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Code No: 115AJ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech III Year I Semester Examinations, November/December - 2016

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) Why is unilateral tolerance preferred over bilateral tolerance? Explain in detail. [2]
- b) Why it is necessary to give tolerance in engineering dimensions. [3]
- c) Distinguish between measuring instrument and a gauge. [2]
- d) Explain the working principle of measurement of angles using spirit levels. [3]
- e) What is optical flat? [2]
- f) Name the various types of interferometers. [3]
- g) Define the principle of Talysurf instrument. [2]
- h) What are the reasons for controlling the surface texture? [3]
- i) Distinguish the comparator and gauge. [2]
- j) List out the various characteristics of comparator. [3]

PART - B

(50 Marks)

2. a) What are the advantages of interchangeability?
- b) Explain briefly the difference between the interchangeable manufacturing and selective assembly. [5+5]

OR

3. a) What are the different types of fits and explain with neat sketches?
- b) A shaft with a nominal size of 42 mm is fitted with an inner ring. The fitting condition is K5/h6.
 - i) Determine the type of fit between the shaft and the hole.
 - ii) Mention, whether it is a hole-based or a shaft-based. [5+5]

4. a) State the Taylor's principle for the design of limit-gauges.
- b) Write a short note on the various aspects for deciding the limits on the limit gauges. [5+5]

OR

5. Design the general type of GO and NO-GO gauge for components having 20H7/f8 fit. $I = \text{Microns} = 0.45 (D^{1/3}) + 0.001D$, upper deviation of "f" shaft = $-5.5D^{0.41}$, 20 mm falls from the diameter step of 18-30, IT7=16i, IT8=25i, wear allowance = 10% of gauge tolerance. [10]

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6. What are the methods used for measuring the flatness and explain with neat sketches. [10]

OR

7. a) Explain optical flat types and its limitations. P6 P6 P6 P6
b) With a neat sketch explain the working of optical flat. [5+5]

8. a) Define the principle of Profilograph instrument.
b) Explain the working of Profilograph surface roughness instrument. [5+5]

OR

9. What are the inspection methods used for measurement of surface finish. Explain in detail. [10]

10. a) Distinguish between mechanical comparator and electrical comparator.
b) Explain the construction and working of pneumatic comparator. [5+5]

OR

11. a) Describe briefly Coordinating Measuring Machine (CMM). P6 P6 P6 P6
b) State the advantages and applications of CMM. [5+5]

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