H.T.No. | | | | | | | | | | |

**Code No: EE1509** **GEC-R14**

## I B. Tech II Semester Supplementary Examinations, December 2017

# CIRCUIT THEORY – I

(Electrical and Electronics Engineering)

**Time: 3 Hours** **Max. Marks: 60**

**Note:** All Questions from **PART-A** are to be answered at one place.
Answer any **FOUR** questions from **PART-B.** All Questions carry equal Marks.

## PART-A

**6 × 2 = 12M**

1. Derive the expression for equivalent resistance when 'n' resistances are connected in series.
2. Explain the terms tree and co-tree with an example.
3. Define average value of an alternating quantity.
4. What is quality factor? Explain its significance.
5. State superposition theorem.
6. Define magnetic flux and magnetic field density.

## PART-B

**4 × 12 = 48M**

1. a) Explain the classification of energy sources. (6M)

   b) Find the current ***I*** in the circuit shown in Figure 1. (6M)

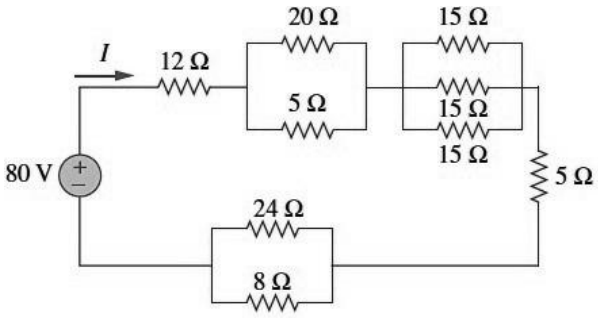


**Fig.1**

2. a) Explain the procedure for obtaining fundamental tie – set matrix of a given network. (6M)

   b) Obtain the dual network for the circuit shown in Figure 2. (6M)

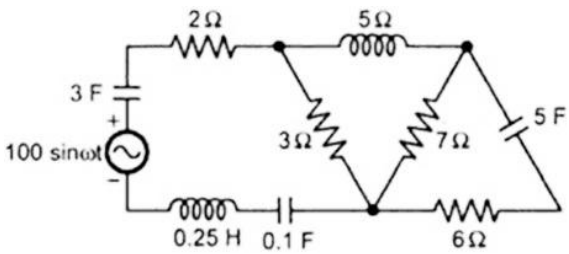


**Fig.2**

3. a) Determine the R.M.S value for the waveform shown in Figure 3. (6M)

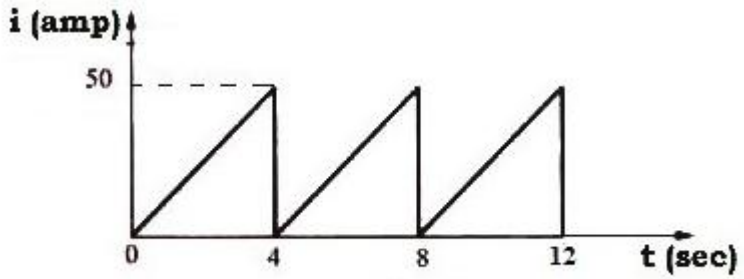

Fig.3

b) A resistor of 50Ω, inductor of 0.1H and a capacitor of 50μF are connected in series. A supply voltage of 230V, 50Hz is connected across the series combination. Calculate the following: (6M)

i) impedance ii) current drawn by the circuit

iii) power factor iv) active and reactive powers consumed by the circuit

4. a) Show that the locus of current in an R – L circuit with variable R is a semicircle. Find the radius and centre of the circle. (6M)

b) A series R-L-C circuit consists of a resistance of 1kΩ and an inductance of 100mH in series with capacitance of 10μF. If an A.C voltage of 100V is applied across the combination, determine the resonant frequency, band width, quality factor, half power frequencies, the voltage across inductor and capacitor at resonance. (6M)

5. Obtain the Thevenin's and Norton's equivalent circuits between the terminals 'ab' for the circuit shown in Figure 4 and hence find the current through 4Ω resistor. (12M)

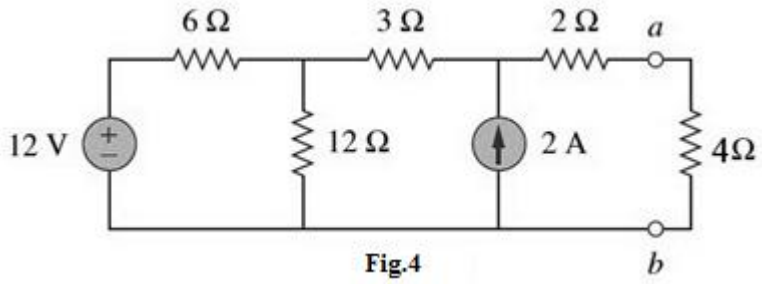

Fig.4

6. a) Derive the expression for equivalent inductance of two coils in series with

i) series aiding ii) series opposition. (6M)

b) Two similar coils connected in series give a total inductance of 600mH and when one of the coils is reversed, the total inductance is 300mH. Determine mutual inductance between the coils and coefficient of coupling. (6M)

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