

Code No: 125AJ

**R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, May - 2018

**ENGINEERING METROLOGY**

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

**Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART - A****(25 Marks)**

- 1.a) Differentiate between sensitivity and range with suitable example. [2]
- b) State the important factors of ISI system for selection of fits and tolerances. [3]
- c) List out any four angular measuring instrument used in metrology. [2]
- d) State the advantages and limitations of sine bar. [3]
- e) List out some applications of Tool makers microscope. [2]
- f) How will you test the flatness and parallelism of micrometer anvil surfaces with optical flat? [3]
- g) What are the factors affecting surface roughness? [2]
- h) State the working of Talysurf surface roughness instrument. [3]
- i) Distinguish between mechanical comparator and electrical comparator. [2]
- j) State the advantages and possible sources of errors in CMM. [3]

**PART - B****(50 Marks)**

- 2.a) With the help of neat sketches state the essential conditions for clearance fit and Interference fit.
  - b) Discuss about types of Assemblies used in engineering. [5+5]
- OR**
- 3.a) What are elements of a measuring system? How they affect accuracy and precision? How error due to these elements are eliminated
  - b) Explain the various systematic and random errors in measurements. [5+5]
- 4.a) Design the general type GO and NO-GO gauge for components having  $20H_7/f_8$  fit.  $I = \text{Microns} = 0.45D^{1/3} \pm 0.001D$ , upper deviation of "F" shaft =  $-5.5D^{0.41}$ , 20 mm falls in the diameter step of 18-30, IT 7 = 16i, IT 8 = 25i, Wear allowance = 10% of gauge tolerance.
  - b) How sine plate is used to measure the tapers. Explain in brief. [5+5]
- OR**
- 5.a) Describe with neat sketch explain the working of bevel protractor.
  - b) State the working principles of Sine bar and Spirit level. [5+5]

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- 6.a) Explain the method of checking the height of component with the help of optical flat.  
b) Explain optical flat types and state their limitations. [5+5]

OR

7.a) With neat sketch, explain the construction and working of auto collimator.  
b) Sketch and describe NPL flatness interferometer. [5+5]

- 8.a) Explain the average surface roughness methods of CLA and RMS.  
b) In the measurement of surface roughness, roughness, heights of successive 10 peaks and troughs were measured from a datum and were 34, 23, 31, 20, 23, 19, 30, 26 and 18 microns. If these measurements were obtained on 10 mm length, determine CLA and RMS values of surface roughness. [5+5]

OR

9.a) Explain one method of assessing the straightness of a straight-edge.  
b) State the difference between surface roughness and surface waviness. [5+5]

- 10.a) List out the various characteristics of comparator.  
b) Name the various types of pitch errors found in screw and state their causes. [5+5]

OR

11.a) State the role of CMM in measurements and list out the applications in present scenario.  
b) Write short note on gear measuring instruments. [5+5]

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