

Total No. of Questions : 9]

SEAT No. :

**P1691**

**[5058]-312**

[Total No. of Pages : 2

**T.E.(Mechanical Auto)**  
**METROLOGY & QUALITY CONTROL**  
**( 2012 Pattern)(End Sem) (Semester-I)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Question No. 09 is compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
- 4) *Assume Suitable data, if necessary.*

- Q1)** a) Draw a neat sketch of Vernier caliper and How to calculate least count of Vernier caliper give one example. [4]  
b) write short notes on- [6]  
i) Types of standards  
ii) Electrical comparator (LVDT)

OR

- Q2)** a) Write short notes on universal measuring machine [5]  
b) Explain angle Dekker with neat sketch. [5]
- Q3)** a) Explain Interferometry applied to flatness testing by using optical flat [5]  
b) Determine the dimensions and tolerances of shaft and hole having size of 30H7f8 fit. (IT7=16i, IT8=25i, D is in a step 18-30mm, Fundamental deviation for f =  $-5.5D^{0.41}$ ) [5]

OR

- Q4)** a) Derive an expression for best wire size for measuring effective diameter. [6]  
Calculate Effective diameter and best wire diameter for M22×2.5 screw plug gauge by using Floating carriage Micrometer for which reading were taken as

Diameter of standard cylinder 20 mm

Micrometer reading over standard cylinder with two wire is=15.9334mm

Micrometer reading over plug screw gauge with two wire is=15.2245mm

- b) Write short notes on Gear tooth vernier caliper [4]

**P.T.O.**

- Q5)** a) Explain Deming's cycle and 14 point towards quality improvement. [8]  
 b) Explain seven old quality tools. [8]

OR

- Q6)** a) Explain the concept of quality circle and their structure and limitation [8]  
 b) What is cost of quality? Explain its types. [8]

- Q7)** a) Control chart for  $\bar{X}$  is to be prepared for a certain dimension of component the sub group size is 4 after 20 sub group it is found that  $\Sigma \bar{x} = 825.60\text{mm}$  and  $\Sigma R = 5.60\text{ mm}$  compute the central line and the control limits for  $\bar{X}$  chart d2 for sub group size 4=2.059.

If the specified dimension is  $41.0 \pm 0.40\text{mm}$  and the above process is in the control and is normally distributed, can it meet the specification requirement? If not, determine the percentage of rejection. [8]

- b) Explain the following OC curve characteristics
- i) Changing of lot size.
  - ii) Changing of sample size.
  - iii) Changing of acceptance number
  - iv) Changing of sample size and acceptance number [8]

OR

- Q8)** a) Explain the Multiple sampling plan with flow chart [8]  
 b) Define producer risk; consumer risk and AOQL and AOQ for the given data calculate sample size and AOQ for single sampling plan. [8]
- i) Probability of acceptance for 0.4% defective in a lot is 0.558.
  - ii) Lot size  $N=10000$
  - iii)  $np'=1.6$  &  $c=1$
  - iv) Defectives found in the sample are not to be replaced.

- Q9)** Explain the following terms (Any Three) [18]
- a) KANBAN
  - b) JIT
  - c) FMECA
  - d) DMAIC
  - e) FIVE S

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