53 (EE 201) BEEN

2017

BASIC ELECTRICAL ENGINEERING

Paper : EE-201

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* Define the following terms : 1×6=6

   (i) Active element

   (ii) Passive element

   (iii) Non-linear circuits

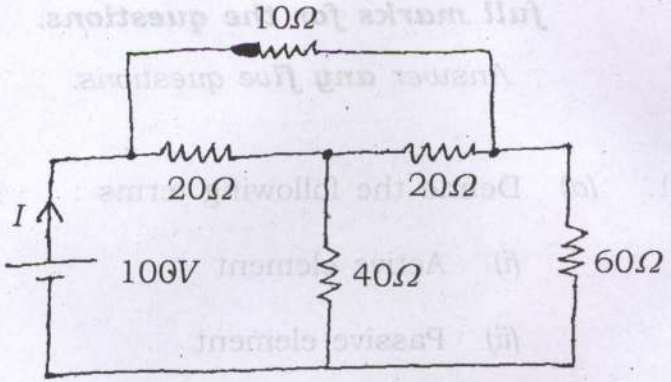
   (iv) Bilateral circuits

(v) Mesh

(vi) Loop.

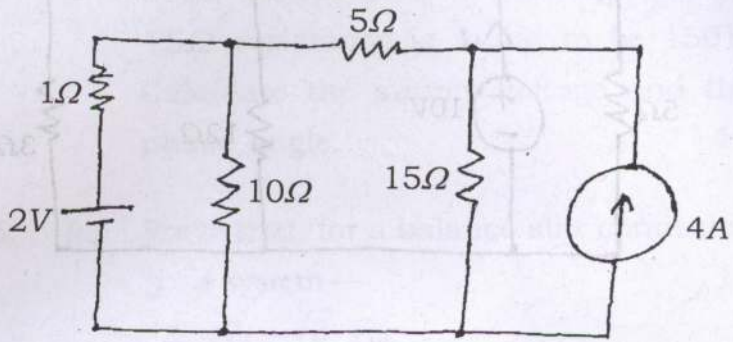
(b) State and explain Kirchhoff's Current law and Kirchhoff's Voltage law with necessary diagrams. 3+3=6

(c) Find the Current I for the given network— (use Delta/Star or Star/Delta transformation only). 8

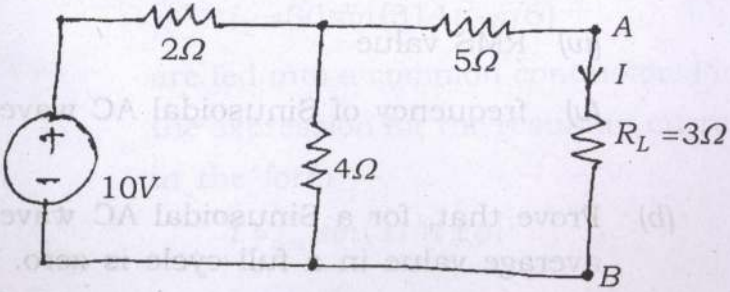


2. (a) Write the statements of Superposition and Reciprocity theorem and explain. 5+5=10

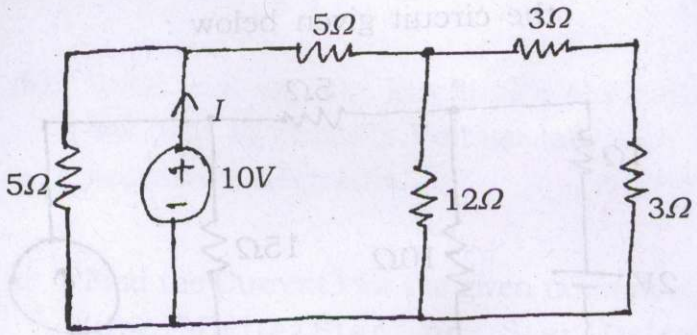
(b) Using Superposition theorem, find the power delivered in the 10Ω resistor in the circuit given below : 10



3. (a) Determine the Current I in the given circuit using Thevenin's equivalent circuit. 10



(b) In the following circuit, calculate the Current I. 10



4. (a) Define the following terms — 1×5=5

(i) Peak value

(ii) Symmetrical wave

(iii) Time period

(iv) RMS value

(v) frequency of Sinusoidal AC wave.

(b) Prove that, for a Sinusoidal AC wave, average value in a full cycle is zero. 5

(c) A pure inductance of $318mH$ is connected in series with a pure resistor of 75Ω. The circuit is supplied from $50Hz$ source and the voltage across 75Ω resistance is found to be $150V$. Calculate the supply voltage and the phase angle. 10

5. (a) Prove that, for a balance star connected $3-\phi$ system — 10

$$V_L = \sqrt{3}\ V_{ph}$$

Where, V_L = Line Voltage

V_{ph} = Phase Voltage

(b) Two currents represented by — 10

$$i_1 = 50 \sin 314t \text{ and}$$

$$i_2 = 30 \sin(314t - \pi/6)$$

are fed into a common conductor. Find the expression for the resultant current in the form —

$$i = I_m \sin(314t \pm \phi)$$

6. *(a)* An iron ring of cross-sectional area $6cm^2$ is wound with a wire of 100 turns and has a saw cut of $2mm$. Calculate the magnetising current required to produce a flux of $0{\cdot}1\,mwb$ if mean length of magnetic path is $30cm$ and relative permeability of iron ring is 470. 10

(b) Explain the following : 2+2=4

(i) Self-inductance

(ii) Magnetic intensity.

(c) Mention *three* similarities and dissimilarities between Magnetic and Electric circuits. 3+3=6

7. *(a)* What is the significance of shunt in ammeters ? Explain how the range of an ammeter can be extended. 5

(b) A moving coil instrument has a resistance of 10Ω and gives full scale deflection when carrying a current of $50mA$. Show how it can be adopted to measure voltage upto $750V$ and currents upto $1000A$. 5

(c) What are the different types of internal wiring usually employed in industries and house ? With the help of a neat diagram show, how a single phase energy meter, main switch and a distribution box (with 4 sub-circuits) are connected in a domestic wiring system. 10