

**B.Tech. MECHANICAL ENGINEERING
(COMPUTER INTEGRATED
MANUFACTURING)**

Term-End Examination

December, 2015

BME-014 : METROLOGY AND INSTRUMENTATION

Time : 3 hours

Maximum Marks : 70

Note : Answer any ten questions. All questions carry equal marks. Use of scientific calculator is permitted.

1. What are fits and tolerances ? How are they designated ? 7
2. 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 ? 7

3. What do you mean by 'error' in measurement ?
Explain the different types of errors. 7
4. Explain the formation of interference fringes when light falls on an optical flat resting on a lapped surface. What is the effect of using a monochromatic, instead of white light ? 7
5. (a) Describe in brief the principle of a micrometer screw measuring device. 3
- (b) State a particular precaution which must be taken when using an external micrometer to measure a diameter. 2
- (c) Why is it important to use the ratchet, when taking measurements with a micrometer ? 2
6. (a) What is meant by "accuracy" of a measuring instrument ? 3
- (b) How do you distinguish between "repeatability" and "stability" of an instrument ? 2
- (c) What is the difference between "magnification" and "amplification" ? 2

7. (a) What is the meaning of calibration of measuring equipment ? What is its principle ? 4
- (b) Why sometimes a measurement system in use, does not conform to its calibration ? 3
8. (a) What is meant by 50 H 5 ? What is the fundamental deviation of this hole ? 4
- (b) You have received an e-mail message in which the fit for an assembly is specified as H52 H7/ S52 G6. What do you understand by the above designated fit ? 3
9. (a) List out a few advantages of Mechanical Comparators. 4
- (b) Draw a neat sketch of any one mechanical comparator. 3
10. (a) Make a list of gauges that are used in production. Describe two of them which are applied on internal surface. 4

(b) Name the gauges to be used for the following :

(i) Pulley

(ii) Wire

(iii) Thread

(iv) Shaft

Sketch two of these gauges and mention the material of which they are made. 3

11. Sketch and describe any *one* of the following : 7

(a) Inside spring caliper

(b) Inside firm joint caliper

(c) Transfer caliper

12. (a) What is a sine bar ? How is it used to measure an angle between two surfaces ? Can you measure all angles with this arrangement ? 4

(b) What is the purpose of a Spirit level ? How does it differ from clinometer ? 3
