



10MT51

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020  
**Metrology and Mechanical Measurements**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1 a. Define Metrology. What are the objectives of metrology from industry point of view? (08 Marks)  
b. Explain “Imperial Standard yard” and International prototype meter with neat sketches. (12 Marks)
- 2 a. Define Tolerance. Explain the difference between unilateral and bilateral tolerances. (10 Marks)  
b. Determine the tolerances 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 – 50 mm  
(ii)  $i(\text{micron}) = 0.45(D)^{1/3} + 0.001D$   
(iii) fundamental deviation for H hole = 0  
(iv) fundamental deviation for ‘g’ shaft =  $2.5D^{0.34}$   
(v) IT<sub>7</sub> = 16 i  
(vi) IT<sub>6</sub> = 10 i  
State the actual maximum and minimum sizes of the hole and shaft and maximum and minimum clearances. (10 Marks)
- 3 a. Explain the working of sigma comparator with a neat sketch. (10 Marks)  
b. With a neat diagram, explain the principle of working of LVDT. (10 Marks)
- 4 a. With a neat sketch, explain the working principle of an autocollimator. (10 Marks)  
b. Describe the 3-wire method of measuring effective diameter of threads and derive the equation for the same. (10 Marks)

**PART – B**

- 5 a. Explain the 3 stages of Generalized measuring method, using any one example. (08 Marks)  
b. Explain any 3 system response characteristics. (06 Marks)  
c. Define the following : i) Sensitivity ii) Hysteresis iii) Precision. (06 Marks)
- 6 a. With a neat sketch explain : i) X-Y plotter ii) Cathod ray oscilloscope. (10 Marks)  
b. With an example, explain primary and secondary transducer. (10 Marks)
- 7 a. Sketch and explain the platform balance method of measuring force. (10 Marks)  
b. Explain how the torque is measured using proxy brake dynamometer. What are its disadvantages? (10 Marks)
- 8 a. Explain the construction and working of optical pyrometer. (10 Marks)  
b. State and explain the Laws of thermocouple. (05 Marks)  
c. Explain Gauge factor and sensitivity. (05 Marks)

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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.