

USN

--	--	--	--	--	--	--	--	--	--

10ME/AU32B

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

Time: 3 hrs.

Max. Marks: 100

**Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.**

**PART – A**

- 1 a. Define the term ‘Metrology’, as applied to engineering industry. (03 Marks)  
b. Discuss the following standards of measurement:  
i) Line standard    ii) Wavelength standard    iii) End standard. (09 Marks)  
c. Explain with an illustration how end standards can be derived from the line standards. (08 Marks)
  
- 2 a. Determine the type of fit after deciding the fundamental deviations and tolerances in the following:  
Fit  $\phi 70 H_9 e_7$  diameters step (50 – 80)  
Fundamental deviation for  $e_{\text{shaft}} = -11 D^{0.41}$   
IT7 = 16i                      IT9 = 40i  
 $i = 0.45\sqrt[3]{D} + 0.001D$  (08 Marks)  
b. State and explain “Taylor’s principle”. (06 Marks)  
c. Explain the different materials used for gauges. (06 Marks)
  
- 3 a. Explain the sources of error in sine bars. (08 Marks)  
b. With a neat sketch, explain the sigma comparator. (08 Marks)  
c. What is a need of a comparator? (04 Marks)
  
- 4 a. With a neat sketch, explain the terminology of screw thread. (07 Marks)  
b. Derive an expression for the Best size wire. (06 Marks)  
c. Explain the principle of Interferometry. (07 Marks)

**PART – B**

- 5 a. Explain the generalized measurement system. Give examples. (06 Marks)  
b. Explain the following with respect to an instrument:  
i) Sensitivity    ii) Threshold    iii) Hysteresis    iv) Loading effect. (08 Marks)  
c. Discuss briefly with sketches of two types of elastic pressure transducers. (06 Marks)
  
- 6 a. Explain Ballast circuit. (08 Marks)  
b. Explain the working principle of CRO and give its applications. (08 Marks)  
c. Write a note on telemetry. (04 Marks)
  
- 7 a. With a neat sketch, explain the multiple lever system. (10 Marks)  
b. Explain the working and application of Bridgman gauge. (10 Marks)
  
- 8 a. Explain the Laws of thermocouple. (04 Marks)  
b. With a neat sketch, explain the optical strain gauge. (06 Marks)  
c. Derive an expression for a gauge factor. (10 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.