



## P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

**Third Semester, B.E. - Automobile Engineering**  
**Semester End Examination; Dec - 2017/Jan - 2018**

### Measurement and Metrology

Time: 3 hrs

Max. Marks: 100

*Note: Answer FIVE full questions, selecting ONE full question from each unit.*

#### UNIT - I

- 1 a. Define measurement. Explain the requirements and significance of measurement systems. 10
- b. Define the following terms :
- |                |                    |                |    |
|----------------|--------------------|----------------|----|
| i) Calibration | ii) Hysteresis     | iii) Linearity |    |
| iv) Time delay | v) Loading effect. |                | 10 |
- 2 a. Sketch and explain international prototype meter and imperial yard standard. 10
- b. State important characteristics of line standard and end standard instruments. 4
- c. Compute the ship gauges to build the following dimensions using M112 sef : 6
- |            |            |              |
|------------|------------|--------------|
| i) 49.3115 | ii) 68.208 | iii) 52.496. |
|------------|------------|--------------|

#### UNIT - II

- 3 a. Define comparator. Write the classification of comparator. 4
- b. Explain with neat sketch principle and operation of LVDT. 8
- c. Explain the mechanism how magnification is achieved in dial indicator? 8
- 4 a. Explain the principle of operation of sine bars and sine centre. 8
- b. With a neat sketch, explain sigma comparator. 8
- c. List the advantages and disadvantages of optical comparator. 4

#### UNIT - III

- 5 a. List the advantages of mechanical, electrical and electronic transducer. 8
- b. Explain electrical intermediate modifying devices. 8
- c. Define Transfer efficiency and Transducer. 4
- 6 a. With neat sketch, explain principle of autocollimator. 8
- b. Explain the principle of operation of inter-ferometry. 8
- c. What are optical flats? Explain the principle of working. 4

#### UNIT - IV

- 7 a. Define dynamometer. With neat sketch, explain Hydraulic dynamometer. 10
- b. With neat sketch, explain measurement of force by proving ring. 8
- c. What are the limitations of prony brake dynamometer? 2

- 8 a. With neat sketch, explain cathode ray oscilograph and mention its applications. 12
- b. With a neat block diagram, explain the working of X-Y plotter. 8

**UNIT - V**

- 9 a. Define gauge factor. Mention methods of strain measurement. 4
- b. Define Absolute Pressure, Vaccume Pressure and Gauge Pressure. With neat sketch, explain the construction and working of Mcledd gauge. 10
- c. Explain how do you Calibrate Strain Gauges? 6
- 10 a. What is thermocouple? State and explain laws of thermocouple. 8
- b. Describe the construction and working of optical pyrometer. 8
- c. Discuss various types of thermocouple materials. 4

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