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

Roll No. .....

EE/EX–303(N)

B. E. (Third Semester) EXAMINATION, Feb., 2010

(New Scheme)

(Common for EE & EX Engg. Branch)

ELECTRICAL INSTRUMENTATION

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any *one* question from each Unit. All questions carry equal marks. Assume any standard data if missing.

Unit – I

1. (a) What do you understand by accuracy, precision, sensitivity and resolution of any measuring instruments ?

   (b) Describe in detail systematic type of errors.

Or

2. Describe the construction of Ballistic galvanometer. Explain its theory of operation. Compare this galvanometer with the ordinary d. c. galvanometer. How do you determine the algorithmic decrement ? Deduce the results whenever necessary.

P. T. O.

Unit – II

3. Discuss the constructions, working, advantages and disadvantages of :

   (i) PMMC and MI instruments

   (ii) Electrodynamometer and Electrostatic instruments.

Or

4. (a) Explain the use of shunt as a device for extending the range of ammeters.

   (b) A moving coil meter gives a full-scale deflection with a current of 5 mA. If the coil of the instrument has a resistance of 10 Ω, show how it can be adopted to work (i) as an ammeter with a range 0–10 A and (ii) as a voltmeter with a range of 0–100 V.

Unit – III

5. (a) Explain clearly with the help of phasor diagram the principle of current transformer.

   (b) A potential transformer with ratio 1000/100 V, has the following constants :

   Primary resistance 94·5 Ω

   Secondary resistance 0·86 Ω

   Primary reactance 66·2 Ω

   Total equivalent reactance 110 Ω

   Magnetising current 0·02 A at 0·4 p. f.

   Calculate :

   (i) The phase angle error at no-load between primary and secondary voltages.

   (ii) The load in VA at unity p. f. at which the phase angle will be zero.

Or

6. (a) Explain the construction and working principle of Electrodynamometer type of wattmeter.

(b) Find the readings of two wattmeters in the following cases :

(i) The load is 20 kW at unity power factor.

(ii) The load is 20 kW at 0·8 p. f.

(iii) The load is 20 kW at 0·5 p. f.

(iv) The load is 20 kW at 0·25 p. f.

Unit–IV

7. (a) Draw a connection diagram of Crompton potentiometer and bring out its salient features. How is it standardised ?

(b) Calculate the inductance of a coil from the following measurements on an a. c. potentiometer : voltage drop across a 0·3 Ω standard resistor connected in series with the coil = 0·612 ∠ 12° 6′ V, voltage across the test coil through 100/1 volt ratio box = 0·781 ∠ 50° 48′ volt. Frequency of supply is 50 Hz.

Or

8. (a) Describe briefly an ampere-hour meter and explain how the meter is compensated for the effects of fluid friction at high loads.

(b) An energy meter is designated to make 100 revolutions of the disc for one unit of energy. Calculate the number of revolutions made by it when connected to a load carrying 20 A at 230 volts at 0·8 p. f. for an hour. If it actually makes 360 revolutions. Find the percentage error.

Unit – V

9. (a) What are the difficulties associated with the measurement of low resistance ? Describe how low resistance is measured accurately by Kelvin's double bridge ?

   (b) The insulation resistance of a 2 metre cable was measured by the loss of charge method. The voltage across the standard capacitor of $0 \cdot 003 \mu F$ falls from 222 V to 155 V in one minute. Calculate the insulation resistance of the cable. Derive the formula used.

Or

10. (a) Explain construction and working principle of vibrating reed frequency meter.

    (b) Describe the Lloyd-Fisher square for measurement of iron losses in a specimen of laminations.