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No. of Printed Pages—2   **ME—404**

B. TECH.

FOURTH SEMESTER EXAMINATION, 2002-2003

MEASUREMENT AND METROLOGY

Time : 2 Hours   *Total Marks : 50*

Note : Attempt **ALL** questions.

1. Attempt any THREE of the following :—   (4×3=12)

    (a) What are primary, secondary and tertiary measurements ? Explain with examples.

    (b) What is the function of a sensing element, signal conditioner and indicating element of a measuring instrument ? Give examples.

    (c) Distinguish between :
        (i)   Self-operated and power-operated instruments
        (ii) Digital and Analog signals
        (iii) Deflection and Null point instruments
        (iv) Static and Dynamic characteristics.

    (d) A thermistor has a resistance of 3980 ohms at ice point (0°C) and 7948 ohms at 50°C. The temperature resistance relationship is given by $R_T = a R_0 \exp(b/T)$. Calculate the constants a and b.

    (e) The accuracy of a pressure gauge of range 1000 kN/m² is stated to be ±1% of full-scale deflection. Workout the range of readings if the true pressure is 100 kN/m². How would these results get modified if the error is specified as ±1% of true value ?

ME—404   1   *Turn Over*

2. Attempt any TWO of the following :— (6·5 × 2 =13)

   (a)   With a neat sketch, describe a Bourdon Gauge.

   (b)   What is a Wheatstone's bridge ? How can it be used for measurement of strain ? What is temperature compensation in strain measurement ?

   (c)   Explain the difference between vibrometers and accelerometers. Explain also the working of elementary accelerometer like cantilever beams. Describe how vibrations are measured by it.

3. Attempt any TWO of the following :— (6·5 × 2 =13)

   (a)   What are sine–bars and how are they used for angular measurements ?

   (b)   What do you understand by limit gauging ? What is the Taylor's principle of gauge design ?

   (c)   Explain, briefly, the difference between interchangeable manufacture and selective assembly.

4. Attempt any TWO of the following :— (6 × 2 =12)

   (a)   Define roundness, and give different methods of testing roundness of a surface.

   (b)   With a neat sketch, describe a Laser Interferometer. How does it work ?

   (c)   Describe the working of an Autocollimator. What measurements are done with that ?