

22342

21222

3 Hours / 70 Marks

Seat No.

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15 minutes extra for each hour

- 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.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define the term “Sensitivity” of a measuring device.
- (b) Draw the neat labelled sketch of Dial Indicator.
- (c) Define the terms :
 - (i) Tolerance
 - (ii) Deviation
- (d) Draw a neat sketch of metric screw thread profile, showing all parameters on it.
- (e) List the instruments used for linear measurement according to their level of accuracy in ascending order.
- (f) Distinguish between Primary texture and Secondary texture in two points only.
- (g) Draw the surface finish symbol with its all parameters.

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

- (a) Differentiate between systematic error and random error.
- (b) Compare the comparators with measuring instruments.
- (c) Draw the sketches illustrating the transition fit, interference fit and clearance fit.
- (d) Describe any one method with neat sketch to measure the effective diameter of screw thread.

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

- (a) Explain the various essential characteristics of precision measuring instruments.
- (b) Explain the various factors affecting on the accuracy of measurement.
- (c) Explain with neat sketch the working principle of differential pneumatic comparator. State its applications.
- (d) The shaft size is given as $40^{-0.04}$ and the hole size is $40^{+0.04}$. Determine the type of fit between them.

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

- (a) Prepare a stack of slip gauges for height of 34.468 mm by using set of M45 as given below. Sketch the arrangement.

Range (mm)	Steps in (mm)	No. of Pieces
1.001 to 1.009	0.001	9
1.001 to 1.09	0.01	9
1.1 to 1.9	0.1	9
1 to 9	1	9
10 to 90	10	9

- (b) Draw the sketch of hole based system. Explain, why it is preferred over shaft based system.
- (c) Apply the Taylor's principle to design Ring gauges.
- (d) "Micrometers provides a more accurate reading than Vernier Calliper." Justify the statement.
- (e) Explain the method recommended by IS : 3073-1967 for specifying the surface texture on machined parts.

5. Attempt any TWO of the following :

12

- (a) Explain the significance of backlash error and runout error observed in gears. How it is checked ?
- (b) Suggest the method to measure the tooth thickness of gear. Explain it with neat sketch.
- (c) "Assessment of surface texture is very important in manufacturing of Job." Justify the statement. State the methods to obtain a numerical value of the texture from a given graphical record.

6. Attempt any TWO of the following :

12

- (a) Draw the labelled sketch of the set up to measure the angle of $35^{\circ} 45'$ with sine bar. What are the accuracy requirements of the sine bar ?
- (b) An angle of $57^{\circ} 6' 9''$ is to be developed using standard angle gauge set of ($1^{\circ}, 3^{\circ}, 9^{\circ}, 27^{\circ}, 41^{\circ}$), ($1', 3', 9', 27'$) and ($3'', 6'', 18'', 30''$). Show the arrangement by sketch. State the advantages and disadvantages of angle gauges.
- (c) In the measurement of surface roughness heights of 20 successive peaks and troughs were measured from a datum and were 35, 25, 40, 22, 35, 18, 42, 25, 35, 22, 36, 18, 42, 22, 32, 21, 37, 18, 35, 20 microns.

If these measurements were obtained over a length of 20 mm, determine the C.L.A. (R_a) and R.M.S. value of the rough surface.
