

# CBCS SCHEME



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## Third Semester B.E. Degree Examination, Dec.2019/Jan.2020 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. Define metrology. List out the objectives of metrology. (06 Marks)
- b. Mention the significance of measurement system. (06 Marks)
- c. Describe with neat sketch,
  - i) International Prototype Meter
  - ii) Imperial Standard Yard. (08 Marks)

OR

- 2 a. Four End bars A, B, C and D are to be calibrated using a calibrated length bar of 400mm whose actual length is 399.9998mm. The bar B is longer than bar A by 0.0004mm, bar C is longer than bar A by 0.0003mm, while bar D is shorter than A by  $-0.0001$ mm. The four gauges together have a combination length of 400.0002mm. Determine the corrected (actual) length of each end bar. (10 Marks)
- b. Write short notes on : i) Line standard ii) End standard iii) Wavelength standard. (10 Marks)

### Module-2

- 3 a. Describe the construction and working of LVDT. With a neat sketch. (10 Marks)
- b. Explain with a neat sketch, Zeiss ultra optimeter. List out the advantages and disadvantages of optical comparator. (10 Marks)

OR

- 4 a. Give the combination of angle gauges to obtain the following angles :
  - i)  $37^{\circ}16'42''$
  - ii)  $102^{\circ}8'36''$ . (06 Marks)
- b. With a neat sketch, explain the method of measuring taper angles using sine center. (06 Marks)
- c. Illustrate the principle of interferometry with neat sketches. (08 Marks)

### Module-3

- 5 a. Mention any five mechanical and five electrical transducer elements. Also sketch and explain electronic transducers. (10 Marks)
- b. Briefly explain inherent problems (any five) associated with mechanical intermediate modifying system. (10 Marks)

OR

- 6 a. Explain with a neat sketch, the working principle of CRO. (10 Marks)
- b. What are X-Y plotters? With a block diagram, explain its working. (10 Marks)

**Module-4**

- 7 a. With a neat sketch, explain the working principle of prong brake dynamometer. List the limitations. (10 Marks)  
b. Explain with a neat sketch, the working principle of proving ring. (10 Marks)

**OR**

- 8 a. Write a note on preparation and mounting of strain gauges. (08 Marks)  
b. Explain with a neat sketch, of any one methods of strain, measurement. (08 Marks)  
c. Write short notes on Gauge factor. (04 Marks)

**Module-5**

- 9 a. Explain the following types of fits with a neat sketch and designations.  
i) Clearance fit  
ii) Interference fit  
iii) Transition fit. (10 Marks)  
b. Define the following :  
i) Nominal size  
ii) Basic size  
iii) Allowance  
iv) Fit  
v) Tolerance. (10 Marks)

**OR**

- 10 a. State the laws of thermocouples with neat sketch. (08 Marks)  
b. With a neat sketch, explain McLeod gauge. (08 Marks)  
c. Write short notes on optical pyrometer. (04 Marks)

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