

Code No: 115AJ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, November - 2015

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) Distinguish between measuring instrument and Gauge. [2]
- b) Define fit. What are the conditions of types of fits? [3]
- c) What are the chances of occurrence of errors in the sine bar? [2]
- d) Why sine bar is not suitable for measuring angles for more than  $45^\circ$ ? [3]
- e) Why is monochromatic light used in interferometry instead of white light? [2]
- f) What are the uses of tool maker's microscope? [3]
- g) Distinguish between CLA and RMS method. [2]
- h) Explain the terms Roughness, Waviness, and Lay. [3]
- i) What are progressive errors in screw threads? [2]
- j) Derive an expression for the best wire size in screw threads. [3]

## PART - B (50 Marks)

- 2.a) Explain the principle of selective assembly and interchangeability in detail.
- b) Convert hole based fit Equivalent to the Shaft based fit with neat sketch.
  - i)  $25 H_8/c_7$
  - ii)  $30 H_5/n_9$

[5+5]

OR

- 3.a) What is the difference between unilateral tolerance and Bilateral tolerance? Which is the most suitable tolerance method and why?
- b) Explain the principal features of British standard system of limits and fits. [5+5]
- 4.a) Explain with a neat sketch how a vernier caliper is used for linear measurements.
- b) Where are Airy points located on a 125 mm length bar? Describe an international prototype meter. What should be the distance between its two supports? [5+5]

OR

- 5.a) Describe a method used to check the flatness of a surface plate.
- b) Shafts of  $75 \pm 0.02$  mm diameter are to be checked by the help of GO and NO-GO ring gauges. Design the Gauge, sketch it and show GO size and NO-GO size dimensions. Assume Normal wear allowance and Gauge maker's tolerance. [5+5]

- 6.a) What is optical flat? What are their types? State the limitations of optical flat.
- b) With neat sketch explain the working principle of auto collimator. [5+5]

OR

- 7.a) Explain the optical system and working principle of a profile projector.
- b) What are the essential features of an optical system? Explain. [5+5]

- 8.a) What is a profilograph? Sketch a profilograph and explain the procedure of measurement of Surface finish. [5+5]  
b) It is not possible to produce perfectly smooth surface. Justify the statement? [5+5]

OR

- 9.a) Explain typical set up using which the measurement of surface finish of a surface is carried out.  
b) Briefly explain the working principle of a tool maker's microscope with neat diagram. [5+5]

- 10.a) Explain a method of measuring errors in the pitch of a screw thread.  
b) Describe the basic principle of pneumatic comparator with neat sketch. [5+5]

OR

- 11.a) Explain the structure of various types of coordinate measuring machines with neat sketch.  
b) Specify with the diagrams how two of the following tests would be carried out on a centre lathe?  
i) The straightness of the bed horizontally and vertically.  
ii) The spindle axis parallel to the bed in both the horizontal and vertical planes. [5+5]

