

Code No: R13212

**R13**
**SET-1**
**I B. Tech II Semester Supplementary Examinations, April/May - 2018**
**ELECTRICAL CIRCUITS 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 **THREE** Questions from **Part-B**
**PART -A**

1. a) A delta-connected network consists of three resistors  $5\Omega$ ,  $6\Omega$  and  $9\Omega$ . Convert the delta-connected network into an equivalent star-connected network. (4M)
- b) In a series RC circuit, the current and voltage are given as  $i = \cos(314t - 20^\circ)$ ,  $v = 10\cos(314t + 10^\circ)$ . Find the values of R and L. (4M)
- c) Obtain the resonance condition in series R L C circuit. (4M)
- d) Compare electrical and magnetic circuits (4M)
- e) What are the Planar and Non planar networks? (3M)
- f) State Maximum power transfer theorem in AC circuits. (3M)

**PART -B**

2. a) Obtain the equivalent resistance  $R_{ab}$  in the circuit shown in figure 2(a). (8M)

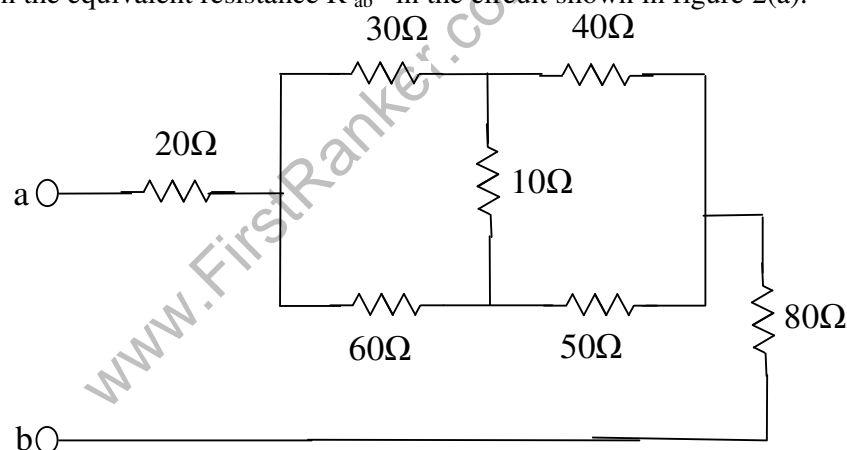


Figure 2(a)

- b) Use nodal analysis to find the power delivered by the 2 V source in figure 2(b). (8M)

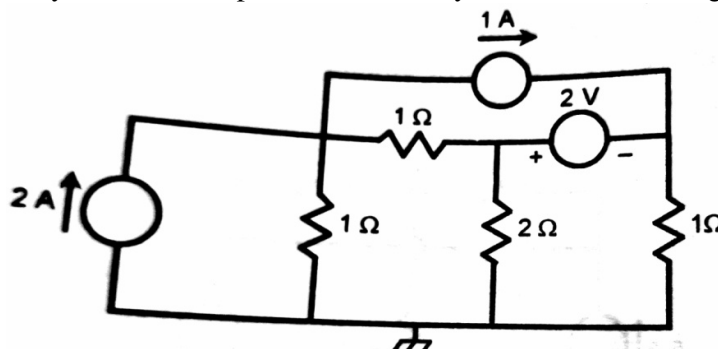


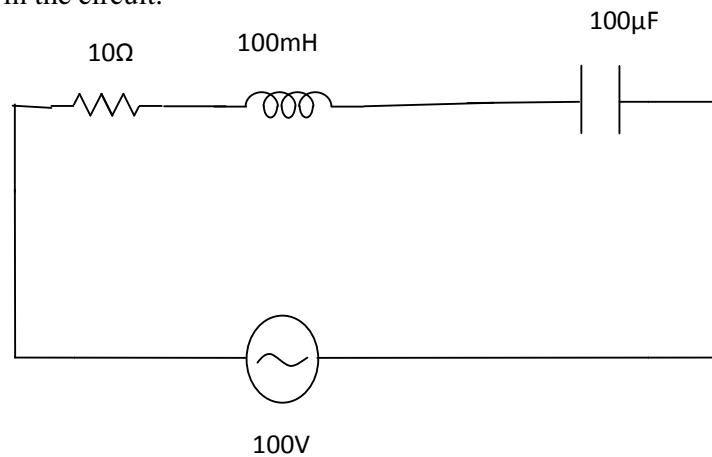
Figure 2(b)

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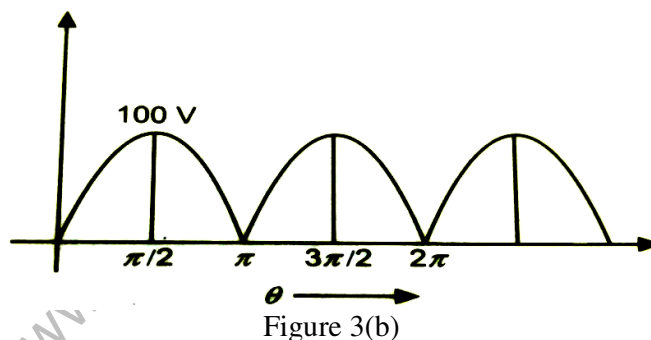
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3. a) A series circuit consisting of a 10 ohm resistor, 100  $\mu$ F capacitance and a 10 mH inductance is driven by a 50 Hz AC voltage source of maximum value 100 volts. Calculate the equivalent impedance, current in the circuit, the power factor and power dissipated in the circuit. (8M)



- b) Find the rms value, average value and form factor of the voltage wave form shown in figure 3(b). (8M)



4. An inductance of 0.5 H, a resistance of 5 ohm, and a capacitance of 8  $\mu$ F are in series across a 220 V AC supply. Calculate the frequency at which the circuit resonates. Find the current at resonance, bandwidth, half power frequencies and the voltage across capacitance at resonance. (16M)
5. a) A coil of 500 turns is wound uniformly over a wooden ring having a mean circumference of 50 cm and a cross sectional area of 500 mm<sup>2</sup>. If the current through the coil is 3A, calculate (8M)
- The magnetic field strength
  - The flux density and
  - The total flux
- b) Define coefficient of coupling and derive its expression. (8M)

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6. a) For the graph shown in figure 6(a), select a tree, obtain the tie-sets and cut-set matrices. (8M)

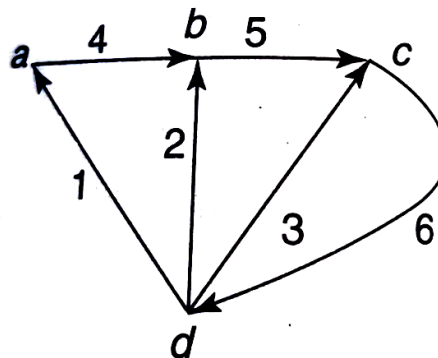


Figure 6(a)

- b) Explain the procedure for constructing dual networks and obtain the dual of a network shown in figure 6(b). (8M)

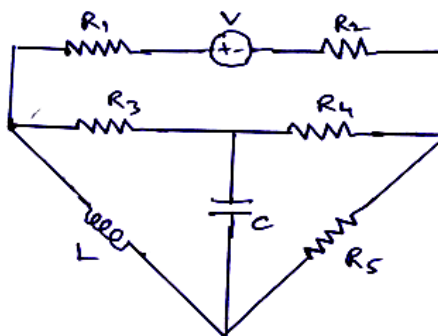


Figure 6(b)

7. a) Use Thevenin's theorem to find the power in the  $10\Omega$  resistor connected across the terminals a,b shown in figure 7(a). (8M)

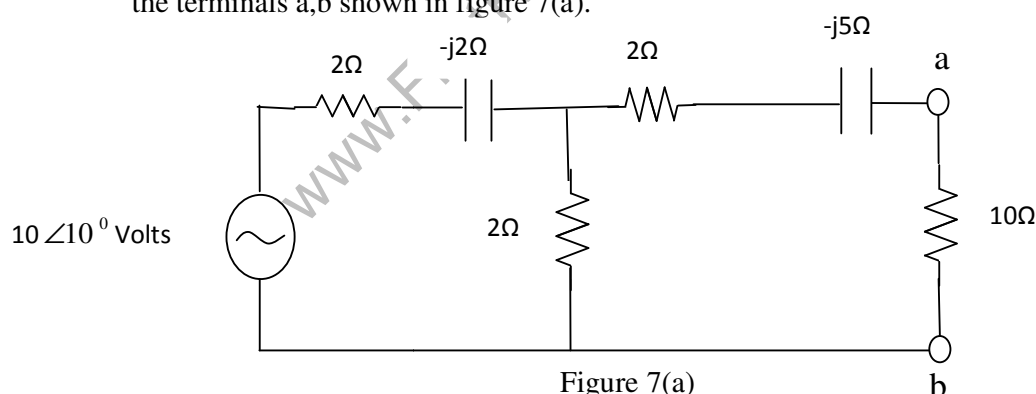


Figure 7(a)

- b) Using superposition theorem, calculate the current  $i_s$  in the network shown in figure 7(b). (8M)

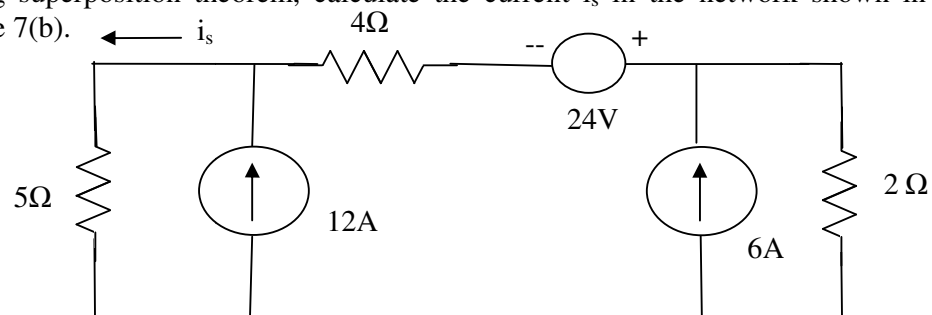


Figure 7(b)