

R13

Code No: 115AJ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, March - 2017

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) State the condition when the shaft based system is used for limits and fits. [2]
- b) On what factors the variation in size depends in any manufacturing process? [3]
- c) What is limit gauging? [2]
- d) What are the materials used for slip gauges? [3]
- e) What do you mean by Angle Dekkor? [2]
- f) What do you mean by interferometers? [3]
- g) What is meant by direction of Lay? [2]
- h) Distinguish between surface roughness and waviness? [3]
- i) What do you mean by error in screw threads? [2]
- j) Distinguish between geometrical tests and practical tests on machine tool? [3]

PART - B

(50 Marks)

- 2.a) Bring out the salient features of British standard and ISO systems of limits and fits.
- b) Determine and sketch the limits of tolerance and allowance for a 42 mm shaft and hole pair designated as H8-g10. The basic size lies in the range of 30 – 50 mm. The multipliers for grades 8 and 10 are 25 and 64 respectively. The fundamental deviation for g shaft is $(-2.5 D^{0.34})$ microns and standard tolerance unit is $0.45\sqrt[3]{D} + 0.001D$ in microns. [5+5]

OR

- 3.a) Define fit and describe various types of fits in brief?
- b) A 50 mm diameter shaft and bearing are to be assembled with a clearance fit. The tolerance and allowance are as under.
Allowance = 0.035 mm
Tolerance on hole = 0.025 m
Tolerance of shaft = 0.017 mm
Find the limits of size for the hole and shaft if
a) Hole basis system is used
b) Shaft basis system is used. [5+5]

- 4.a) What do you understand by Airy points. State the condition to achieve it?
b) Indicate the minimum number of angle gauges required to obtain the following angle?
i) $24^{\circ} 3'$
ii) $32^{\circ} 29' 54''$
iii) $110^{\circ} 30'$
The following standard angle gauges
[$1^{\circ} 3' 9'' 27^{\circ}$ and 41°] [$1' 3' 9' 27'$] and [$3'' 6'' 18'' 30''$] [5+5]
- OR**
- 5.a) What are the end standards? Explain with the example, the characteristics of end standards.
b) State and explain the Taylor's principle of gauge design with neat sketch of Plug gauge and Snap gauges. [5+5]
- 6.a) Explain flatness interferometer with neat sketch and write its applications.
b) With a neat sketch explain the working principle of Auto Collimator. [5+5]
- OR**
- 7.a) Explain how flatness errors of lapped surfaces are measured with an optical flat.
b) Explicate the uses of interferometer in measuring flatness of surfaces. [5+5]
- 8.a) Explain the construction and working of a Profilograph for surface roughness measurement.
b) State the various factors affecting on surface texture in detail. [5+5]
- OR**
- 9.a) Explain the construction and working of Taylor Hobson Taly surf for surface roughness measurement.
b) State and explain the methods of measuring primary texture of a surface. [5+5]
- 10.a) Name the various instruments required for performing the alignment tests on machine tool.
b) Describe with sketches the applications of CMMs taking an example of a work piece. [5+5]
- OR**
- 11.a) What is best size wire for effective diameter measurement. Derive a relationship for the best size wire in terms of its effective diameter.
b) Describe with the help of a neat sketch the working principle of Solex Pneumatic Gauge. [5+5]

---ooOoo---