

# CBCS Scheme

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15AE36

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

Time: 3 hrs.

Max. Marks: 80

**Note: Answer any FIVE full questions, choosing one full question from each module.**

### Module-1

- 1 a. Define Metrology. State the objectives of metrology. (08 Marks)  
b. Explain with neat sketch, the International Proto type meter. (05 Marks)  
c. With suitable examples, distinguish between Line standard and End standard. (03 Marks)

OR

- 2 a. Show NPL method of deriving end standard from line standard. (08 Marks)  
b. Four end bars of basic length 100mm each are to be calibrated using a standard bar of 400mm whose actual length is 399.9992mm. It was also found that lengths of bars B, C and D in comparison with A are + 0.0002mm, + 0.0004mm and - 0.0001mm respectively and the length of all the four bars put together in comparison with standard bar is + 0.0003mm longer. Find the actual length of each end bars. (05 Marks)  
c. Build or find the dimension using M112 set. Use two protector slips of 2.5mm each, 35.4875mm. (03 Marks)

### Module-2

- 3 a. With suitable example, explain Bilateral and Unilateral tolerance. (06 Marks)  
b. Explain with neat sketch different types of fits. (06 Marks)  
c. Describe compound tolerance. (04 Marks)

OR

- 4 a. Determine the tolerance on the hole and the shaft for a precision running fit designated by 50H<sub>7</sub> g<sub>6</sub>. Given : i) 50mm lies between 30-50mm ii)  $i(\text{micron}) = 0.45(D)^{1/3} + 0.001D$   
iii) For H hole F.D = 0 iv) F.D for g shaft =  $-2.5D^{0.34}$ . IT<sub>7</sub> = 16 i IT<sub>6</sub> = 10 i.  
Calculate the actual maximum and minimum size of the hole and shaft. (06 Marks)  
b. Sketch and explain any two types of plug gauges. (06 Marks)  
c. Explain Taylor's principle for the design of limit gauge. (04 Marks)

### Module-3

- 5 a. Define a Comparator. Give a list of various types of comparators. (06 Marks)  
b. With neat sketch, describe the construction and working of sigma comparator. (06 Marks)  
c. Select the sizes of angle gauges required to build 37° 16' 42". (04 Marks)

OR

- 6 a. Describe with a neat sketch, construction and working of LVDT. (08 Marks)  
b. With neat sketch, explain the working principle of sine bar. (05 Marks)  
c. Explain the following terms of screw threads major dia, minor diameter and pitch. (03 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.

**Module-4**

- 7 a. Discuss with block diagram, generalized measurement system with example for each stage elements. (06 Marks)  
b. Define the following terms in measurement. Accuracy, Precision, Sensitivity, Calibration and Error. (05 Marks)  
c. List the different types of errors in measuring instruments and explain each type in brief. (05 Marks)

**OR**

- 8 a. Define a Transducer. Mention any five mechanical and five electrical transducer. (06 Marks)  
b. With a neat sketch, explain variable mutual – inductance – two coil. (05 Marks)  
c. With a sketch, explain Piezo electric transducer. (05 Marks)

**Module-5**

- 9 a. Explain with a neat sketch, working of proving ring. (08 Marks)  
b. Explain with a neat sketch, the measurement of low pressure by McLeod Gauge. (08 Marks)

**OR**

- 10 a. Describe the construction and working of optical pyrometer with neat sketch. (08 Marks)  
b. Draw a neat diagram and explain a simple resistance bridge arrangement for strain measurement. (08 Marks)

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