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BIME-019

B.Tech. MECHANICAL ENGINEERING (BTMEVI)

Term-End Examination

June, 2014

BIME-019 : METROLOGY

01164

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any five** questions. All questions carry **equal** marks.*

1. (a) What is error in measurement ? Classify errors and describe each class. **7+7**

(b) A hole is dimensioned as $25^{+\ 0.033}_{+\ 0.0}$ and the shaft is dimensioned as $25^{-\ 0.040}_{-\ 0.061}$.

Determine the hole tolerance, the shaft tolerance and allowance of the fit. What type of fit shall be established ?

2. (a) Sketch a Vernier Caliper showing main scale and Vernier Scale. Define least count of Vernier caliper and explain how diameter of bar is measured. **7+7**

(b) What are the comparators ? Explain any one of them with the help of a neat diagram.

3. (a) Describe Co-ordinate Measuring Machine (CMM) and its main elements. 7+7

(b) Describe the working of a Interferometer with the help of a neat diagram.

4. (a) Explain with the help of a neat diagram the working of Vernier Height Gauge. 7+7

(b) The division on the main scale of a Vernier caliper are 0.5 mm apart. The Vernier has 100 divisions equal in length to 98 main scale divisions. To what accuracy the instrument can read.

5. (a) Explain with the help of suitable examples, the adverse effects of poor surface finish. 7+7

(b) In the measurement of surface roughness, heights of 20 successive peaks and troughs were measured from a datum and were : 35, 25, 40, 22, 35, 18, 42, 25, 35, 22, 36, 18, 42, 22, 32, 21, 37, 18, 35, 20 microns. Determine Centre Line Average (CLA) and Root Mean Square (from the mean), values of the rought surface.

6. (a) When measuring the major diameter of an external screw thread gauge, a 35.500 mm diameter cylindrical standard was used. The micrometer readings over the standard and gauge were 9.3768 mm and 11.8768 mm respectively. Calculate the thread gauge major diameter. 7+7

(b) What is the objective of measurement of thread elements ? Mention some important thread elements of linear measurement. What is meant by a "best size" wire ?

7. (a) Explain the principle of a sine bar with the help of a diagram. 7+7

(b) Describe the construction and working principles of a auto - collimator.

8. (a) Explain the repeatability of an measuring instrument. How will you check the repeatability of an instrument ? 7+7

(b) Explain the following terms in mechanical measurement.

(i) Calibration
(ii) Sensitivity
(iii) Precision
(iv) Accuracy
(v) Sampling plans
(vi) Statistical Quality Control
(vii) Control Charts