PVP 14

Code: ME5T4

III B.Tech - I Semester – Regular/Supplementary Examinations
October 2018

ENGINEERING METROLOGY
(MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1.

a) Define fundamental deviation.

b) Find the value of allowance for hole and shaft assembly for the following dimensions of mating parts

Hole: $25^{+0.05}_{+0.00}$ shaft: $25^{-0.02}_{-0.05}$

c) What precautions should be taken while using slip gauges?

d) Explain the principle of spirit level.

e) List the various types of plug gauges.

f) Explain the term lay in surface roughness.

g) List the various stylus probe instruments used for surface finish measurements.

h) Define Runout in gears.

i) Define effective diameter of screw thread.

j) List the various uses of comparators.

k) Discuss the purpose of Alignment tests.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Define fits. Discuss the various types of fits in brief. 8 M

b) A 20mm diameter shaft and bearing are to be assembled with a clearance fit. The tolerance and allowance are as under:

Allowance = 0.002 mm

Tolerance on hole = 0.005 mm

Tolerance on shaft = 0.003 mm

Find the limits of size for the hole and shaft if the hole based system is used. The tolerances are disposed of unilaterally. 8 M

3. a) Explain why it is not preferred to use sine bar for measuring angles more than 45^{o}. 4 M

b) Design the general type GO and NO-GO gauge for components having 20H7f8 fit. Given 12 M

(i) i microns = $0.45(D)^{1/3}+0.001D$

(ii) Upper deviation of f shaft = $-5.5\ D^{0.41}$ microns

(iii) 20 mm falls in the diameter step of 18 mm to 30 mm

(iv) IT7 = 16i

(v) IT8 = 25i

(vi) Wear allowance 10% of gauge tolerance.

4. a) Discuss the optical system in NPL Flatness Interferometer with neat sketch. 8 M

b) List and discuss any two types of numerical methods of assessment of surface finish. Also draw sketches. 8 M

5. a) Discuss the Parkinson's gear tester with neat sketch and state its limitations. 8 M

b) Explain with a sketch the three-wire method of measuring the effective diameter of a screw thread. 8 M

6. a) Discuss the following alignment tests with neat sketch

(i) Lathe machine:
Parallelism of main spindle to saddle movement.

(ii) Milling machine:
True running of internal taper of the main spindle.

8 M

b) Explain about Reed comparator with neat sketch. 8 M