17530

11718

3 Hours / 100 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.

Marks

1. a) **Attempt any <u>THREE</u> of the following:** **12**

(i) Define comparator. State the working principle of mechanical comparator.

(ii) Define the following terms:

1) Tolerance

2) Allowance

3) Deviation

4) Limits

(iii) "Sine bar does not use to measure the angle more than 45°." Justify.

(iv) Explain any four factors affecting the accuracy of measurement.

P.T.O.

Marks

b) **Attempt any ONE of the following:** **6**

(i) Explain the concept of cost of quality and value of quality by using suitable graph.

(ii) Define TQM. Describe any 3 principal elements of TQM.

2. Attempt any FOUR of the following: **16**

a) In the measurement of surface roughness heights of 18 successive peaks and valleys measured from a datum are as follows:

49, 27, 39, 24, 44, 26, 45, 27, 41, 25, 42, 28, 43, 26, 46, 29, 47, 28 the measurement were made over 18 mm. Determine the CLA and RMS values of the surface.

b) [1°, 3°, 9°, 27°, 41°] [1', 3', 9', 27'] [3", 6", 18", 30"] and a square block.

Construct an angle of 116° 35' 6" using minimum number of angle gauges using standard angle gauge set. Draw the sketch of the arrangement.

c) Give the name of measuring instrument/method for following parameter of screw threads:

(i) Major diameter of external screw

(ii) Minor diameter of internal screw

(iii) Pitch of external screw

(iv) Effective diameter of external screw

d) Compare alignment test with performance test on any four parameters.

e) Compare acceptance sampling with 100% inspection.

Marks

3. Attempt any FOUR of the following: **16**

a) State any four characteristics of good comparator.

b) Explain importance of surface finish in engineering applications.

c) Explain the principle of measurement of Parkinson's gear tester with a neat sketch.

d) Compare accuracy and precision.

e) Compare variable measurement and attribute measurement.

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

(i) Explain with neat sketch the procedure for squarness testing of drilling machine spindle.

(ii) State the meaning of "Quality of Design" and "Quality of performance".

(iii) List the minimum number of slip gauges to be wrung together to produce an overall dimension of 63.875 mm using a set of 87 pieces. The set contain (Ref. Table No.1)

Table No. 1

Range (mm)	Step	Pieces
1.005	–	01
1.001 to 1.009	0.001	09
1.01 to 1.49	0.01	49
0.5 to 9.5	0.5	19
10 to 90	10	09

(iv) How major diameter is measured using floating carriage micrometer?

b) **Attempt any ONE of the following:** **6**

(i) Enlist the types of sampling plans. Explain double sampling plan with suitable example.

(ii) What is LVDT? Explain its principle of working with neat sketch.

Marks

5. Attempt any TWO of the following: **16**

a) Following are the inspection results of castings for a shift. Draw appropriate control chart and write your conclusion.

Given A2 = 0.58, d_3 = 0, d_4 = 2.11 (Refer Table No.2)

Table No. 2

Time (Hrs)	7 am to 8 am	8 am to 9 am	9 am to 10 am	10 am to 11 am	11 am to 12 pm	12 pm to 1 pm	1 pm to 2 pm	2 pm to 3 pm
No. of Defective Castings	08	07	09	06	04	05	04	06
Casting Inspected	300	350	400	400	350	375	350	320

b) (i) Calculate the mean, mode and median for following observation data. (Refer Table No.3)

Table No. 3

Obs.No.	1	2	3	4	5	6	7	8	9	10
Observations	4.11	4.18	4.19	4.22	4.25	4.15	4.16	4.18	4.18	4.20

(ii) Explain the principle of measurement of gear tooth thickness using a gear tooth vernier.

c) (i) What is six sigma statistical concept? Enlist its benefits.

(ii) Explain basic shaft and basic hole with neat sketch.

Marks

6. Attempt any TWO of the following: **16**

a) Explain with neat sketch construction and working of sigma comparator.

b) Draw a P-chart and comment on it. 25 samples of 100 items. Were inspected, they are as follows:

Sample No. 1 2 3 4 5 6 7 8

No. of defectives : 14 22 25 15 20 14 12 24

Sample No. 9 10 11 12 13 14 15 16 17

No. of defectives : 10 17 35 36 16 23 14 6 7

Sample No. : 18 19 20 21 22 23 24 25

No. of defectives : 33 17 34 11 16 25 36 18

Total No. of defectives : 500

c) (i) Draw O.C. Curve and explain the Producer's Risk and Consumer's Risk.

(ii) State and explain any four types of errors in gears.