

B.Tech IV Year I Semester (R15) Regular Examinations November/December 2018

METROLOGY & MEASUREMENTS

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

1 Answer the following: (10 X 02 = 20 Marks)

- (a) Briefly explain the need to specify tolerance on components.
- (b) Define a comparator. Discuss the functional requirements of a comparator.
- (c) How do you measure the depth of a hole or recess using a depth gauge? What are the limitations of this instrument?
- (d) Discuss any two important uses of an autocollimator in the industry.
- (e) List the various geometrical checks made on machine tools.
- (f) What are the various methods used for measuring the gear tooth thickness?
- (g) Explain the principle of seismic instruments.
- (h) What is the need of calibration? Explain.
- (i) Define temperature. How is it different from heat? Compare the different temperature scales.
- (j) Differentiate between force and torque.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 State and explain Taylor's principle of gauge design. Explain why special attention should be given to GO gauges compared to NOT GO gauges during the design of gauges.

OR3 A clearance fit has to be provided for a shaft and bearing assembly having a diameter of 40 mm. Tolerances on hole and shaft are 0.006 and 0.004 mm, respectively. The tolerances are disposed unilaterally. If an allowance of 0.002 mm is provided, find the limits of size for hole and shaft when:
(i) Hole basis system. (ii) Shaft basis system are used.**UNIT – II**

4 Why are slip gauges called 'Johansson gauges'? Explain the phenomenon involved in 'wringing' of slip gauges.

OR

5 Explain with the help of neat sketches, the principle and construction of an autocollimator.

UNIT – III

6 With the help of an illustration, explain the following terms: roughness, waviness, lay, and flaws.

OR

7 With the help of neat sketch explain the construction and working of gear tooth Vernier.

UNIT – IV

8 Write a brief note on mechanical tachometer and non-contact type tachometer.

OR

9 Explain the three types of bonded strain gauges with a neat sketch.

UNIT – V

10 Explain with a neat sketch the constructional features and basic working principle of McLeod gauge used for the measurement of low pressures.

OR

11 List out different types of thermocouples and the materials used. State and explain the laws governing thermocouples and explain the temperature measuring techniques with thermocouples.