B.E. Electrical (Electronics & Power) Engineering (MODEL CURRICULUM) Sem-IV

SE204 - Measurements and Instrumentation

P. Pages : 2 **GUG/W/22/13859**

Time : Three Hours * 3 0 8 8 * Max. Marks : 80

Notes :
1. All questions carry equal marks.
2. Answer **any five** questions as per internal given choice.
3. Assume suitable data wherever necessary.
4. Illustrate your answers wherever necessary with the help of neat sketches.
5. Use of non programmable calculator is permitted.
6. Due credit will be given to neatness and adequate dimensions.

1. a) Describe the different methods of producing controlling torque in an analog indicating instrument. List their advantages and disadvantages. **8**

b) Derive a general equation for deflection of a spring controlled repulsion type moving iron instrument. Comment upto the shape of the scale. Explain the methods adopted to linearize the scale. **8**

OR

2. a) Describe the working and constructional details of an attraction type moving iron instrument. Discuss its advantages and disadvantages. **8**

b) A moving coil instrument gives a full scale deflection of 10m A when the potential difference across its terminals is 100mV. Calculate. **8**
   a) The shunt resistance for full scale deflection corresponding to 100 A.
   b) The series resistance for full scale reding with 1000V. Calculate the power dissipation in each case.

3. a) Explain the terms accuracy, sensitivity and resolution as used for indication instrument. **6**

b) A set of independent 10 measurements were made to determine the weight of a lead shut. The weights in gromme were : 1.570, 1.597, 1.591, 1.562, 1.577, 1.580, 1.564, 1.586, 1.550, 1.575. Determine the: **10**
   i) Arithmetic mean
   ii) Average deviation
   iii) Standard deviation
   iv) Variance
   v) Probable error of one reading
   vi) Probable error of the mean.

OR

4. a) Name different types of strain gauges. Explain any one in detail. **8**

b) Write short note on linear voltage differential transformer. **8**

5. a) An energy meter is designed to make 100 revolutions of disc far one unit of energy. Calculate the number of revolutions made by it when connected to load carrying 40A at 230V and 0.4 four factor for an hour. If it actually make 360 revolutions find the percentage error. **8**

b) Explain the construction and working of single phase induction type energy meter. **8**

OR

6. a) Describe the method for measurement of reactive power in three phase circuit. **8**

b) In a particular measurement, the wattmeter readings were 5000 and 1000W. Calculate the power and power factor if. **8**
a) Both meter reads direct and
b) One of the meter has to be reversed.

7. a) Derive the expression for bridge sensitivity for a Wheatstone bridge with equal arms. Find also the expression for current through the galvanometer for a small unbalance. **8**

b) A length of cable is tested for insulation resistance by the loss of charge method. An electrostatic voltmeter of infinite resistance is connected between the cable conductor and earth, farming therewith a joint capacitance of 600 pF. It is observed that after charging the voltage falls from 250v to 92v in 1 minute. Calculate the insulation resistance of the cable. **8**

OR

8. a) Explain why Maxwell's inductance capacitance bridge is useful for measurement of inductance of coils having storage factor between 1 and 10. **8**

b) A capacitor bushing from arm ab of a Schering bridge and a standard capacitor of 500 pF capacitance and negligible loss, form arm ad. Arm bc consists of a non. When the Ω inducible resistance of 300 bridge is balanced arm cd has a resistance in parallel with a capacitance of Ω of 72.6 0.148 uF. The supply frequency is 50 Hz. Calculate the capacitance and dielectric loss angle capacitor. **8**

9. a) Explain the working principle of resistance thermometer. In what temperature range it is used? **8**

b) What is thermistor? Describe with the help of neat sketches the various form of construction sketch typical characteristics of thermistors and explain them. **8**

OR

10. a) What are different type of frequency meter. Explain any one in detail. **8**

b) Explain the construction and working of moving iron type power factor meter. **8**

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