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BME-014

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

Term-End Examination

00722

December, 2017

BME-014 : METROLOGY AND INSTRUMENTATION

Time : 3 hours *Maximum Marks : 70*

Note : *Answer any **seven** questions. All questions carry equal marks.*

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1. (a) What are fits and tolerances ? How are they designed ?

(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 ? *5+5*

2. (a) Discuss 'Metrology' as a means to achieve quality control.

(b) Define the following : *5+5*

(i) Nominal size

(ii) Basic dimension

(iii) Tolerance

(iv) Upper dimension

(v) Allowance

3. (a) What are the sources of errors ? Explain them briefly.

(b) Distinguish between 'Controllable errors' and 'Random errors'. *5+5*

4. (a) Name the different types of vernier calipers and draw a neat sketch for one of them.

(b) Write down the precautions which should be taken while using a vernier caliper. *5+5*

5. (a) Draw a neat sketch of a vernier depth gauge and explain its construction and working.

(b) State the 'principle' on which micrometers are designed. *5+5*

6. (a) Explain any ***one*** of the following instruments with the help of a neat sketch :

(i) Vernier bevel protractor

(ii) Dial bevel protractor

(b) Write down the essential requirements in the use of sine bar to get accurate results. *5+5*

7. (a) Describe the working principle of an autocollimator with suitable sketches.

   (b) Describe the different parts of a Coordinate Measuring Machine (CMM). *5+5*

8. (a) Describe the construction and working of a mechanical comparator with a neat sketch.

   (b) Explain the construction and working of a simple dial gauge with the help of a neat sketch. *5+5*