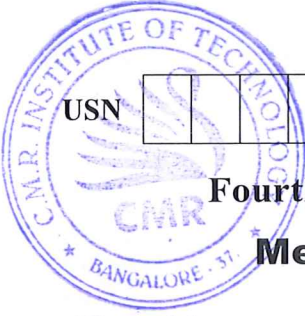


CBCS SCHEME



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15ME46B/15MEB406

Fourth Semester B.E. Degree Examination, June/July 2019

Mechanical Measurements and Metrology

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Describe with a suitable sketch Imperial Standard Yard. (06 Marks)
b. Explain with a neat sketch, the use of sine bar for measurement of known angle. (06 Marks)
c. Build up the slip gauge combination using the M112 set for the following:
(i) 52.9875 mm (ii) 35.357 mm

M112 SET

Range	Steps	Pieces
1.0005	-	1
1.001 to 1.009	0.001	9
1.01 to 1.49	0.01	49
0.5 to 24.5	0.5	49
25, 50, 75, 100	25.0	4

(04 Marks)

OR

- 2 a. Explain briefly the wringing phenomenon in slip gauges. (06 Marks)
b. List some of the advantages of wavelength standards. (04 Marks)
c. Explain the principle of an autocollimator and list some of its applications. (06 Marks)

Module-2

- 3 a. Explain the different types of fits with suitable sketches. (06 Marks)
b. Define a comparator. With a neat sketch explain Solex pneumatic gauge. (06 Marks)
c. Determine the dimensions of hole and shaft assembly designated as 100 H₈e₉, fit given:

100 mm lies in the diameter step of 80 and 120 mm
 $i = 0.45 (D)^{1/3} + 0.001D$, (D in mm, i value in microns)

IT₈ = 25i

IT₉ = 40i

Fundamental deviation of 'e' shaft is given by $-5.5D^{0.41}$ in microns. Also determine the maximum and minimum clearances. (04 Marks)

OR

- 4 a. Distinguish between the following:
i) Hole Basis System and Shaft basis system (08 Marks)
ii) Geometric Tolerances and Positional tolerances (02 Marks)
b. State Taylor's principle on limit gauges. (06 Marks)
c. Sketch and explain Johansson's Mikrokator.

Module-3

- 5 a. With a neat sketch explain the Three-Wire method for measurement of effective diameter. (05 Marks)
 b. With a neat sketch, explain Tool Maker's microscope. (06 Marks)
 c. Explain with a neat sketch the use of Gear Tooth Vernier Calipers for the measurement of Chordal thickness of a spur gear. (05 Marks)

OR

- 6 a. Explain any one type of laser Interferometer. List some of the advantages of lasers. (08 Marks)
 b. With a neat sketch, explain CMM. List some of the applications of CMM. (08 Marks)

Module-4

- 7 a. Describe the generalized measurement system with a block diagram. (06 Marks)
 b. Define the following terms:
 (i) Accuracy (ii) Precision (iii) Hysteresis
 (iv) Sensitivity (v) Loading effects (05 Marks)
 c. Sketch and explain any one type of electrical transducer. (05 Marks)

OR

- 8 a. Explain the inherent problems present in mechanical modifying system. (05 Marks)
 b. Describe the Cathode-Ray-Oscilloscope with a neat sketch. (07 Marks)
 c. With a neat sketch, explain any one type of capacitive transducer. (04 Marks)

Module-5

- 9 a. Explain with a neat sketch, McLeod gauge for measurement of low pressure. (08 Marks)
 b. With a neat sketch, explain the working principle of Prony Brake Dynamometer. (08 Marks)

OR

- 10 a. State the laws of thermocouples. (04 Marks)
 b. Explain the construction and working principle of optical pyrometer. (08 Marks)
 c. Write a brief note on Gauge factor with respect to the strain gauges. (04 Marks)

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