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10ME/AU32B

**Third Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Mechanical Measurements and Metrology**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1 a. Describe with neat sketches : i) Imperial standard yard meter. (06 Marks)  
ii) International prototype meter. (04 Marks)
- b. Distinguish between line and end standards. Give examples.
- c. Three 100mm gauges are measured on a comparator by wringing them together and then comparing with 300mm gauge, also intercomparing them. The 300mm gauge actually measures 300.0025mm. And three gauges together have a combination length of 300.0035mm. Gauge 'A' is 0.002mm longer than 'B' but shorter than 'C' by 0.001mm. Determine correct length of each gauge. (10 Marks)
- 2 a. Define the terms : i) Allowance ii) Tolerance iii) FIT iv) LIMITS. (08 Marks)
- b. How do you classify plain gauges? Sketch and explain solid plug gauge and snap gauge. (08 Marks)
- c. A 20mm diameter shaft and bearing are to be assembled with a clearance fit. The tolerance and allowances are as below : Allowance = 0.002mm ; Tolerance on hole = 0.005mm ; Tolerance on shaft = 0.003mm. Find the limits of size of the hole and shaft with hole basis and shaft basis systems. The tolerances are disposed of unilaterally. (04 Marks)
- 3 a. What is a Comparator? List essential characteristics of a good comparator. (06 Marks)
- b. Briefly describe construction and working of a SOLEX pneumatic comparator. (08 Marks)
- c. Explain how a sine bar is used to measure the angle of a component of large size. (06 Marks)
- 4 a. Write a short note on Optical flats. (04 Marks)
- b. Illustrate the following methods :  
i) Measurement of minor diameter using two V – pieces. (08 Marks)  
ii) Measurement of effective diameter using thread micrometer.
- c. Describe with neat sketch, the working principle and applications of Tool Makers Microscope. (08 Marks)

**PART – B**

- 5 a. Explain the following terms : i) Accuracy and precision ii) Repeatability iii) Error iv) Systematic error's. (08 Marks)
- b. Sketch and explain generalized measuring system taking pressure gauges as an example. (08 Marks)
- c. List the advantages and disadvantages of capacitive transducers. (04 Marks)
- 6 a. Briefly explain the following : i) Chopper Amplifier ii) Carrier Amplifier. (06 Marks)
- b. With a neat diagram, explain the following :  
i) Light Beam type oscillograph ii) X – Y Plotter. (14 Marks)

- 7 a. Define Force. What are the basic methods of measurement of force? (06 Marks)  
b. With a neat diagram, explain the working of a mechanical dynamometer and list its limitations. (08 Marks)  
c. Briefly discuss principle of Pirani gauge. (06 Marks)
- 8 a. What is a Thermocouple? Explain the principle on which it works and list its advantages and limitations. (08 Marks)  
b. Write a brief note on Optical pyrometer with its advantages and disadvantages. (08 Marks)  
c. What are Electrical Strain gauges? Discuss. (04 Marks)

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