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# T.E. (Mechanical) (Semester – II) Examination, 2010
# METROLOGY AND QUALITY CONTROL
## (2003 Course)

Time : 3 Hours Max. Marks : 100

***Instructions :*** *1) Answer **3** questions from Section **I** and **3** questions from Section – **II**.*
*2) Neat diagrams must be drawn **wherever** necessary.*
*3) Assume suitable data, **if necessary**.*
*4) Answer Q. **1** or **2**, **3** or **4**, **5** or **6**, **7** or **8**, **9** or **10**, **11** or 12.*

SECTION – I

1. a) Explain in brief following systamatic error 8
   1) Alignment error
   2) Cosine error
   3) Error due to ambient condition
   4) Errors due to elastic deformation
   5) Random errors.

   b) Differentiate between 8
   1) Accuracy and precision
   2) Line standard and End standard.

OR

2. a) Explain requirement, uses, and limitation of sine bar and sine centre. 8
   b) Describe calibration of dial gauge. 8

3. a) Design the general type Go and NOGO gauge for component having 20 $H_7f_8$ fit. 16
   1) $i = 0.45 \sqrt[3]{D} + 0.001\ D$ (D is in mm)
   2) Fundamental deviation for f shaft – $5.5\ D^{0.41}$
   3) IT 7 = 16 i
   4) IT 8 = 25 i
   5) Wear allowance 10% of gauge Tolerance

OR

P.T.O.

4. a) Describe with neat sketch Taylor Hobson surface meter. 8

   b) Explain the following term
      1) Primary Texture
      2) Secondary Texture
      3) CLA value
      4) RMS value 8

5. a) Explain following alignment test on pillar type drilling machine.
      i) Flatness test of clamping base surface
      ii) Perpendicularity test
      iii) Parllelism Test
      iv) Deflection Test. 10

   b) Draw the following sketches 8
      i) Sigma comparator
      ii) Solex air gauge
      iii) Optical comparator

OR

6. a) Explain with neat sketch 18
      i) Co-ordinate measuring machine
      ii) Floating carriage micrometer
      iii) Gear measurement by dimension over pins for even and odd no. of tooth.

SECTION – II

7. a) Explain Dr. W. Edward Demings 14 point and PDCA cycle for quality control. 10

   b) Explain Juran Trilogy diagram. 6

OR

8. a) Explain following cost of quality
      a) Appraisal cost
      b) Failure cost
      c) Prevention cost. 6

   b) Differentiate between quality control and quality assurance. 4

   c) Differentiate between chance causes and assignable causes. 6

9. a) The no. of defects observed on 24 motor cycle assembly.

| Assembly No. | No. of defects Observed | Assembly No. | No. of defects Observed |
|---|---|---|---|
| 1 | 11 | 13 | 10 |
| 2 | 8 | 14 | 9 |
| 3 | 15 | 15 | 14 |
| 4 | 9 | 16 | 11 |
| 5 | 19 | 17 | 10 |
| 6 | 14 | 18 | 19 |
| 7 | 16 | 19 | 12 |
| 8 | 8 | 20 | 16 |
| 9 | 9 | 21 | 13 |
| 10 | 28 | 22 | 8 |
| 11 | 7 | 23 | 15 |
| 12 | 22 | 24 | 9 |

Compute the control limits and control chart for the stable and under control statistical process. **8**

b) Differentiate between single, double, multiple or sequential sampling plan. **8**

OR

10. a) Explain the following characteristics of oc curve
    1) Changing lot size
    2) Changing sample size
    3) Changes of acceptance no.
    4) Change of sample size. **8**

b) Distinguish between
    i) $\overline{X}$ and R charts
    ii) P-chart and C chart. **8**

11. Write a short note on : **18**
    i) Six Sigma
    ii) Ts 16949
    iii) EMECA

OR

12. Write a short note on : **18**
    i) Cause and effect diagram
    ii) Pareto analysis
    iii) Kaizen