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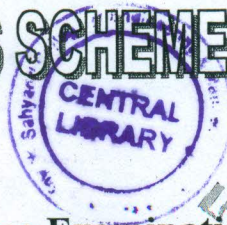
17ME36B/17MEB306

Third Semester B.E. Degree Examination, June/July 2019
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. Explain with a neat sketch Imperial Standard Yard and International Prototype Meter.
                                                                                    (08 Marks)

    b. Four end bars A, B, C, D of approximately 100 mm are to be calibrated using standard and calibrated length bar of 400 mm. This calibrated standard bar has actual length of 399.9998 mm. The bar B is 0.0004 mm longer then bar A, bar C is 0.0003 mm longer then bar A and bar D is 0.0001 mm shorter then bar A. The four end bars, when mounted, their combined length is found to be 0.0004 mm longer than actual length of standard bar, estimate the actual length of each bar.   **(08 Marks)**

    c. Explain line and end standards.   **(04 Marks)**

OR

2   a. Explain the principle of autocollimator with the help of a neat sketch.   **(08 Marks)**

    b. Using a set of M112 slip gauges, build the following dimensions: (i) 49.3115 (ii) 87.3215
                                                                                    (04 Marks)

    c. Explain the phenomenon of wringing of slip gauges with a neat sketch.   **(08 Marks)**

Module-2

3   a. With neat sketches, explain the hole based and shaft based system of limits and fits.
                                                                                    (08 Marks)

    b. Differentiate between:
        i) Interchangeability and selective assembly
        ii) Unilateral and bilateral tolerance   **(08 Marks)**

    c. Explain with neat sketches, snap gauge and ring gauge.   **(04 Marks)**

OR

4   a. Explain with a neat sketch, the construction, working, advantages and disadvantages of LVDT.   **(10 Marks)**

    b. Sketch and explain the principle and construction of Johansson Mikrokator. **(10 Marks)**

Module-3

5   a. Derive an expression for measuring the effective diameter of a screw thread using 3-wire method.   **(10 Marks)**

    b. Derive an expression for best size wire.   **(05 Marks)**

    c. Explain with a neat sketch gear roll to tester for composite error.   **(05 Marks)**

OR

6   a. Explain the working and construction of CMM.   **(10 Marks)**

    b. Sketch and explain laser interferometer.   **(06 Marks)**

    c. Give the applications of CMM.   **(04 Marks)**

Module-4

7   a. Explain the generalized measurement system with a block diagram and example.   (10 Marks)
    b. Define: (i) Accuracy   (ii) Precision   (iii) Linearity   (iv) Loading effect   (04 Marks)
    c. Explain with neat sketch capacitive transducer of changing distance.   (06 Marks)

OR

8   a. Sketch and explain Cathode Ray Oscilloscope.   (08 Marks)
    b. Explain with a neat sketch, Ballast circuit diagram.   (08 Marks)
    c. Differentiate between:
        i)   Primary and secondary transducer
        ii) Active and passive transducer   (04 Marks)

Module-5

9   a. Explain with a neat sketch the working principle of McLeod gauge.   (08 Marks)
    b. Explain prony brake dynamometer with a neat sketch.   (06 Marks)
    c. Explain with a neat sketch, the working of hydraulic dynamometer.   (06 Marks)

OR

10 a. Sketch and explain the working principle of optical pyrometer.   (08 Marks)
    b. State the laws of thermocouple with neat sketches.   (06 Marks)
    c. Explain temperature compensation in resistance type strain gauge.   (06 Marks)

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