R09

Code No: 09A30204

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech II Year I Semester Examinations, November/December-2013
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) Explain in detail the volt-ampere relationship of R, L and C elements with neat diagrams.
b) What is meant by independent and dependent sources? Give examples.
c) Find the equivalent voltage source across a, b terminals of the following Figure 1. [15]

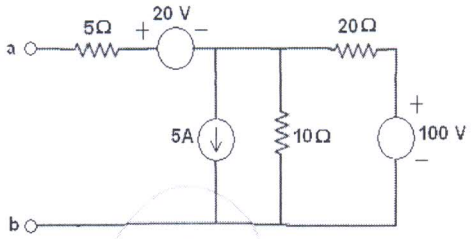

Figure: 1

2.a) State and explain Kirchoff's laws.
b) Find the equivalent resistance across the terminals A-B as shown in Figure 2. [15]

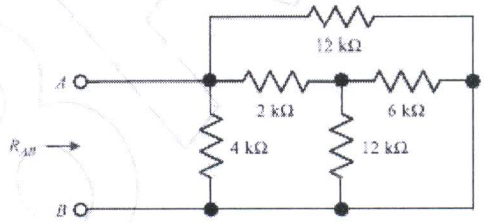

Figure: 2

3.a) Illustrate following terms:
i) Impedance
ii) Reactance
iii) Phase deference
iv) Power factor.
b) A circuit consists of a resistance of 15Ω, a capacitance of 200 μF and inductor of 0.05H all in series. If supply of 230V, 50Hz is applied to the ends of circuit. Calculate
i) Current in the coil
ii) Potential difference across each element
iii) Frequency at which current would have unity power factor. [15]

4.a) Obtain the current locus of a fixed resistance and a variable capacitance when connected with voltage of variable frequency.
b) Given a series RLC circuit with R = 10 ohms, L = 1 mH and C = 1 μF is connected across a sinusoidal source of 20 V with variable frequency. Find
i) The resonant frequency
ii) Q factor of the circuit at resonant frequency
iii) Half power frequencies. [15]

8. A beam *ABCDE*, 10m long, is hinged at *A* and freely supported at *B* and *D*. AB=2m; *BD*=6m; the overhang *DE*=2m. There is a hinge at *C*, midway between *B* and *D*. The loading consists of a point-load of 15kN at the free end *E*, 20kN at the middle of *BC* and 40kN at the middle of *CD*. Evaluate the reactions at the supports. [15]

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5.a) Derive the relation between self inductance, mutual inductance and coefficient of coupling.

b) A mild steel ring has a mean circumference of 600mm and a uniform cross-sectional area of 350 mm^2. Calculate the MMF required producing a flux of 600μWb when an air gap of 1mm length is now cut in ring. Also, determine the flux produced if MMF remains constant. Given relative permeability of mild steel is 1200. [15]

6. For the network shown in Figure 3, draw the following
a) Graph
b) Tree
c) Dual network. [15]

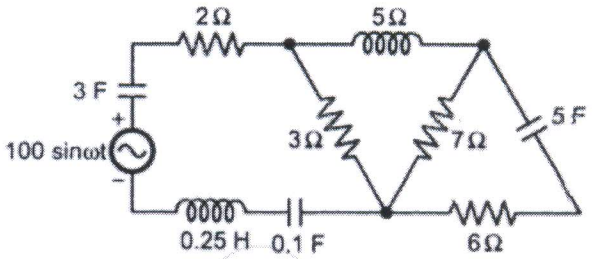

Figure: 3

7.a) State and explain Compensation theorem.

b) By using Norton's theorem determine the current through 5Ω resistor (All resistances are in Ω) as shown in Figure 4. [15]

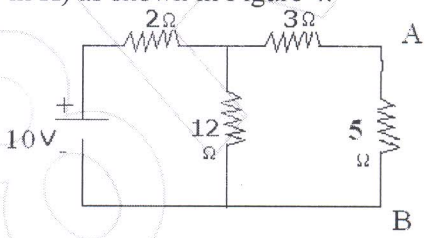

Figure: 4

8.a) State and explain Superposition theorem.

b) For the network shown in Figure 5, replace the circuit to the left of terminals 'AB' with a Thevenin equivalent. The determine current in the (2–j2)Ω impedance connected to the equivalent circuit. [15]

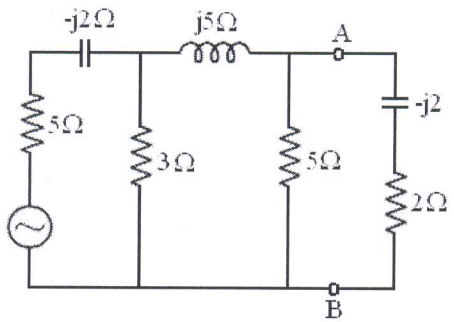

Figure: 5

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