

Total No. of Questions :9]

SEAT No. :

**P3570**

**[5560]-514**

[Total No. of Pages :2

**T.E. (Mechanical/ Automobile)**  
**METROLOGY AND QUALITY CONTROL**  
**(2015 Pattern) (Semester - I) (302045)**

*Time : 2½Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Neat diagrams must be drawn wherever necessary.*
- 2) *Solve Q.No.1 or 2, Q.No 3 or 4, Q.No.5 or 6, Q.No.7 or 8 & Q.No.9*
- 3) *Assume suitable data if necessary.*
- 4) *Use of non-programmable calculator is allowed*
- 5) *Figures to the right indicate full marks.*

**Q1) a)** Explain the terms: Calibration & Traceability. **[4]**

b) Write a note on 'LVDT Comparator'. **[6]**

OR

**Q2) a)** Explain - Adverse effects of Poor Surface Finish. **[4]**

b) Find the shaft & hole dimensions with tolerance for a 85H8e9 pair given the following data with standard notations -85 mm lies in diameter step of 80 to 100 mm. Upper deviation for e shaft=  $-11D^{0.41}$ , Tolerance unit,  $i=0.45(D)^{0.33} + 0.001D$ . IT8=25i & IT9=40i. Show it with a diagrammatic representation. What type of fit it is ? **[6]**

**Q3) a)** Calculate the effective diameter of metric threads using two wire method: Micrometer reading over standard Cylinder with two wires=15.64mm, Micrometer reading over the gauge with two wires = 15.26 mm, Wire diameter = 2 mm, Thread pitch =2.5mm, Standard cylinder diameter=18mm. **[5]**

b) Explain various errors in Spur gears. **[5]**

OR

**Q4) a)** Explain any 4 symbols of Geometrical Dimensioning & Tolerancing (GD & T) **[4]**

b) Write a note on NPL Flatness Interferometer. **[6]**

**P.T.O.**

- Q5)** a) Enlist Basic & New Seven Quality Tools & explain any 2 of them. [8]  
 b) Comparison between Deming's & Juran's Quality Concepts. [8]

OR

- Q6)** a) Write a note on Quality of Design, Quality of Conformance & Quality of Performance with their co-relationship. [8]  
 b) Explain importance of quality deployment at design & manufacturing & elaborate importance of initial planning for quality. [8]

- Q7)** a) Enlist different types of control charts & their applications/ uses. Elaborate on 'Control Chart Patterns' [10]  
 b) The number of defects found in each sample of paper of 1 square meter area are shown below. Draw appropriate control chart & state whether the process is under control or not. If sample falling outside control limits is taken out, what are the new control limits. [6]

Sample	1	2	3	4	5	6	7	8	9	10	11	12
No. of defects found	5	6	2	5	2	6	6	13	6	5	6	4

OR

- Q8)** a) Explain the concept of Process Capability & the indices Cp, Cpk & Ppk. [8]  
 b) The lot size N is 2000 in a certain AOQL inspection procedure. The desired AOQL of 2 % can be obtained with any one of the three sampling plans. These are: (i)  $n=65$   $c=2$ , (ii)  $n=41$ ,  $c=1$  & (iii)  $n=18$ ,  $c=0$ . If a large no. of lots 0.3% defective are submitted for acceptance, what will be the average no. of units inspected per lot under each of these sampling plans? Take  $P_a = 0.999, 0.993$  &  $0.947$  for plan-i), ii) & iii) respectively [8]

- Q9)** Write note on (Any 3) [18]

- 'House of Quality' matrix
- FMECA
- TPM
- Poka-Yoka
- Six Sigma
- 5S

