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

I B. Tech II Semester Supplementary Examinations, Nov/Dec - 2019
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 series circuits? (2M)

   b) List out the characteristics of a tree. (2M)

   c) A mild steel ring has a mean diameter of 20 cm and cross-sectional area of 400 mm^2. What is the reluctance of magnetic circuit, if μ_r of mild steel is 1080? (2M)

   d) The mathematical expression for instantaneous value of an alternating quantity is given as $i = 0.7071\sin(157.08t - \pi/4)$ amperes. Find RMS value and periodic time. (2M)

   e) Write the properties of parallel resonance. (2M)

   f) A series RLC circuit has R=5 ohms, L=0.01 H, and C=10 microfarads. What is the bandwidth of the circuit? (2M)

   g) State reciprocity theorem. (2M)

PART -B

2. a) Explain the star to delta and delta to star transformation with suitable example. (6M)

   b) Find the values of voltages V_1 and V_2 in the circuit shown in figure 2(b). All the values of resistances in the circuit are in ohms. (8M)

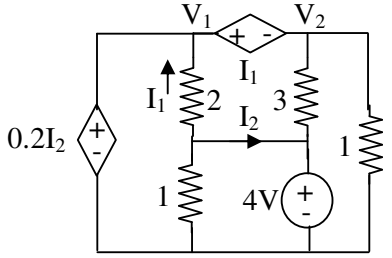

Figure 2(b)

3. a) Draw the graph of the network shown in figure 3(a). Select a suitable tree to write tie-set schedule and then find the three loop currents. All the values of resistances in the circuit are in ohms. (8M)

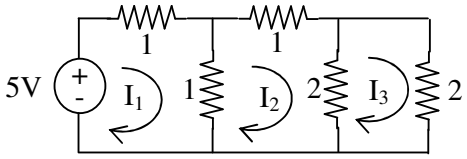

Figure (3a)

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b) What is duality? Explain the procedure to obtain dual of a given planar network. (6M)

4. a) Compare electric and magnetic circuits with respect to their similarities and dissimilarities. (6M)

b) Two coils connected in series have an equivalent inductance of 0.7 H when connected in aiding, and an equivalent inductance of 0.4 H when the connection is opposing. Calculate the mutual inductance of the coils and coupling coefficient. (8M)

5. a) Determine average value, rms value and form factor for resultant current of 10 A, DC and AC current having peak value of 10 A. Also draw the resultant waveform. (7M)

b) A coil of power factor 0.6 is in series with a 100 μF capacitor. When connected to a 50 Hz supply, the voltage across the coil is equal to voltage across the capacitor. Find the resistance and inductance of the coil. (7M)

6. a) A series RLC circuit has R=10Ω, L=0.5 H and C=40μF. The applied voltage is 100V. Determine (7M)
(i) resonant frequency
(ii) Quality factor
(iii) lower and upper half-power frequencies
(iv) bandwidth
(v) current at resonance
(vi) current half power-points
(vii) voltage across inductance at resonance, in the circuit.

b) A 230V, 50 Hz voltage is applied to a coil of R=2ohms and L=5mH in series with a capacitance C. What value must C have so that the potential difference across the coil shall be 250 V? (7M)

7. a) State and explain Millman's theorem with suitable example. (6M)

b) How much will be the maximum power that can be transferred to R_L in the circuit shown in figure 7(a). All the values of resistances in the circuit are in ohms. (8M)

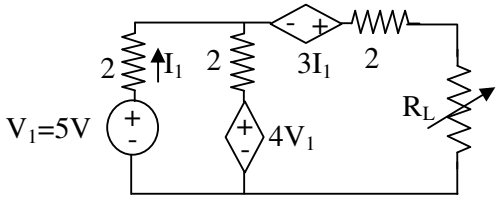

Figure 7a