

17530

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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 : $4 \times 3 = 12$

- (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 : $6 \times 1 = 6$

- (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 : $4 \times 4 = 16$

- (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 $49^{\circ} 29' 18''$ 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 R_q , CLA, RMS and R_z 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.

5. Attempt any TWO :

8 × 2 = 16

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

Sr. No.	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
R	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 × 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 : $A_2 = 0.58$, $d_3 = 0$, $d_4 = 2.11$

Day	1	2	3	4	5	6	7	8	9	10
No. of defective magnets	58	83	70	80	72	58	64	78	80	84
Magnets inspected	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).

