

17530

**15116****3 Hours / 100 Marks**

Seat No.

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- 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.

**Marks**

**1. (A) Attempt any THREE :** **4 × 3 = 12**

- (a) Define line standard and end standard. Give one application of each.
- (b) Draw a labelled sketch of bevel protractor. State its uses.
- (c) Differentiate between gauge and comparator.
- (d) If length of sine bar is 100 mm, find the length of slip gauges required to build an angle of 14° by using M45 slip gauge set.

**(B) Attempt any ONE :** **6 × 1 = 6**

- (a) Explain the concept of cost of quality and value of quality by using suitable graph.
- (b) “Inspection is a part of quality control.” Justify.

**2. Attempt any FOUR :** **4 × 4 = 16**

- (a) State the advantages and limitations of mechanical comparator.
- (b) Define maximum clearance and minimum interference. Draw suitable sketch.

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- (c) Differentiate between line standard and end standard.
- (d) Draw a neat labelled sketch of screw thread micrometer. State its principle of working.
- (e) Explain the terms Calibration and Traceability.
- (f) State the meaning of flaw, waviness, lay and roughness with respect to surface finish.

3. Attempt any FOUR :

4 × 4 = 16

- (a) Explain the principle of measurement of gear tooth thickness using a gear tooth vernier.
- (b) State merits and demerits of acceptance sampling.
- (c) An angle of 49° 29' 18" is to be developed by using standard angle gauge set of 13 pieces. Calculate the gauges required and sketch the arrangement.
- (d) Distinguish between accuracy and precision with suitable sketch.
- (e) Define any four factors affecting accuracy of measurements.
- (f) Explain hole basis system. Why it is preferred ?

4. (A) Attempt any THREE :

4 × 3 = 12

- (a) Compare alignment test with performance test on any four parameters.
- (b) Define the terms Rq, CLA, RMS and R<sub>Z</sub> values with respect to surface finish.
- (c) Sketch primary and secondary texture. Show on it the sampling length and lay.
- (d) What is interchangeability ? State its importance in mass production.

(B) Attempt any ONE :

6 × 1 = 6

- (a) Explain in brief the concept of “quality audit”.
- (b) Define TQM. Describe any 3 principal elements of TQM.

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5. Attempt any TWO :

 $8 \times 2 = 16$ 

(a) 10 samples of size 5 have been collected with following observations :

<b>Sr. No.</b>	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	2.011	2.008	2.001	2.003	1.998	1.995	1.997	1.997	2.002	2.003
<b>R</b>	0.011	0.017	0.009	0.026	0.27	0.21	0.014	0.017	0.023	0.015

Given  $A_2 = 0.577$ ,  $D_3 = 0$ ,  $D_4 = 2.114$ 

Draw the appropriate control chart and explain whether the process is in statistical control or not.

- (b) What is an OC curve ? State the meaning and significance of important points on OC curve.
- (c) With a neat sketch, explain measurement of tooth thickness by constant chord method.

6. Attempt any TWO :

 $8 \times 2 = 16$ 

- (a) Explain in brief two wire method for thread measurement.
- (b) Following are the inspection results of magnets for 10 observations. Draw appropriate control chart and write your conclusion.

Given :  $A_2 = 0.58$ ,  $d_3 = 0$ ,  $d_4 = 2.11$ 

<b>Day</b>	1	2	3	4	5	6	7	8	9	10
<b>No. of defective magnets</b>	58	83	70	80	72	58	64	78	80	84
<b>Magnets inspected</b>	721	728	720	730	720	700	710	700	710	740

- (c) (i) Define process capability. State how it is achieved.
- (ii) Classify the quality control charts and differentiate between variable and attribute charts (any four points).

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