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

(An Autonomous Institution affiliated to VTU, Belgaum)

Third Semester, B.E. - Automobile Engineering

Semester End Examination; Dec - 2016/Jan - 2017

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. Explain the concept of generalized measurement system using block diagram. Mention their requirement and significance. 10
- b. Define the terms and state the significance of following terms used in measurement : 10
- i) Accuracy ii) Precision iii) Sensitivity iv) Calibration v) Hysteresis.
- 2 a. Sketch and explain international prototype meter and imperial yard standard. 8
- b. What is wringing? Explain the procedure of wringing slip gauge. Give the details of M112 set and built the following dimensions : 8
- i) 49.3115 ii) 68.208 iii) 52.496
- c. State important characteristics of line standard and end standard instruments. 4

### UNIT - II

- 3 a. Define comparator. When are the essential characteristics of good comparators? Mention the classification of comparators. 8
- b. With a neat sketch, describe the construction and working of Sigma comparator. 8
- c. List the advantages and disadvantages of optical comparators. 4
- 4 a. Explain with sketch, measurement of unknown angles of small and heavy components using sine bar. Also mention the limitations of sine bar. 8
- b. With a neat sketch, explain construction and working of LVDT. 8
- c. Sketch and explain optical bevel protractor. 4

### UNIT - III

- 5 a. Define "Transfer Efficiency". Distinguish between active and passive transducer. 4
- b. Define transducer. List out six mechanical transducing elements and mention the transducing action they perform. 8
- c. With a neat sketch, explain the construction and working of an ionization transducer. Mention their application. 8
- 6 a. Explain the inherent problems present in any mechanical intermediate modifying systems. 8
- b. Explain with a neat sketch, the principle of microptic autocollimator. 6
- c. Explain the principle of operation of optical flat. 6

**UNIT - IV**

- 7 a. Explain with a sketch, the analytical balance (equal arm balance). 8
- b. Sketch and explain measurement of force by proving ring. 6
- c. With the help of a neat sketch, explain the working principle of prony brake dynamometer and mention its limitations. 6
- 8 a. With neat sketch, explain the construction and working of eddy current dynamometer. 7
- b. Explain “Cathode Ray Oscilloscope” with a block diagram and mention its application. 7
- c. Explain with a block diagram the working of X-Y plotters. 6

**UNIT - V**

- 9 a. Describe the process of preparation and mounting of strain gauges. Also mention the problems associated with strain gauge installations. 10
- b. Define absolute pressure and vacuum gauge pressure. With a neat sketch, explain the construction and working of McLeod gauge. 10
- 10 a. What is a thermocouple? State and explain the laws of thermocouple. 6
- b. Describe the construction and working of optical pyrometer with a neat sketch. 7
- c. Explain with a neat sketch, Pirani thermal conductivity gauge. 7

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