[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1400 **I**

Unique Paper Code : 2512041103

Name of the Paper : Testing and Measurement (CORE)

Name of the Course : **B.Sc. (H) Instrumentation**

Semester : I

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question **1** is compulsory.
3. Attempt any **5** questions in all.
4. Use of scientific calculator is allowed.
5. **All** questions carry equal marks.

1. (a) The resistance of a circuit is found by measuring current flowing and the power fed into the circuit. Find the limiting error in the measurement of resistance when the limiting errors in the measurement of power and current are respectively ±1.5% and ±1.0%. (3)

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(b) Define Hysteresis and Resolution. (3)

(c) The dead zone in a bolometer is 0.150 percent of span. The calibration is 400°C to 1000°C. Calculate the dead zone. (3)

(d) What are the two most common causes of fault in cables which are used for distribution of lower voltages? (3)

2. (a) What are dynamic characteristics of an instrument? Explain each in detail. (6)

(b) What are loading effects in measurement? A moving coil voltmeter bas a uniform scale with 100 divisions, the full-scale reading is 300 V and 1/10 of a scale division can be estimated with a fair degree of certainty. Determine the resolution of the instrument in volt. (6)

3. (a) Differentiate between accuracy and precision. State the number of significant figures in (a) 0.0000400 Ω (b) 5.01×10^4. (6)

(b) What are the different methods of calibration of measuring instruments? Determine the sensitivity of a pressure gauge as a ratio of scale length to pressure if the gauge has radius of scale line as 100 mm and pressure of zero to 50 pascals is displayed over an arc of 270°. The gauge has linear calibration curve. (6)

4. (a) What are limiting errors? Current was measured during a test as 15A, flowing in a resistor of 0.205Ω. It was later discovered that the ammeter reading was low by 1.2% and the marked resistance was high by 0.3%. Find the true power as a percentage of the power that was originally calculated. (6)

   (b) Name any one material used for constriction of Ammeter Shunts. A 1mA d'Arsonval meter movement with an internal resistance of 50Ω is to be converted into a 0-100mA ammeter. Calculate the shunt resistance required. (6)

5. (a) Explain Murray loop test using suitable diagram. (6)

   (b) In Varley loop test (Fig. 1), the ratio of arms is set at $R_1 = 5\Omega$ and $R_2 = 10\Omega$ and the values of variable resistances R are 16 Ω for position 1 of switch S and 7Ω for position 2. The sound and faulty cables are identical and have a resistance of 0.4Ω/km. Determine the length of each cable and distance of fault from the test end. (6)

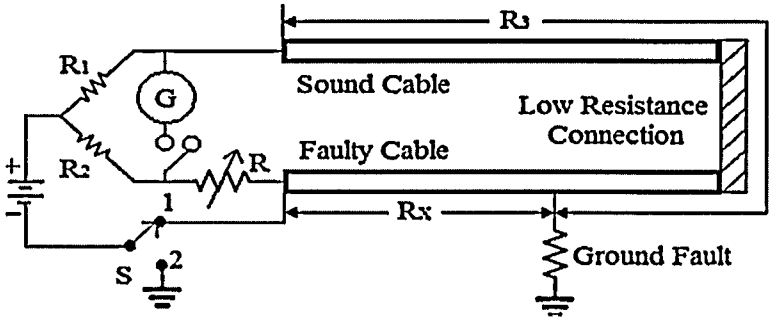

Fig. 1

6. (a) Explain various types of systematic errors. List two ways by which gross errors can be avoided. (6)

(b) What is Lux meter? Describe its operation. (6)

7. (a) What are the different methods of calibration of measuring instruments? Explain any two methods in detail. (6)

(b) What are the different types of probes and connectors used in measurement? Discuss the key benefits of implementing standardization in production plants and how it affects cost, quality, and production speed. (6)