

Printed Pages – 4

Roll No. : .....

**B000311(014)**

**B.Tech. (Third Semester) Examination**

**Nov.-Dec. 2021**

**(New Scheme)**

**MATHEMATICS-III**

**(Mechanical Measurement and Metrology)**

***Time Allowed : Three hours***

***Maximum Marks : 100***

***Minimum Pass Marks : 35***

***Note : Part (a) from each unit is compulsory. Attempt any two from (b), (c) and (d).***

**Unit-I**

1. (a) Define process of Measurement. 4
- (b) Discuss the following terms : (any **four**) 2×4=8

**B000311(014)**

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[ 2 ]

- (i) Sensitivity
  - (ii) Accuracy and precision
  - (iii) Reproducibility
  - (iv) Drift
  - (v) Standards and Calibration
- (c) Describe various types of error associated with measuring instrument. How those error can be minimized? 8
- (d) Eight different students turned in the circuit for resonance and the values of resonant frequency in kHz were recorded as  
412, 428, 423, 415, 426, 411, 423, 416.  
Calculate the following :
- (i) Arithmetic Mean
  - (ii) Average deviation
  - (iii) Standard deviation
  - (iv) Variance 2×4=8

### Unit-II

2. (a) What is the unit of Pressure measurement? 4
- (b) Describe McLeod gauge with neat diagram. 8

[ 3 ]

- (d) Explain the principle of operation of a Pirani gauge with neat sketch. 8
- (c) Prove that gauge factor
- $$G_F = 1 + 2 \nu + \frac{\Delta Q/Q}{\epsilon} \quad 8$$

### Unit-III

3. (a) What are the different type of flow? 4
- (b) Describe the working of rotameter. 8
- (c) Explain the working of Seismic Instrument. 8
- (d) Explain Multi-channel data acquisition system. 8

### Unit-IV

4. (a) What are objectives of Metrology? 4
- (b) Explain Vernier Caliper with description. 8
- (c) What are the different types of gauges used for measurement? Classify them. 8
- (b) Describe the working of autocollimator. What is its application? 8

[ 4 ]

**Unit-Y**

5. (a) Explain the principle of Interferometry? 4
- (b) Explain the working of optical comparator with neat sketch. 8
- (c) Describe the dial indicator with sketch in detail. 8
- (d) Explain two wire method of measurement of screw thread. 8