24027

B.Tech. 3rd Semester (Electrical Engg.) Branch–I

Examination, December–2013

ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS

Paper–EE–209-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *(i)* ***Question No. 1 compulsory.***

(ii) Attempt ***four*** *questions from remaining four parts selecting* ***one*** *question from each part.*

1. (a) Explain the terms : (i) Resolution (ii) Precision

   (b) What do you mean by gross and systematic error ?

   (c) Explain the recording instruments by giving some examples.

   (d) Comparison of damping methods & their suitability.

   (e) Write down advantages and disadvantages of Hay Bridge.

   (f) Short note on earthing.

   (g) What do you mean by extension of range of measuring instruments as voltmeter ?

   (h) What do you mean by loss of charge method ?

Part–A

2. (a) Explain the three forces in electromechanical indicating instruments. 10

   (b) Define the term "True Value". Explain why it is not practically possible to know the true value of a quantity. 10

3. A voltmeter having a sensitivity of 1kΩ/V is connected across an unknown resistance in series with a milliammeter reading 80V on 150V scale. When the milliammeter reads 10mA, calculate :

   (i) Apparent resistance of unknown resistance,

   (ii) Actual resistance of unknown resistance,

   (iii) Error due to loading effect of voltmeter. 20

Part–B

4. Describe the construction and working of PMMC instrument. Derive the equation for deflection if the instrument is spring controlled. Describe the method of damping used in these instruments. 20

5. The coil of PMMC voltmeter is 40mm long and 30mm wide and has 100 turns on it. The control string exerts a torque of 120×10^{-6} Nm when the deflection is 100 divisions on full scale. If the flux density of magnetic field in air gap is 0.5 wb/m^2 estimate the resistance that must be put in series with the coil to give one volt per division. The resistance of voltmeter coil may be neglected. 20

Part–C

6. Derive the equation for deflecting torque in dynamometer wattmeter. Explain the source of error in dynamometer wattmeter. 20

7. An electro dynamic wattmeter has a voltage circuit resistance of 8000 Ω and inductance of 63.6 mH which is connected directly across a load carrying current of 8A at 50Hz voltage of 240 V and pf of 0.1 lagging. Estimate the percentage error in wattmeter reading caused by loading and inductance of voltage circuit. 20

Part–D

8. (a) Write short note on Kelvin double bridge. 10

   (b) What are the difficulties to measure high resistance ? 10

9. Draw circuit diagram and phasor diagram of :

   (a) Wein bridge. 10

   (b) De-sauty bridge. 10