Total No. of printed pages = 4

CAI-301/PEEE/3rd Sem/2014/N

PRINCIPLES OF ELECTRICAL AND ELECTRONICS ENGINEERING

Full Marks – 70

Pass Marks – 28

Time – Three hours

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

Answer any *five* questions.

1. (a) What do you mean by specific resistance of a material ? What is its unit ? 1+1=2

(b) Find the resistance of 1000 meters of copper wire 25 sq.mm in cross-section. The resistance of copper is 1/58 ohm per meter length and 1 sq.mm cross-section. What will be the resistance of another wire of the same material, three times as long and one-half of the cross-sectional area ? 12

Or

(a) What do you mean by temperature coefficient of resistance ? 2

[Turn over

(b) A 50Ω resistor is in parallel with a 100Ω resistor. The current in 50Ω resistor is 7.2A. What is the value of third resistance to be added in parallel to make the line current 12.1A ? 6

(c) A pure resistance is connected across an AC voltage source. Show that the circuit current and voltage are in same phase. 6

2. (a) Write the KCL and KVL and explain with necessary diagrams. 2+2=4

(b) A Wheatstone bridge ABCD is arranged as follows : AB = 20Ω, BC = 5Ω, CD = 4Ω and DA = 10Ω. A galvanometer of resistance 6Ω is connected between B and D. A 10V DC supply of negligible resistance is connected between A and C with A +ve. Find the magnitude and direction of galvanometer current. 10

Or

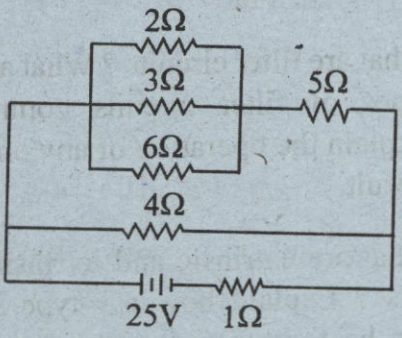
(a) In a certain 50 kVA transformer, the number of turns on the primary and secondary windings are 834 and 58 respectively. If primary is connected to a 3300V supply, find

(i) secondary voltage

(ii) primary and secondary currents when the transformer is fully loaded. Neglect the losses. 5+5=10

(b) Derive the EMF equation of a 1-ϕ transformer. 4

3. (a) For the following circuit, calculate the power loss in the 2Ω resistor. 8



(b) Express the following in polar form with diagrams : (i) 6 – j8 (ii) –50 –j75. 3+3=6

4. (a) Define the following : 3

(i) Time period

(ii) Maximum value

(iii) Form factor.

(b) An alternating current is given by i = 141.4 sin 314t, calculate 4

(i) maximum value

(ii) frequency

(iii) time period

(iv) instantaneous value.

(c) A series circuit consists of a resistor of 10Ω, an inductor having an inductance of 0.159H and a capacitor having a capacitance of 1.06×10^{-4}F. It is connected to a 230V AC supply. Calculate (i) circuit current (ii) the power consumed (iii) the power factor. 7

5. (a) What are filter circuits ? What are the different types of filter circuits commonly used ? Explain the operation of any one type of filter circuit. 8

(b) What are extrinsic and intrinsic semiconductors ? Explain how a p-type semiconductor can be formed from intrinsic semiconductor by the process of doping. 6

6. (a) Explain the following terms related to SCR. (i) Breakover voltage (ii) Forward current rating. 2+2=4

(b) With the help of a neat circuit diagram, explain the characteristics of common emitter connecting of a NPN transistor. 10

7. Write short notes on any *two* : 7×2=14

(a) Series resonance

(b) Full-wave rectifier

(c) Semiconductors.