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**Third Semester B.E. Degree Examination, June 2012**  
**Mechanical Measurements and Metrology**

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.**

**2. Use of any handbook / chart/ table in any form is not permitted.**

**PART – A**

- 1
  - a. Distinguish between line standards and end standards. (04 Marks)
  - b. Give the details of M112 set of slip gauge and using the same build the following dimensions
    - i) 34.1685
    - ii) 64.8975
    - iii) 79.7915. (08 Marks)
  - c. Four end bars A, B, C, D of approximately 100 mm in length 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 than bar A, bar C is 0.0003 mm longer than bar A and bar D is 0.0001 mm shorter than 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 end bar. (08 Marks)
- 2
  - a. With neat sketches, explain the hole based and shaft based system of limits and fits. (06 Marks)
  - b. Give detailed classification of gauges. (04 Marks)
  - c. Calculate all the relevant dimensions of components of assembly designated as 25 H<sub>7</sub> – f<sub>8</sub>, given that 25 mm falls in the diameter steps of 18 – 30. The fundamental deviation for 'f' shaft is -5.5 D<sup>0.41</sup>. Tolerance unit  $s = 0.45 \sqrt[3]{D} + 0.001D$ . Tolerance for IT<sub>7</sub> = 165 and for IT<sub>8</sub> = 25i. Show all the dimensions on tolerance diagram. (10 Marks)
- 3
  - a. What is the basic characteristic feature of comparator? Give the classification of comparators. (04 Marks)
  - b. Explain with a neat sketch, the working principle of electrical comparator. (06 Marks)
  - c. Give the details of angle gauge set and build the following angles
    - i) 43°, 35', 36"
    - ii) 35°, 29', 42". (05 Marks)
  - d. What is the maximum angle for which sine bar can be used? Justify your answer referring to relation between error and angle measured. (05 Marks)
- 4
  - a. Sketch and explain the interference fringe pattern for the following surfaces
    - i) Surface with scratch at centre
    - ii) Surface curved at one corner. (06 Marks)
  - b. Sketch and explain the pattern of following errors in screw threads
    - i) Progressive error
    - ii) Periodic error
    - iii) Drunkenness error (09 Marks)
  - c. List any five errors that may occur in gears. (05 Marks)

**PART – B**

- 5** a. With a neat block diagram, explain the generalized measurement system. (10 Marks)  
b. Define :  
    i) Accuracy  
    ii) Precision  
    iii) Sensitivity  
    iv) Linearity. (04 Marks)  
c. Write a note on transducers. (06 Marks)
- 6** a. With one example, explain the distinction between intermediate modifying device and terminating device. (04 Marks)  
b. Sketch and explain ballast circuit. (08 Marks)  
c. With a neat sketch, explain the working of cathode ray oscilloscope. (08 Marks)
- 7** a. Sketch and explain the working of proving ring. (10 Marks)  
b. List the instruments used for low pressure measurement and explain with a neat sketch any one of them. (10 Marks)
- 8** a. List the different instruments for measurement of temperature. Explain any one instrument used for high temperature measurement. (10 Marks)  
b. Write a note on mounting of strain gauge. (06 Marks)  
c. Explain the term 'Gauge Factor'. (04 Marks)

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