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

Time : 3 Hours Max. Marks : 100

*N.B. : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data **if necessary**.*
*4) Answer to the Sections – **I** and **II** should be written **separately**.*

SECTION – I

1. a) Compare the end standard and line standard. **6**

   b) Define straightness and flatness. Explain with neat sketch method of checking straightness of straight edge by wedge method. **10**

OR

   a) Describe with neat sketch the principle of working of an autocollimator and state its application. **8**

   b) Design a 'workshop' type GO and NOGO Gauge suitable for 25H7 the value of IT7 = 16i and the diameter step 18 and 30. **8**

2. a) Explain with pneumatic circuit diagram the solex pneumatic comparator. Explain advantages and limitations of pneumatic comparator. **8**

   b) Explain sigma mechanical comparator. **8**

OR

2. a) Explain the difference between primary texture and secondary texture. **4**

   b) Write short note on : **8**

      1) Constant deviation prism
      2) Angle dekor.

   c) A 1.45 mm slip gauge is being measured on a gauge length interferometer using a Cadmium lamp. The red and blue wavelength emitted by this lamp are 0.643850537 μm and 0.47999360 μm. Calculate the nominal fractions expected for the gauge for red and blue wavelength. **4**

3. a) Derive the relation for width W and depth h by const. chord method. Calculate chord length and its distance below tooth tip for a gear of module 5 mm and pressure angle 20°. **8**

   b) Derive an expression for best wire size for measuring effective diameter. Calculate diameter of best size of wire for $M_{20} \times 2.5$ screw. Explain Rack correction and compression correction. **10**

OR

3. Write short notes (**any three**) : **18**

   1) Co-ordinate Measuring Machine
   2) Parkinson's Gear Roller Tester
   3) Tomlinson's Surfacemeter
   4) Types of pitch errors in screw thread.

SECTION – II

4. a) Differentiate between : **8**

      i) Vendor rating and Vendor quality rating.
      ii) Quality Control and Quality Assurance.

   b) Explain the concept of quality defined by Juran, Crosby, Deming and Taguchi. **8**

OR

   a) Explain Quality Policy. **5**

   b) The balance between cost of quality and value of quality gives optimum quality of design. Discuss. **6**

   c) Explain spiral progress in quality system. **5**

5. a) Differentiate between Chance Cause and Assignable Causes. **6**

   b) A manufacturer purchases small bolts in cartons that usually contain several thousands bolts. Each shipment consists of number of cartons, as a part of the acceptance procedure for these bolts, 400 bolts are selected at random form each carton and are subjected to visual inspection for certain defects. In a shipment of 10 cartons the respective percentages of defectives in the samples form each carton are 0, 0, 0, 5, 0.75, 0, 2, 0.25, 0.25 and 1.25. Does the shipment of bolts appear to exhibit statistical control ? **6**

   c) Distinguish between P-chart and C-chart. **4**

OR

5. a) Explain the following OC curve characteristic : **8**
   1) Changing of lot size
   2) Changing sample size
   3) Change of acceptance number
   4) Change of sample size.

   b) For the following data, calculate sample size and AOQ for single sampling plan :
   1) Probability of acceptance for 0.6% defective is 0.9397
   2) Lot size N = 10,000
   3) np = 2.5.

   Defectives found in sample are not to be replaced. **8**

6. Write short notes (**any three**) : **18**
   a) Quality Audit
   b) TS 16949
   c) Process Capability Index
   d) DMAIC.
