[Total No. of Questions - 9] [Total No. of Printed Pages - 3] (2125)

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B. Tech 4th Semester Examination

Electrical Measurements & Measuring Instruments (OS)

EE-4005

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question from each of the section A, B, C, and D and all the subparts of the question in Section E. Marks for each question are given in bracket and assume missing data if any suitably.

SECTION - A

1. (a) Explain the various types of errors in measurement by giving suitable examples and suggest the means to minimize such errors. (10)

   (b) A 0-150V voltmeter has a guaranteed accuracy of 1% of full scale reading. The voltage measured by this instrument is 75 volt. Calculate the limiting error in percent. (10)

2. (a) Explain the classification of instruments based upon their principle of operation. (10)

   (b) Differentiate between recording and integrating instruments giving examples in each case. (10)

SECTION - B

3. (a) Explain the working principle of a permanent magnet moving coil instrument and also state their relative merits and demerits. (10)

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   (b) A moving coil instrument has a resistance of 10Ω and gives full scale deflection when carrying a current of 50 mA. Show how it can be adopted to measure voltage upto 750 V and current upto 1000 A. (10)

4. (a) Explain the working principle of repulsion type moving iron instruments and also state the sources of errors in such instruments. (10)

   (b) Describe the constructional details and working of an electrostatic type instruments. (10)

SECTION - C

5. (a) Explain the construction and working of dynamometer type wattmeter. (10)

   (b) Explain the construction and working of a single phase dynamometer type power factor meter. (10)

6. (a) Derive the expression for deflecting torque in single phase induction type energy meters. Show when the deflection will be maximum. (10)

   (b) The meter constant of a 230 V, 10 A watt hour meter is 1800 revolutions/KWh. The meter is tested at half load on rated voltage and unity power factor. The meter is found to make 80 revolutions in 138 s. Determine the meter error at half load. (10)

SECTION - D

7. (a) Explain the low resistance measurement by Kelvin's Double Bridge and derive the condition for balance. (10)

   (b) Explain the difficulties encountered in high resistance method. State how these difficulties are overcome. (10)

8. (a) Derive the equation of balance for Hay's bridge. Also draw the phasor diagram of the bridge under balanced conditions. (10)

   (b) Derive the equation for capacitance and dissipation factor in low voltage Schering bridge. Also draw the phasor diagram of the bridge under balanced conditions. (10)

SECTION - E

9. (a) State the advantages of using SI units.

   (b) Define absolute error.

   (c) State why and where multipliers are used.

   (d) Name the instruments those can measure both AC and DC quantities.

   (e) State why controlling torque is required.

   (f) What is creeping error and in which instrument it is encountered?

   (g) Which bridge is used to measure frequency and how?

   (h) Classify the resistances from view point of measurements.

   (i) What is the multiplying factor of a wattmeter?

   (j) State the various sources of errors in bridge circuits. (10×2=20)