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No. of Printed Page : 4 **BME-014**

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

Term-End Examination, 2019

BME-014 : METROLOGY AND INSTRUMENTATION

Time : 3 Hours] **[Maximum Marks : 70**

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

1. (a) How do you classify fits ? [5]

   (b) Sketch and describe the working principle and uses of **any two** of the following : [5]

   (i) Outside micrometer

   (ii) Inside micrometer

   (iii) Depth micrometer

2. (a) Distinguish between "Controllable errors" and "Random errors". [5]

   (b) Define **any five** of the following : [5]

(i) Primary Standards

(ii) Secondary Standards

(iii) Metrology

(iv) Snap gause

(v) Pitch

(vi) Candela

3. (a) Explain the construction and working of a vernier height gauge with the help of a neat sketch. [5]

(b) The diameter of a steel ball is measured five times with a micrometer, giving the following results :

8.011 mm ; 8.005 mm ; 8.009 mm ; 8.014 mm ; 8.011 mm.

Calculate the mean diameter and its standard deviation. [5]

4. (a) What is a coordinate measuring machine ? What advantages does it offer in measuring various manufactured parts ? [5]

(b) What are the various types of projector ? Describe the principle used in each of them. [5]

5. (a) Define tolerance. What are unilateral and bilateral tolerances ? Find the type of fit for a pair of shafts defined as follows :

Shaft dia : $100^{+0.55}_{+0.050}$

hole dia : $100^{+0.050}_{-0.025}$ [5]

(b) What are the differences between standard gauges and limit gauges ? [5]

6. (a) What is meant by the "magnification" of a dial indicator ? [5]

(b) Mention briefly the essentials of a good dial indication. [5]

7. (a) Discuss the application of a tool-maker's microscope. [5]

(b) Describe the light-sources used in interferometry. [5]

8. (a) Explain the phenomenon of interference of light waves. Two monochromatic light waves emerge from two slits in the same vertical plane and reach at a point on the screen parallel to the plane of slit. Develop an expression for the path difference. [5]

(b) What is a comparator ? Compare mechanical comparator with electrical comparator. [5]

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