Total No. of Questions : 10] [Total No. of Printed Pages : 4

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BE–104

B. E. (First/Second Semester) EXAMINATION, June, 2010

(Common for all Branches)

BASIC ELECTRICAL ENGINEERING

(BE – 104)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt only *five* questions. *One* question from each Unit is to be attempted worth 20 marks only.

Unit – I

1. (a) Distinguish between the following : 6
   (i) Active and Passive elements
   (ii) Node and Junction
   (iii) Loop and Mesh

   (b) Find the current through 4 ohm resistor using node equation method in fig. 1. 14

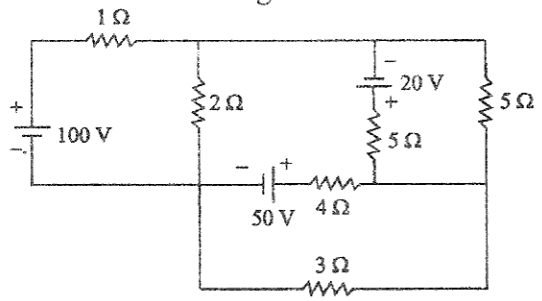

Fig. 1

P. T. O.

Or

2. While applying Kirchhoff's voltage law to a loop how signs are applied to the emf and voltage drops ?

   Apply Kirchhoff's law in the circuit shown in fig. 2, determine the value E_2 which will reduce galvanometer current to zero. The galvanometer resistance is 10 ohm. 20

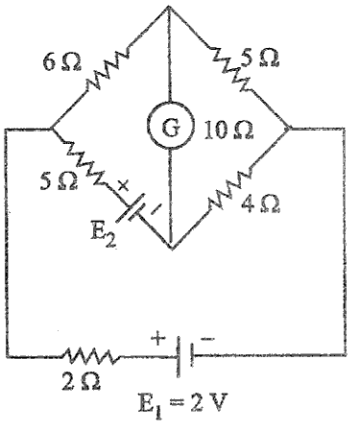

Fig. 2

Unit–II

3. (a) Determine phase angle relationship between alternating voltage and current in a purely inductive and purely capacitive circuit under steady state condition. 10

   (b) A series R-L-C circuit consists of 100 ohm resistor, an inductor of 0·318 henry, and a capacitor of unknown value, when the circuit is energised by $230 \angle 0^{\circ}$ volt, 50 Hz sinusoidal supply, the current was found to be $2{\cdot}3 \angle 0°$ amperes. Find the value of capacitor in microfarad, the voltage across the inductor, the total power consumed. 10

Or

4. (a) Three-phase system is preferred over single-phase system, why ? Develop the relationship between line voltage and line current with phase voltage and phase current in star-connected and delta-connected circuits. 12

   (b) The power input to a 2000 volt, 50 Hz, 3-phase motor running on full load at an efficiency of 90% is measured by two wattmeters which indicate 300 kW and 100 kW respectively. Calculate input power, power factor, line current and HP output. 8

Unit – III

5. Define the terms mmf, magnetic flux and magnetic reluctance and establish the relation which holds between these quantities for magnetic circuit.

   Estimate the number of ampere turns necessary to produce a flux of 100000 lines round an iron ring of 6 cm^2 cross-section and 20 cm mean diameter having an air gap 2 mm wide across it. Permeability of the iron may be taken 1200. Neglect the leakage flux outside the 2 mm air gap. 20

Or

6. (a) Derive an expression for field strength at the centre of a long solenoid af N-turns having a length of l metres and carrying a current I amperes. 10

   (b) Find the eddy current loss in a 50 Hz transformer core with a maximum flux density of 1·2 Wb/m^2. The core of section 8 cm × 8 cm and total effective length 60 cm is constructed of lamination of thickness 0·3 mm. Assume the space factor to be 0·9 and the eddy current coefficient $6·58 \times 10^6$. 10

Unit – IV

7. (a) With the help of a neat diagram explain the construction and working principle of a transformer. Also explain the function of conservator and silica gel breather. 10

   (b) Draw the equivalent circuit of a transformer and explain how the secondary parameters are transferred to primary. 10

Or

8. (a) Explain the following with respect to transformer : 10

   (i) Core type and shell type transformer

   (ii) Hysteresis and eddy current loss and how they are minimised.

   (b) Draw the phasor diagram of a transformer under : 10

   (i) Resistive

   (ii) Inductive

   (iii) Capacitive load

Unit – V

9. (a) Explain with the help of a diagram the construction of a D.C. machine. 10

   (b) Derive the emf equation of a D.C. generator. 10

Or

10. (a) Explain the difference between 3-phase and single-phase induction motor. Also explain how single phase induction motor is started. 10

    (b) Explain how rotational field is produced in a 3-phase induction motor. 10