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Total Pages : 3

8007

BT-I/D09

ELECTRICAL TECHNOLOGY

Paper : EE-101(E)

Time : Three Hours] [Maximum Marks : 100

Note : Attempt any *five* questions. Each question carry equal marks.

1. (a) Use Kirchhoff's and Ohms law in a step-by-step procedure to evaluate all the currents and voltages of Fig 1. 10

   (b) Calculate the power absorbed by each of seven circuit elements and show that the sum is zero. 10

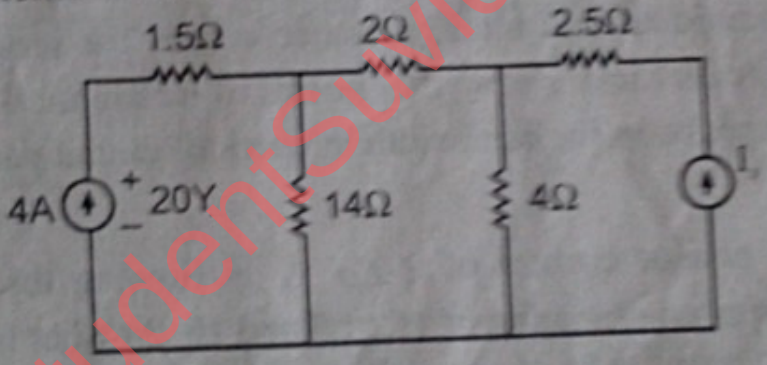

Fig. 1.

2. (a) Explain the following terms applied to alternating current wave (a) maximum value, (b) average value, and (c) r.m.s. value. If the maximum value of sine wave is 300A, give the average and r.m.s. value. 10

   (b) A circuit consists of 5Ω resistor, a coil of resistance 4Ω and inductive reactance 6Ω and a capacitor of reactance 9Ω connected in series across a 240V, 50Hz supply. Calculate the current, its phase angle and power factor. 10

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3. (a) Define Thevenin's and Norton's theorem with suitable example. 5+5

(b) With reference to the circuit of Fig. 2, find Thevenin's equivalent at terminals '*a*' and '*b*' and how much power would be delivered to a resistor connected to '*a*' and '*b*' if R_{ab} equals to (i)50Ω, and (ii)12.5Ω. 10

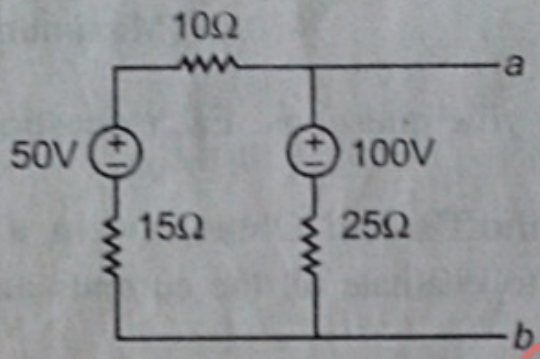

Fig. 2.

4. (a) Define Series resonance. Draw reactance curves for individual and total reactance curves for series R-L-C circuit and show the point of resonance. Derive expression for bandwidth in terms of circuit parameters. 10

(b) A phasor current of $1\angle o^{\circ}$ A is flowing through the series combination of 1Ω, 1H and 1F. At what frequency the amplitude of the voltage across the network twice the amplitude of the voltage across the resistor ? 10

5. (a) Prove with the help of phasor diagram that

$I_L = \sqrt{3}\, I_{phase}$ Δ connection

$V_L = \sqrt{3}\, V_{phase}$ Y connection 10

(b) Show that two wattmeter method is sufficient to measure the power of a 3ϕ circuit. Also derive power factor in terms of wattmeter readings. 10

6. (a) Explain the working principle of a Single phase transformer. Also draw a phasor diagram for unity power factor load. 6+4

(b) What are different losses in a single-phase transformer ? How these loses can be minimised ? Explain. 5+5

7. (a) Derive an expression of induced emf in a d.c. generator. Also discuss the concept of back emf in a d.c. motor. 6+4

(b) Compare the external characteristics of different types of d.c. generators. Also give their typical applications. 10

8. Write short notes on the following :

(a) Induction motor.

(b) Synchronous motor.

(c) Speed control of d.c. motor.

(d) Construction of d.c. motor. 5×4=20
