Code No: 115AJ

R13

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 45^0? [3]
e) Why is monochromic 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_8c_7
ii) 30 H_5n_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 ± 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.

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]

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