



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

(An Autonomous Institution affiliated to VTU, Belagavi)

**Fourth Semester, B.E. - Automobile Engineering**

**Semester End Examination; June - 2017**

**Measurements and Metrology**

Time: 3 hrs

Max. Marks: 100

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

ii) Issue of Specific Hand books, Charts and Tables are permitted.

iii) Any missing data may be suitably assumed and stated.

### UNIT - I

- |   |    |  |   |
|---|----|--|---|
| 1 | a. | Explain the concept of a generalized measurement system using a block diagram with a suitable example. | 8 |
|   | b. | Define error in measurement. Give the detail classification of errors in measurement.                  | 4 |
|   | c. | Define and state the significance of following terms used in measurement. Give example for each :      | 8 |
|   |    | i) Precision                      ii) Accuracy   |   |
|   |    | iii) Sensitivity                  iv) Calibration.   |   |
| 2 | a. | What is metrology? State and explain the objectives of metrology.                                      | 6 |
|   | b. | State important characteristics of line standard and end standard instruments.                         | 6 |
|   | c. | Describe with neat sketches and constructional features of :   | 8 |
|   |    | i) Imperial standard Yard                  ii) International prototype meter.                          |   |

### UNIT - II

- |   |    |   |   |
|---|----|---|---|
| 3 | a. | Define comparator. What are the essential characteristics of a good comparator? | 6 |
|   | b. | Explain the working of Sigma comparator with a neat sketch.                     | 7 |
|   | c. | Sketch and explain the Zeiss - Ultra optometer.                                 | 7 |
| 4 | a. | With a neat diagram, explain the principle of working of LVDT.                  | 6 |
|   | b. | Explain with a neat sketch, the working of 'Solex' pneumatic comparators.       | 6 |
|   | c. | Explain with a neat sketch, of vernier bevel protractor and Sine bar.           | 8 |

### UNIT - III

- |   |    |   |   |
|---|----|---|---|
| 5 | a. | List primary detector transducer elements and operations they perform.              | 8 |
|   | b. | State the advantages of electrical transducer over other transducers.               | 6 |
|   | c. | Distinguish between active and passive transducers.                                 | 6 |
| 6 | a. | Explain the inherent problems present in mechanical intermediate modifying systems. | 6 |
|   | b. | With a neat sketch explain the working and principle of an autocollimator.          | 8 |
|   | c. | Describe in detail a ballast circuit.   | 6 |

**UNIT - IV**

- 7 a. Sketch and explain platform balance method of measuring force. 6  
b. Define torque. With the help of neat sketch, explain prony - brake dynamometer. 7  
c. Explain the working of proving ring with a neat sketch. 7
- 8 a. What are terminating devices? Explain with examples the way they provide information. 6  
b. Explain Cathode Ray Oscilloscope with a block diagram and mention its applications. 8  
c. What are X-Y plotters? With a block diagram explain its working. 6

**UNIT - V**

- 9 a. Describe the process of preparation and mounting of strain gauges. 7  
b. Explain with a neat sketch, the working of McLeod gauge to measure pressure. 7  
c. Sketch and explain optical gauge. 6
- 10a. What is a thermocouple? State and explain the laws of thermocouple. 7  
b. Discuss the construction and working of an optical pyrometer with a neat sketch. 7  
c. Describe the construction and working of total radiation pyrometer with a neat sketch. 6

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