Code No: R13212   **R13**   SET - 1

I B. Tech II Semester Supplementary Examinations, April/May - 2017
ELECTRICAL CIRCUITS ANALYSIS-I
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of **Part-A** and **Part-B**
2. Answering the questions in **Part-A** is Compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1. a) What are linear and non-linear elements? Give an example of each.   (4M)
    b) Write the expression for impedance of R-L-C series circuit. When does it have minimum impedance?   (3M)
    c) Define Q-factor. Find the Q-factor for an inductor and capacitor.   (4M)
    d) State Faraday's laws of electromagnetic induction.   (3M)
    e) A connected graph has 9 branches and 4 branch currents which are independent. Find the number of nodes.   (4M)
    f) State the limitations for Thevenin's theorem.   (4M)

PART –B

2. a) Discuss the concept of source transformation technique.   (8M)
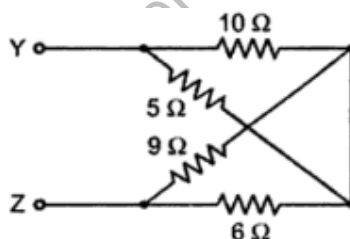   b) Find the equivalent resistance between the terminals Y and Z in Figure 1.   (8M)

Figure 1

3. a) Define the following: (8M)
        i) Amplitude of an alternating quantity
        ii) Instantaneous value of an alternating quantity
        iii) Frequency
        iv) Phase
    b) Show that power consumed in a purely inductive circuit is zero when sinusoidal voltage is applied across it.   (8M)

4. a) Prove that the locus of the current in an R-L circuit with R variable is a semicircle. Find the radius and the centre of the circle.   (8M)
    b) A coil of inductance 0.1H and resistance of 10Ω is connected in series with a capacitor of 0.1µF. Find frequency of resonance of the circuit. Also find quality factor of the circuit at resonance.   (8M)

5. a) Write the procedure to analyze a parallel magnetic circuit.   (8M)
    b) Describe an experiment to illustrate electromagnetic induction.   (8M)

6.   Explain the following terms with reference to network topology with an   (16M)
       example.
       a) Twig
       b) Link
       c) Oriented graph
       d) Incident matrix

7. a) State and explain Super position theorem.   (8M)
    b) Find R_{AB} in Figure 2, for maximum power transfer. Also calculate maximum   (8M)
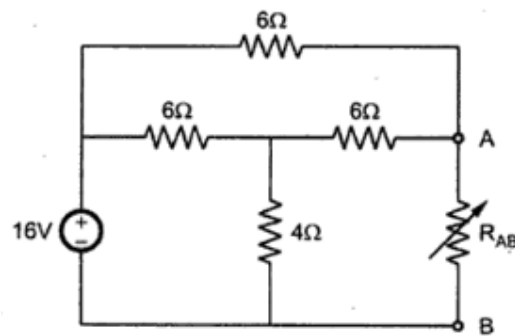   power.

Figure 2