CBCS SCHEME

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17AE36

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Measurement and Metrology

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. What is Metrology? State and explain the objectives of metrology. **(06 Marks)**

b. Describe with neat sketches :
i) Imperial standard yard ii) International prototype meter. **(08 Marks)**

c. Three 100mm end bars are measured on a level comparator by first wringing them together and comparing with a 300 mm bar. The 300 mm bar has a known error of + 40 μm and the three bars together measure 64μm less than the 300 mm bar. Bar A is 18μm longer than bar B and 23μm longer than bar C. Find the actual length of each bar. **(06 Marks)**

OR

2 a. Explain the wringing phenomena of slip gauges. **(06 Marks)**

b. Write a brief note on the manufacture of slip gauges. **(06 Marks)**

c. The slip gauge set of M38 consists of the following :

Range (mm)	Steps (mm)	Pieces
1.005	-	1
1.01 – 1.09	0.01	9
1.1 – 1.9	01	9
1.0 – 9.0	1.0	9
10.0 – 100.0	10.0	10

List the slip gauges to be wrung together to produce the following dimensions.
i) 29.875mm ii) 15.09mm iii) 101.345. **(08 Marks)**

Module-2

3 a. Define the following : i) Nominal size ii) Basic size iii) Actual size iv) Zero line v) Allowance vi) Fit. **(06 Marks)**

b. Explain unilateral and bilateral tolerance, with an example. **(08 Marks)**

c. Discuss hole basis and shaft basis system. **(06 Marks)**

OR

4 a. What are the different types of materials used for gauges? **(08 Marks)**

b. Explain in detail the three methods of gauge maker's tolerance. **(12 Marks)**

Module-3

5 a. What are the required characteristics of comparators? **(06 Marks)**

b. Explain the principle of optical comparator. **(06 Marks)**

c. Explain with a sketch, Zeiss ultra – optimeter. **(04 Marks)**

d. List the advantages and disadvantages of optical comparators. **(04 Marks)**

OR

6 a. What are the various types of errors on screw heads and explain the reasons for the same? **(06 Marks)**
b. Describe the 3 – wire method of measuring the effective diameter of threads. **(08 Marks)**
c. Explain with sketch the principle of microptic autocollimator. **(06 Marks)**

Module-4

7 a. Describe the three stages of measurement, with a suitable example. **(06 Marks)**
b. Define and state the significance of the following terms in measurement :
i) Accuracy ii) Precision iii) Sensitivity iv) Repeatability v) Loading effect vi) Hysteresis. **(06 Marks)**
c. Briefly explain systematic and random errors. **(08 Marks)**

OR

8 a. How do you classify first stage devices? Give examples for each. **(06 Marks)**
b. Discuss the various mechanical type of pressure sensitive elements. **(06 Marks)**
c. Explain with sketches, capacitive transducers of
i) Changing area ii) Changing distance. **(08 Marks)**

Module-5

9 a. Explain the three types of dynamometers. **(06 Marks)**
b. Write a note on hydraulic dynamometer. What are the advantages of hydraulic dynamometers over mechanical brakes? **(08 Marks)**
c. Describe with a neat sketch, McLeod vaccum guage. **(06 Marks)**

OR

10 a. What is a Thermocouple? Explain the principle on which it works. **(06 Marks)**
b. Explain with a sketch, bonded type resistance strain gauge. **(06 Marks)**
c. Explain the treatment regarding preparation and mounting of strain gauges. Also explain the problems associated with strain gauge installations. **(08 Marks)**

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