22450

11920

3 Hours / 70 Marks   Seat No.

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

(8) Use of Steam tables, logarithmic, Mollier's cart is permitted.

Marks

1.   Attempt any FIVE of the following: **10**

a) State any four objectives of metrology.

b) The thimble of a micrometer screw gauge advances by 0.5 mm when rotated in clockwise direction through one complete revolution. If the number of divisions on the circular scale = 50, find the least count of the micrometer screw gauge.

c) With reference to fits, define the term 'tolerance'.

d) Define 'minor diameter' and 'effective diameter' with reference to screw threads.

e) List angular measuring instruments which have used.

f) State four major applications of Coordinate Measuring Machine (CMM).

g) State the meaning of 'Quality control'.

Marks

2. **Attempt any THREE of the following:**   **12**

  a) Describe the terms 'Accuracy', 'Precision', 'Repeatability' and 'Reproducibility'.

  b) Compare 'Line standard' and 'End standards'.

  c) With the help of a neat labelled sketch explain construction and working of 'sigma comparator'.

  d) Explain the terms 'Interchangeability' and 'Selective Assembly'. State the importance of interchangeability.

3. **Attempt any THREE of the following:**   **12**

  a) Explain 'Hole Basis System' with reference to fits. State the reasons why it is preferred to 'Shaft Basis system'.

  b) With the help of an example explain Taylor's principle of gauge design.

  c) With the help of a neat sketch, explain the procedure to measure major diameter of screw thread using floating carriage micrometer.

  d) Explain the working principle of a 'Tool maker's microscope' and state its applications.

4. **Attempt any THREE of the following:**   **12**

  a) List various, errors in gears. Describe 'backlash emor' and 'run out error' with reference to gears.

  b) Explain the procedure to measure the gear tooth thickness using 'Gear tooth vernier'.

  c) With the help of a neat sketch explain the procedure to measure angle of a tapered job using a sine bar.

  d) With the help of a neat sketch explain the use of 'clinometer' to check the angle between two surfaces.

Marks

e) With reference to surface finish measurement, define the following terms :

(i) Primary texture,

(ii) Secondary texture,

(iii) Sampling length,

(iv) CLA value

5. Attempt any TWO of the following: 12

a) With the help of neat sketches, illustrate procedure to carry out any two alignment tests on Lathe machine.

b) State the meaning of monochromatic light source.

The surface of a metallic part is to be tested with the help of an optical flat. With the help of standard fringe patterns, describe the procedure to judge the surface as flat, concave or convex.

c) Describe the following terms and discuss the factors influencing them

(i) Quality of Design.

(ii) Quality of conformance

6. Attempt any TWO of the following: 12

a) Describe concept of 'Zero defects'. State the statistical meaning of 'six sigma' process.

Describe the five step 'Six Sigma' methodology to improve the quality of an existing process.

b) Define

(i) Process capability

(ii) process capability index C_p

and describe stepwise procedure to calculate C_p.

c) In a manufacturing industry, the inspector recorded the following observations.

Sample No.	Total number of articles in the sample	Number of defectives in the sample
1	75	4
2	78	3
3	72	4
4	79	5
5	71	2
6	68	3
7	82	4
8	81	3
9	72	4
10	76	4
11	72	3
12	78	4

Draw appropriate control chart and interpret.

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