Code No: R161208 **R16** SET - 1

I B. Tech II Semester Supplementary Examinations, Nov/Dec - 2018
ELECTRICAL CIRCUIT ANALYSIS – I
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) What are the applications and advantages of parallel circuits? (2M)

b) What are the properties of tie-set matrix? (2M)

c) State Ohm's law for magnetic circuits and write its expression in terms of magnetic quantities. (2M)

d) The instantaneous value of emf is $V = 300\, sin(80\frac{\pi}{4} t)$ Volts. Determine average value and periodic time. (2M)

e) A series RLC circuit has a resonant frequency of 12 kHz. If R=5 ohms and X_L at resonance is 300 ohms, find the bandwidth. (2M)

f) Write the properties of series resonance. (2M)

g) State Compensation theorem. (2M)

PART -B

2. a) Explain about dependent and independent sources with examples. (6M)

b) Use nodal analysis to determine V_1 and power being supplied by the dependent current source in the circuit shown in Figure 2(b). All the values of resistances in the circuit are in ohms. (8M)

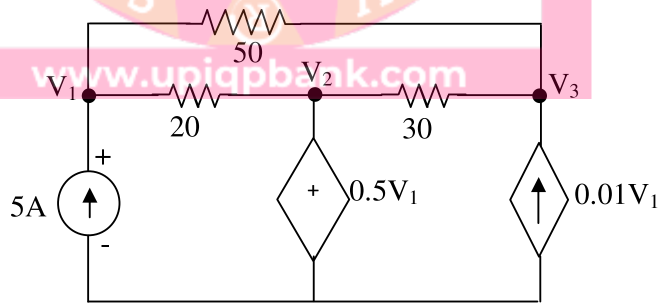

Figure 2(b)

3. a) For the network shown in figure 3(a), obtain the oriented graph of the network. Write the cut-set matrix of the graph and determine the loop currents. All the values of resistances in the circuit are in ohms. (8M)

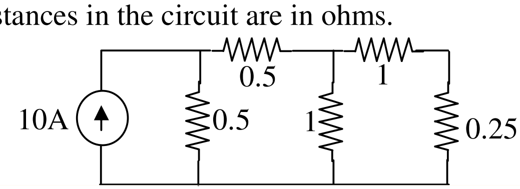

Figure 3(a)

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b) Explain the procedure for obtaining fundamental tie-set matrix of given network. (6M)

4. a) A coil of 200 turns is wound uniformly over a wooden ring having a mean circumference of 600 mm and a uniform cross sectional area of 500 mm^2. If the current through the coil is 4 A, calculate: (6M)
(i) magnetic field strength,
(ii) flux density, and (iii) total flux.

b) Explain the importance of dot convention in coupled circuits. (4M)

c) State and explain Faraday's laws of electromagnetic induction. (4M)

5. a) For a half-wave rectified alternating current, find average value, rms value and form factor. Find average and rms values when I_m=3A. (7M)

b) A resistor and capacitor are connected in series across a 150 V AC supply. When the frequency is 40 Hz, the current in the circuit is 5 A and when the frequency is 50 Hz, the current in the circuit is 6 A. Find R and C of the circuit. (7M)

6. a) An inductive coil of resistance 10 Ω and inductance 0.1 H is connected in parallel with a 150 μF capacitor to a variable frequency, 200 V supply. Find the resonant frequency at which the total current taken from the supply is in phase with the supply voltage. Also find the value of this current. (7M)

b) Show that for an RLC series resonant circuit, $Q_r = \frac{\omega_r L}{R} = \frac{f_r}{Band\ \text{width}}$ (7M)

7. Find the current flowing through branch A-B of the network shown in figure 7, by applying Norton's and Thevenin's theorem. Verify the equivalence between Norton's equivalent circuit and Thevenin's equivalent circuit. All the values of resistances and reactances in the circuit are in ohms (14M)

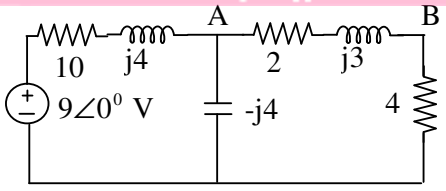

Figure 7