CBCS SCHEME

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18SM44

Fourth Semester B.E. Degree Examination, July/August 2022
Mechanical Measurements 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. Compare line and end standards. **(07 Marks)**

b. Three 200mm gauges to be calibrated are measured on a level comparator by wringing them together and then comparing them with a 600mm gauge. The 600mm gauge has an actual length of 600.0025mm and the three gauges together have a combined length of 600.0035mm. When the 3 gauges are Inter-compared, it is found that Gauge A is longer than gauge B by 0.0020mm but shorter than gauge C by 0.001mm. Determine the length of each gauge. **(07 Marks)**

c. Sketch only with all notations:
   i) Imperial standard yard
   ii) International prototype meter. **(06 Marks)**

OR

2 a. Explain with a neat sketch, how conical work pieces are inspected on a sine centre. **(06 Marks)**

b. Draw a neat sketch and Label all parts of: i) Auto collimator ii) Bevel protractor. **(08 Marks)**

c. Using angle gauges combinations, set-up: i) 102°8′36″ ii) 33°16′42″. **(06 Marks)**

Module-2

3 a. Compare with sketches:
   i) Hole basis and shaft basis system.
   ii) Unilateral tolerance and bilateral tolerance. **(06 Marks)**

b. Design the general type of GO and NOT GO gauges for a 40mm shaft and hole pair designated as 40H8/d9, given that:
   i) $i = 0.45\sqrt[3]{D} + 0.001D$
   ii) 40mm lies in the diameter range of 30-50mm
   iii) IT8 = 25i
   iv) IT9 = 40i
   v) Upper deviation of shaft = $-16D^{0.44}$
   vi) Wear allowance assumed 10% of gauge tolerance. **(14 Marks)**

OR

4 Explain with a neat sketch.
a. Johansson Mikrokator
b. LVDT
c. Solex Pneumatic gauge
d. Zeiss-ultra Optimeter. **(20 Marks)**

Module-3

5 a. With a neat sketch, indicate the following on a screw thread: i) Pitch ii) Major Dia iii) Minor dia iv) Root v) crest vi) Addendum vii) Dedendum. **(07 Marks)**

b. Derive the expression for best size wire. **(07 Marks)**

c. Sketch a label all parts of tool makers microscope. **(06 Marks)**

OR

6 a. With a neat sketch, indicate the following on a gear tooth:
i) Pitch circle ii) Addendum iii) Dedendum iv) Circular pitch v) Top land vi) Flank vii) Tooth thickness. **(07 Marks)**

b. Sketch and label all parts of:
i) GTVC ii) David Browntangent comparator. **(08 Marks)**

c. Explain constant chord method for gear tooth measurements. **(05 Marks)**

Module-4

7 a. Define: i) Accuracy ii) Precision iii) Calibration iv) Loading effect v) Threshold. **(05 Marks)**

b. Classify and explain the types of errors. **(05 Marks)**

c. List the examples of 3 stages of GMS of mechanical, optical and electrical types. **(10 Marks)**

OR

8 a. Discuss the inherent problems in mechanical system. **(04 Marks)**

b. Write a note on: i) Ballast circuit ii) Advantages of Electrical Modifying devices. **(08 Marks)**

c. Explain with a neat sketch:
i) CRO ii) Light Bean oscillograph. **(08 Marks)**

Module-5

9 With a neat sketch explain:

a. Pendulum scale

b. Rope brake dynamometer

c. Mcleod gauge

d. Pirani gauge

e. Proving ring. **(20 Marks)**

OR

10 With a neat sketch explain:

a. Unbonded wire strain gage

b. Laws of thermocouple

c. Optical pyrometers

d. Bimetallic thermometer. **(20 Marks)**

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