

00104

**BACHELOR OF TECHNOLOGY IN
MECHANICAL ENGINEERING
(COMPUTER INTEGRATED
MANUFACTURING)**

Term-End Examination

June, 2010

**BME-014 : METROLOGY AND
INSTRUMENTATION**

Time : 3 hours

Maximum Marks : 70

Note : Attempt any five questions.

1. (a) What do you understand about the standard of measurement ? How do you define a standard meter ? 7
- (b) The thermal conductivity of a metal is 4.76×10^{-4} w/mK. Find its value in cgs units. 7

2. The effect of temperature on the resistance of a wire is expressed by $R = R_0 [1 + \alpha (T - 18)]$ where R is resistance at temperature T and R_0 is resistance at 18°C temp. 14
If $R_0 = 8\Omega \pm 2\%$
 $\alpha = 0.005 \text{ C}^{-1} \pm 0.5\%$, $T = 30 \pm 1\%$
Calculate uncertainty in R.

3. Calculate the mean, standard deviation and variance of the following dimensions : 14

Reading	1	2	3	4	5	6	7	8	9	10
x_i (cm)	4.12	4.23	4.40	4.21	4.35	4.50	4.62	4.64	4.72	4.75

4. Following data points are expected to follow a functional variation between x and y in the form of 14

$$y = a e^{bx}$$

Find the best functional relation between x and y using the method of least squares :

x	1	2	3	4	5
y	9.2	8.8	7.3	5.3	3.4

5. (a) What is a strain gauge ? Describe the working principle of electrical wire strain gauge. 7
- (b) What is a projector ? What are the various applications of the projector ? 7
6. (a) Describe the different parts of the Coordinate Measuring Machine (CMM) and its applications. 7
- (b) List the various advantages of CMM. Explain any one of them in brief. 7

7. (a) Describe the principle and working of autocollimator. 7
(b) Why is sine bar not preferred for measuring angle more than 45° ? 7
8. (a) Draw a neat diagram of micro-meter. Also indicate all the parts of the instrument. 7
(b) Explain the procedure for reading a micro-meter. 7
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