norton's current.	[2]
j)	What are the limitations of superposition theorem?	[3]

PART-B

(50 Marks)

2.a) Give the detailed classification of independent sources.
b) Using Mesh analysis, find the voltage across 5Ω resistor in the circuit below shown in figure 1. [5+5]

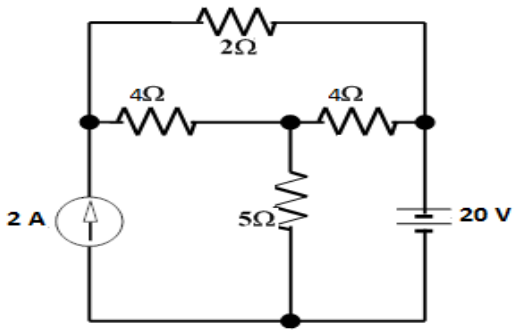

Figure: 1

OR

3.a) With an example explain about Kirchoff's laws.

b) Using Nodal analysis, find the voltage 'V' in the circuit below shown in figure 2. [5+5]

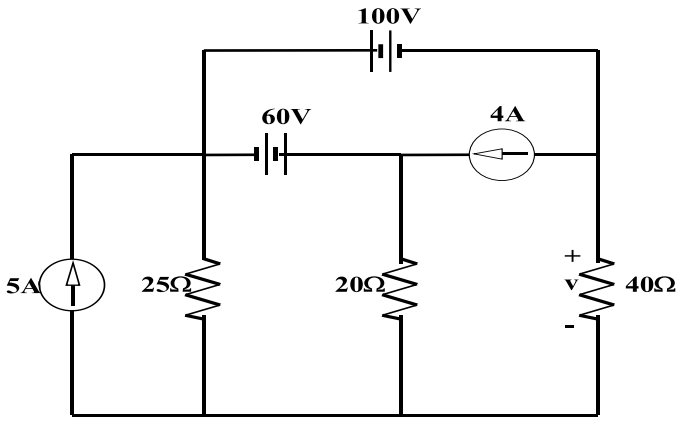

Figure: 2

4.a) Derive the expression for the average value and form factor of a sinusoidal waveform.

b) In the circuit shown below in figure 3, if the power consumed by the 5Ω resistor is 20 W, Find the power factor and reactive power of the circuit w = 100 rad/sec. [5+5]

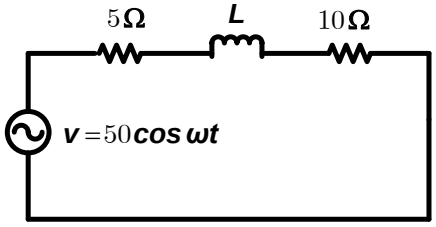

Figure: 3

OR

5.a) Derive the relationships for real and reactive powers in a series RL circuit with sinusoidal excitation.

b) Find the RMS voltage of the signal below in figure 4. [5+5]

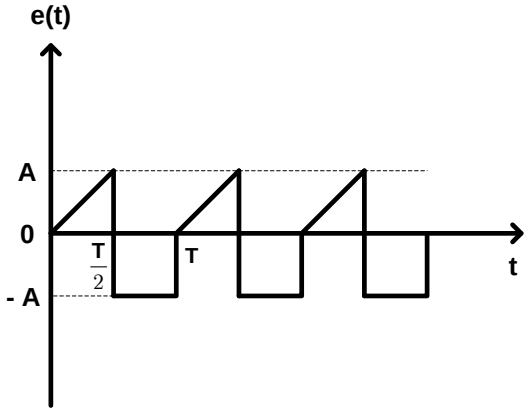

Figure: 4

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

b) For the magnetic current shown in figure 5, find the current 'I' in the coil needed to produce a flux of 5.5 mWb in the air gap. The magnetic circuit has a uniform cross sectional area of 5 cm^2. Assume the relative permeability of the magnetic material as 3523, neglect leakage and fringing effect. [5+5]

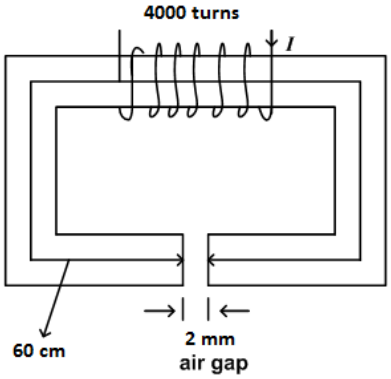

Figure: 5

OR

7.a) Explain in detail about Faraday's law of electromagnetic induction.

b) In a series circuit of L=10mH and C=0.01μF and R=50Ω. Calculate the resonant frequency and also the impedance at the resonant frequency. [5+5]

8.a) What is loop method? Explain the analysis of networks with this method in detail.

b) For the graph shown in figure 6, determine the number of branches, sub graphs, trees and draw them. [5+5]

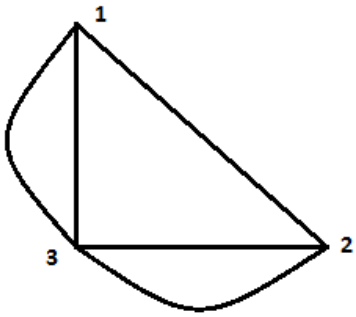

Figure: 6

OR

9.a) Define Duality. Explain with the help of an example.

b) With the help of an example, explain the procedure of formulating the Basic tie set matrix. [5+5]

10.a) With the help of an example, explain about Compensation theorem.

b) Using Superposition theorem, find the current flows in 2Ω resistor in the circuit shown in figure 7. [5+5]

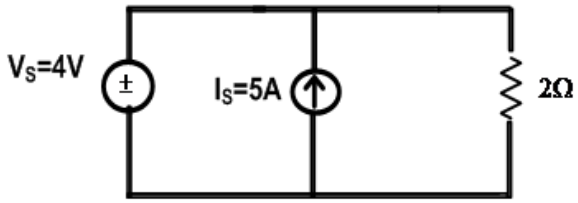

Figure: 7

OR

11.a) With the help of an example, explain about Millman's theorem.

b) Using Thevenin's theorem, find the voltage 'V' in the circuit shown in figure 8. [5+5]

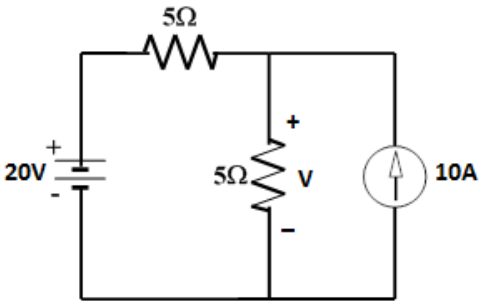

Figure: 8

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