3E1485

B. Tech. (Sem. III) (Main/Back) Examination, February - 2010
Electrical Engineering
(3EE5 Electrical Measurements)

Time : 3 Hours]

[Total Marks : 80
[Min. Passing Marks : 24

Attempt five questions in all. Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly.

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

1. _____Nil_____   2. _____Nil_____

1 (a) Describe the constructional details and operation of moving iron type meter. Derive torque equation. Also explain why moving iron instruments are used as both d.c. and a.c.

8+4

(b) What is phantom loading? Where it is used?

4+2

OR

1 Explain the operation of electrodynamometer type of wattmeter. Discuss the following errors in electrodynamometer wattmeter :

(i) Error due to pressure coil inductance

(ii) Error due to connection of wattmeter

(iii) Eddy current error.

7+3+3+3

2 (a) What is Blondel's theorem? Explain one wattmeter method of measurement of power in three phase system with balanced load.

10

(b) Two wattmeter's are connected to measure the input to a balanced 3 phase circuit indicate 2000 W and 500 W respectively. Find the power factor of the circuit :

(i) When both readings are positive

(ii) When the latter is obtained after reversing the connection to the current coil of one instrument.

3+3

OR

2 (a) Explain with neat diagram, how PT and CT are useful for measurement of power.

5

(b) A current transformer has a single turn primary and 400 secondary turns. The magnetizing current is 90A while the core loss current is 40A. Secondary phase angle is 28° (lagging). Calculate the actual primary current and ratio error when secondary carries 5A current.

6

(c) Give any one method of testing of potential transformer.

5

3 (a) What is volt-ratio box? Explain how volt-ratio box works.

5

(b) Describe with the help of neat sketch the essential features of construction of one type of ac potentiometer. Explain how the above potentiometer is standardized. Describe some of typical applications of this meter.

5+4+2

OR

3 (a) Explain how the potentiometer can be used for measurement of resistance.

6

(b) Describe the construction and working of dc potentiometer.

6

(c) A Crompton's potentiometer consists of a resistance dial having 15 steps of 10 Ω each and a series connected slide wire of 10 Ω which is divided into 100 divisions. If the working current of the potentiometer is 10 mA and each division of slide wire can be read accurately upto 1/5 of its span, calculate the resolution of potentiometer in volt.

4

4 Explain what do you mean by low, medium and high resistances. Name various suitable methods for measuring them. Describe the theory and working principle of Kelvin double bridge for measurement of low resistance.

4+4+8

OR

4 (a) Explain how will you measure insulation resistance of

(i) 2-wire dc live main and

(ii) 3-wire dc live main.

4+4

(b) Describe the methods for measurement of medium resistances.

8

5 (a) Explain with the connection and phasor diagram of Hay's bridge for measurement of inductance. Give its advantages and disadvantages.

8

(b) Draw Wien's bridge and its phasor diagram for measurement of capacitance and frequency. Also obtain expression for frequency in terms of bridge parameters.

8

OR

5 (a) Discuss with phasor diagram the Heaviside's bridge for measurement of mutual inductance.

6

(b) Write notes on following :

(i) Sources of error in bridge measurement

(ii) Screening of bridge components.

5+5