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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

Contd…2

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 iii) Thomson effect	6
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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