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## P.E.S. College of Engineering, Mandya - 571 401
*(An Autonomous Institution affiliated to VTU, Belagavi)*
**Fourth Semester, B.E. - Mechanical Engineering**
**Semester End Examination; May/June - 2019**
**Mechanical Measurements and Metrology**

Time: 3 hrs           *Max. Marks: 100*

**Note:** *i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
     *ii) Any missing data may be suitably assumed.*

### UNIT - I

| | | |
|---|---|---|
| 1 a. | What is Metrology? State its objectives. | 6 |
| b. | Define the following : | 9 |
| | i) Imperial standard yard      ii) Line standard      iii) End standard | |
| c. | Describe some sources of errors in precision measurement. | 5 |
| 2 a. | With the help of neat sketches, describe the method of using of slip gauges. | 10 |
| b. | Explain the following terms in mechanical measurements : | 10 |
| | i) Calibration      ii) Sensitivity | |
| | iii) Precision      iv) Accuracy | |

### UNIT - II

| | | |
|---|---|---|
| 3 a. | Explain Unilateral and Bilateral tolerances with sketches. | 10 |
| b. | Define the following with sketches : | 10 |
| | i) Clearance fit      ii) Interference fit | |
| | iii) Transition fit      iv) Fundamental deviation | |

4 a. A fit is designated by $60H_8/f_7$. Dimension 60 mm falls in the range of 50 to 80 mm fundamental deviation for $f$ shaft is $-5.5D^{0.41}$, $IT_7 = 16i$ and $IT_8 = 25i$. Tolerance unit, $i = 0.48\sqrt[3]{D} + 0.001D$ (Microns). Sketch the fit and show these upon the actual dimensions of hole and shaft.    10

| | | |
|---|---|---|
| b. | Explain Taylor's principle for the design of limit gauges. | 5 |
| c. | Explain with sketch the following : | 5 |
| | i) Ring gauges      ii) Snap gauges | |

### UNIT - III

| | | |
|---|---|---|
| 5 a. | Sketch and explain the following comparators : | 12 |
| | i) Sigma comparator      ii) Zeiss ultra optimeter | |
| b. | With a neat figure, explain the principle of sine bar. | 8 |
| 6 a. | What do you mean by best wire size and derive for the same. | 8 |
| b. | Explain with sketches the measurement of effective diameter by two wire method and three wire methods. | 12 |

## UNIT - IV

7 a. What is Transducer? Classify transducers with examples. 8

  b. What are the advantages of electrical transducers? 6

  c. Explain with a circuit simple current sensitive circuit. 6

8 a. Explain with a neat sketch telemetry transmitting and receiving system. 8

  b. Explain with a neat sketch construction and working of Cathode Ray Oscilloscope. 8

  c. Write a note on X-Y plotters. 4

## UNIT - V

9 a. Write a note on Wheatstone bridge circuit with the circuit diagram. 6

  b. Explain with a neat sketch, construction and working of Hydraulic Dynamometer. 8

  c. Explain with a neat sketch, construction and working of Bridgeman gauge. 6

10 a. Write a note on;

    i) Seebeck effect

    ii) Peltier effect     6

    iii) Thomson effect

  b. What is Thermo couple? Explain the laws of thermo couple. 8

  c. Explain with a neat sketch, construction and working of McLeod gauge. 6

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