T.Y. Diploma : Sem. V
[ME/PG/PT/MH/MI]

Metrology and Quality Control

Time: 3 Hrs.] Prelim Question Paper **[Marks : 100**

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.

1. (a) Attempt any **THREE** of the following: **[12]**
(i) State the various needs of the inspection.
(ii) Define the following terms:
(1) Tolerance (2) Allowance (3) Deviation (4) Limits
(iii) Explain various errors in gears.
(iv) Explain the procedure for P-chart.

(b) Attempt any **ONE** of the following: **[6]**
(i) State the various objectives of the quality control (any eight).
(ii) Differentiate 'line standard', 'end standard' and 'wavelength standard'. (Give one application of each of them).

2. Attempt any **FOUR** the following : **[16]**
(a) Explain the Taylors principle of gauge design.
(b) 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
(c) Explain the method of gear tooth thickness measurement by Gear tooth vernier with neat sketch.
(d) Distinguish between the terms "Producer's risk" and "Consumers risk".
(e) Compare acceptance sampling with 100% inspection.

3. Attempt any **FOUR** of the following : **[16]**
(a) Explain how the parallelism between two planes and parallelism between two axes is checked with neat sketch.
(b) An angle of 117° 8′ 42″ is to be set and measured with the help of standard angle gauges and square block. Select the minimum number of pieces and sketch the arrangement.
(c) Compare accuracy and precision.
(d) Explain the (LVDT) Electrical comparator with neat sketch.
(e) State any four characteristics of good comparator.

4. (a) Attempt any **THREE** of the following: **[12]**
(i) State methods of evaluation of surface roughness. Explain any one in detail.
(ii) By using optical flat and monochromatic light source, explain how will you determine whether the given surface is convex or concave or flat.
(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)

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) Explain the multi-gauging machine with neat sketch. State it's any two advantages.

4. (b) Attempt any **ONE** of the following: **[6]**

(i) State the various factors controlling the quality of design.

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

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

(a) State the various factors responsible for the variation due to assignable causes.

(b) Draw a neat labelled sketch of O.C. curve. State the procedural steps of construction of O.C. curve.

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

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

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

(a) The following table gives the numbers of missing rivets noted at aircraft final inspection:

Air Plane No.	**No. of missing reverts**	**Air Plane No.**	**No. of missing reverts**	**Air Plane No.**	**No. of missing reverts**
1	8	10	12	19	11
2	16	11	23	20	9
3	14	12	16	21	10
4	19	13	9	22	22
5	11	14	25	23	7
6	15	15	15	24	28
7	8	16	9	25	9
8	11	17	9		
9	21	18	14		

Find $\bar{C}$ compute trial control limits and plot control chart for C. What values of C' would you suggest for the subsequent period?

(b) Following are the inspection results of magnets for five observations. Draw appropriate control chart and conclude.

Week No.	1	2	3	4	5
No. of magnets inspected	728	724	720	730	724
Defectives found	48	83	80	58	60

(c) Explain quality of conformance and quality of performance and state factors affecting quality of product.

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T Y Diploma Sem-V: Paper Discussion Schedule

Branches	**Date**	**Day**	**Timing**	**Centres**
Mechanical Group	8 Nov. 2018	Thursday	9 a.m. to 11 a.m.	Dadar, Kalyan
	8 Nov. 2018	Thursday	12 noon to 2 p.m.	Thane