

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 9209

Roll No.

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**B.Tech.**

**(SEM. III) ODD SEMESTER THEORY**

**EXAMINATION 2013-14**

**ELECTRICAL MEASUREMENTS AND MEASURING  
INSTRUMENTS**

*Time : 3 Hours*

*Total Marks : 100*

**Note :—Attempt all questions.**

1. Answer any four of the following : (5×4=20)
  - (a) Distinguish between Direct and Indirect methods of measurements giving suitable examples.
  - (b) What is error of an instrument ? Discuss about various types of “Errors” in measurement.
  - (c) If  $R_x = (R_1 \cdot R_2) / R_3$  where  $R_1 = 100 \pm 1\%$ ,  $R_2 = 200 \pm 2.5\%$  and  $R_3 = 100 \pm 2\%$ . Find :
    - (i) The nominal value
    - (ii) The limiting error, and
    - (iii) The percentage limiting error of  $R_x$ .
  - (d) Compare a PMMC instrument with a Dynamometer type instrument on the basis of their :
    - (i) Construction
    - (ii) Operation
    - (iii) Applications.

- (e) What error does the inductance of pressure coil introduce in wattmeters ? How is this error compensated ?
- (f) The ratio of readings of two wattmeters is 5:3 when they are connected to measure the total power of a three phase capacitive load. Find out the power factor of the load.

2. Answer any **two** of the following : (10×2=20)

- (a) With the help of connection diagram show that the range of 3 –  $\phi$  power measurement by two wattmeters method can be extended by using CT and PT. Obtain the formula for True Power for this case.
- (b) Write a note on frequency meter.
- (c) Discuss about a drag cup rotor type of AC tachometer.

3. Answer any **two** of the following : (10×2=20)

- (a) Why is it difficult to measure low resistances using Wheatstone's Bridge ? Explain how the problem is overcome in measuring low resistance by use of Kelvin's Double Bridge.
- (b) Describe the method of measurement of capacitance using Wien's bridge with the help of circuit diagram, phasor diagram and derivation of formula. How can frequency be measured by this bridge ?
- (c) Write about a Q-meter on following points :
  - (i) Working principle
  - (ii) Practical Q-meter, and
  - (iii) Sources of error in it.

4. Answer any **two** of the following : (10×2=20)

- (a) Discuss about Gall-Tinsley Co-ordinate type of AC Potentiometer on following points :
  - (i) Circuit-diagram
  - (ii) Standardization
  - (iii) Measurement of unknown emf by it.
- (b) In a test on a specimen weighing 13 kg, the measured values of iron loss at a given value of flux density were 17.2 W at 40 Hz and 28.9 W at 60 Hz. Estimate the values of hysteresis and eddy current losses at 50 Hz for the same value of peak flux density.
- (c) Explain the operation of a flux meter. How does a flux meter differ from a Ballistic Galvanometer ?

5. Answer any **two** of the following : (10×2=20)

- (a) What do you understand by "Total Harmonic Distortion" ? Draw suitable block diagram to explain the working of Heterodyne Harmonic Distortion Analyzer.
- (b) Discuss about the construction and working principle of a dual beam CRO. What is the difference between dual beam and dual trace oscilloscopes ?
- (c) Write notes on the following :
  - (i) Electronic multimeter
  - (ii) Power Analyzer.