[4858] - 1012

T.E. (Mech.)

METROLOGY & QUALITY CONTROL

(2012 Pattern)

Time : 3 Hours]   *[Max. Marks : 70*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Neat diagrams must be drawn wherever necessary.*

    3)   *Figures to the right indicate full marks.*

    4)   *Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

    5)   *Assume Suitable data, if necessary.*

Q1) a)   Define uncertainty in measurement and state repeatability and reproducibility of measurement   **[6]**

     b)   Explain angle Dekker with ray diagram and its application.   **[4]**

<p align="center">OR</p>

Q2) a)   Explain N.P.L. Flatness interferometer with neat sketch and write its application.   **[6]**

     b)   Explain hole basic and shaft basic system.   **[4]**

Q3) a)   Explain the method of measuring effective diameter using three wires with neat sketch.   **[6]**

     b)   State the Taylor's principal for designing the limit gauges.   **[4]**

<p align="center">OR</p>

Q4) a)   Explain Tool maker's microscope and their application.   **[6]**

     b)   Write the type of errors in gear metrology.   **[4]**

Q5) a)   What points were given by Deming to improve quality   **[6]**

     b)   Explain juran's trilogy approach.   **[6]**

     c)   Explain cost of quality.   **[6]**

Q6) Explain the following   [3 × 6 = 18]
   a)   Seven Quality New tools.
   b)   Quality circle.
   c)   Characteristics of quality.

Q7) a)   Explain with OC curve and state producer's risk, consumer's risk, AOQL and LTPD.   [8]
   b)   The following data shows number of defectives in inspection of 10 lots of 100 samples sizes each for connecting rods. Determine the control limits and the revision made in case the chart is 'out of limit'.   [8]

Lot No.	1	2	3	4	5	6	7	8	9	10
defection	9	5	4	7	6	11	5	2	4	7

OR

Q8) a)   control chart for $\overline{X}$ & R are maintained for control of an important dimension of a component the subgroup size is settled as 5, The value of $\overline{X}$ & R are computed for each subgroup and value of $\sum \overline{X}$ & $\sum R$ after 25 sub group are found to be 614.8 & 120 respectively compute the value of 3σ limit for $\overline{X}$ - chart $\overline{R} = 2.32\sigma$ [8]
   b)   Define AOQL and AOQ for the given data calculate sample size and AOQ for single sampling plan.   [8]
      i)   Probability of acceptance for 0.3% defectives in a lot is 0.558
      ii)   Lot size N=10000 units
      iii) np'=1.5
      iv)   Detectives found in the sample are not to be replaced.

Q9) a)   Explain quality function development and its benefits.
   b)   Explain JIT concept in industry.
   c)   Explain KAIZEN and KANBAN system.
                                                                [16]

OR

Q10) Write short notes on (any three)   [16]
   a)   ISO 9000
   b)   Quality audit
   c)   FMECA
   d)   Six sigma
   e)   5s

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