1E2408

B. Tech. I - Sem. (Main/Back) Exam., Dec. 2019
1FY1 – 08 Basic Electrical Engineering

Time: 2 Hours

Maximum Marks: 80
Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. Scientific Calculator

2. NiL

PART – A

(Answer should be given up to 25 words only)

[5×2=10]

All questions are compulsory

Q.1 Explain the concept of voltage and current source transformation with an example.

Q.2 What is meant by power factor of an AC circuit? What is its minimum value and its maximum value?

Q.3 What is eddy current loss and how can this loss be reduced?

Q.4 What is meant by slip of an induction motor?

Q.5 Distinguish between a Rectifier and an Inverter.

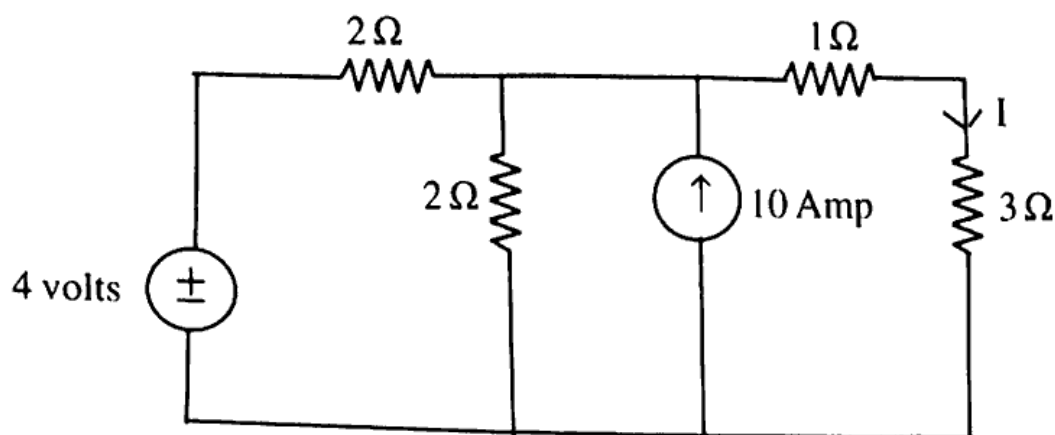Q.1 Find the current through 3Ω Resistor in the circuit shown in Figure 1. by using Thevenin's theorem.

Figure - 1

Q.2 For the circuit shown in Figure. 2. determine the voltages at nodes B and C and calculate the current through the 8Ω resistor.
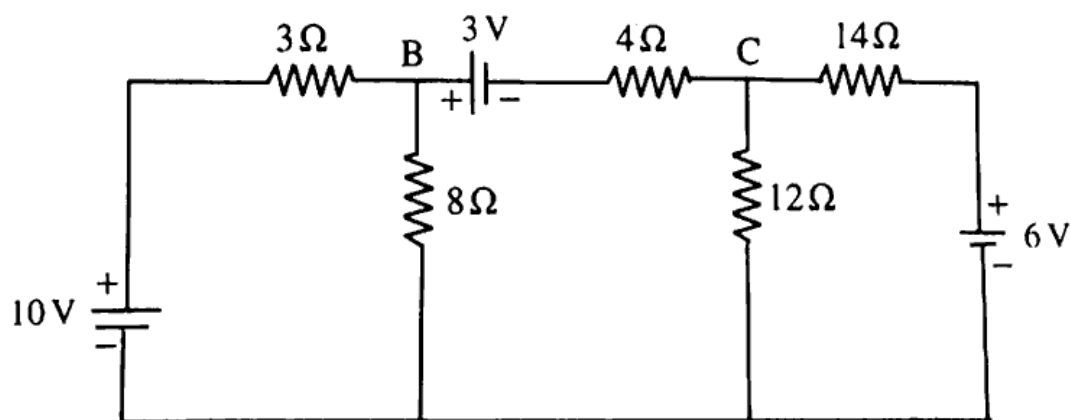

Figure - 2

Q.3 A voltage wave has the variation as shown in figure 3. Determine –

(a) The average and RMS value of voltage.

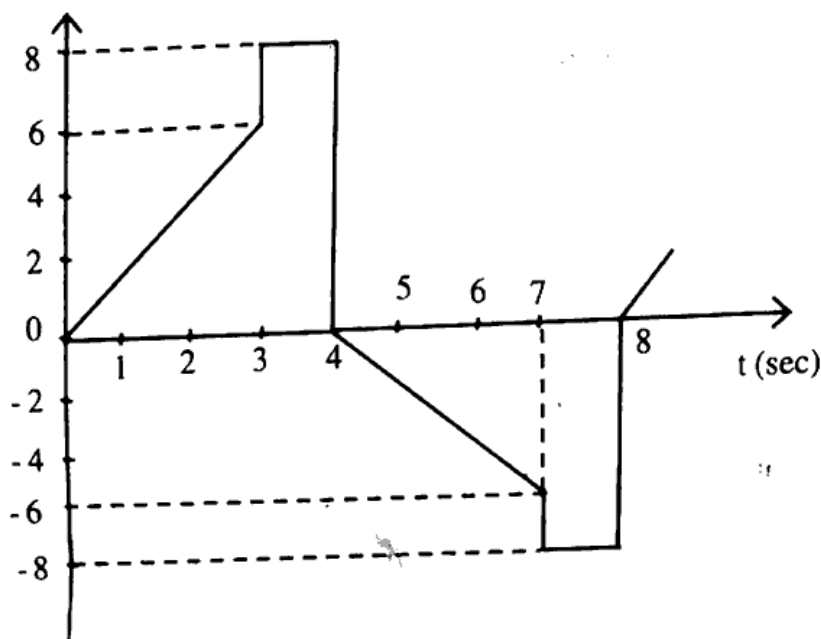(b) If the voltage of part (1) is applied to a 50 Ω resistor. Find the power dissipated in watts.

Figure - 3

Q.4 Derive EMF equation of single phase transforms. Also explain that why transformer is known as constant flux device.

Q.5 Explain in detail the construction and principle of working of a three – phase Induction motor.

Q.6 Explain the working of a single – phase full bridge Inverter with the help of circuit diagram and output voltage waveform.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)   [2×15=30]

Attempt any two questions

Q.1 (a) A non – inductive resistance of 10Ω is connected in series with an inductive coil across 200V, 50 Hz a.c. supply. The current drawn by the series combination is 10 A. The resistance of the coil is 2Ω. Design a circuit first and then calculate inductance of the coil, power factor of the coil, Power factor of the circuit and voltage across the coil.

   (b) Distinguish between active powers, reactive power and apparent power with the help of power triangle. https://www.rtuonline.com

Q.2 (a) What is a SCR? Sketch static I –V characteristics of a thyristor. Label the various voltages, currents and the operating modes on this sketch.

   (b) Explain the torque – speed characteristic and speed control of separately excited DC motor.

Q.3 (a) Why protective devices are used for overload and short – circuit protections? Why do we use an ELCB in an electrical installation?

   (b) Calculate the energy consumed per month by the following loads –

   (i)   4 tube lights of 40 W used on an average of 8 hours per day.

   (ii) 3 fans of 8 W used on an average of 10 hours per day.

   (iii) 1 fridge of ¼ kW rating operating 12 hours per day.

   The supply voltage is 230V, 50 Hz. Also calculate the electricity bill if cost of one unit of energy is ₹ 5/- only.