[5058]-19

T.E. (Mech./Auto.)

MECHANICAL

Metrology & Quality Control

(2008 Pattern) (Semester - II)

Time : 3 Hours]   *[Max. Marks : 100*

Instructions to the candidates:

1) Answer 3 questions from Section - I and 3 questions from Section - II.

2) Answers to the sections should be written in separate books.

3) Neat diagrams must be drawn wherever necessary.

4) Figures to the right indicate full marks.

5) Assume suitable data, if necessary.

6) Use of electronic pocket calculator is allowed.

SECTION - I

Q1) a) Describe the following term: **[8]**

    i) Line standard and End standard

    ii) Accuracy and precision

  b) Define straightness and flatness. Explain with neat sketch method of checking straightness of straight edge by wedge method.   **[8]**

OR

Q2) a) Explain following terms   **[8]**

    i) Sine bar and sine center.

    ii) Angle Dekkor

  b) Explain Solax pneumatic comparator with neat sketch.   **[8]**

Q3) a) What is interferometer. Explain Interferometry applied to flatness testing.   **[8]**

  b) What is Taylor's principle? Determine the dimensions and tolerances of shaft and hole having size of 25H8 h7 fit.   **[10]**

    (IT7 = 16i, IT8 = 25i, D is in a step 18-30 mm)

OR

Q4) a) Design a workshop gauge for Go and NOGO gauge suitable for 25 H8. (IT8 = 25i, D is in a step 18-30 mm) **[10]**

    b) Write short notes on: **[8]**

        i) Tomlinson's surface meter

        ii) Gear tooth vernier caliper

Q5) a) Derive the relation for width W and depth H by constant chord method. Calculate chord length and its distance below tooth tip for a gear of module 4 mm and pressure angle 20 degree. **[8]**

    b) Derive an expression for best wire size for measuring effective diameter. Calculate diameter of best size of wire for M25 × 2.5 screw. **[8]**

OR

Q6) Write Short notes on : **[16]**

    a) Recent trends in metrology.

    b) Co-ordinate measuring machine.

    c) Pitch errors in screw threads.

    d) Lasers in metrology.

SECTION - II

Q7) a) Difference between: **[8]**

        i) Quality Policy and Quality Assurance.

        ii) Quality of conformance and Quality of performance.

    b) Explain the concept of Juran's Trilogy approach. **[8]**

OR

Q8) a) Explain the Pareto Analysis and Cause and Effect diagram. **[8]**

    b) Explain DR. Edward Deming's PDCA and PDSA cycle for quality control.**[8]**

Q9) a) Explain the Quality circle and JIT concept. **[8]**

    b) Write short notes **[8]**

        i) ISO 9000

        ii) Five 'S'

OR

Q10) Write Short notes on [16]

    a)   Kanban

    b)   FMECA

    c)   DMAIC

    d)   Process capability

Q11) a)   Comparison between variable chart and attribute chart. [8]

    b)   Draw and explain OC curve. [4]

    c)   Calculate sample size and AOQ for single sampling plan using following data [6]

        i)   Probability of acceptance of 0.6% defective in a lot is 0.525

        ii)   Lot size = 10,000 units

        iii)   Acceptance number = 1

        iv) $nP' = 1.5$

        v)   Defectives found in the sample are not to be replaced

OR

Q12) a)   Differentiate between single, double, multiple sampling plan. [8]

    b)   A component with specification limits 50±0.1 was inspected the components were taken sub group of 5 items 10 such sub groups were checked the X & R values were noted as follows [10]

Subgroup	1	2	3	4	5	6	7	8	9	10
X(mean)	44	43	41.8	43.4	44	43.8	43.8	45	40.8	43
R	10	7	3	5	4	12	2	5	4	9

Establish the central limits for limits for X(mean) and R charts. Draw the chart & check whether the product will meet the specifications or not, (Take $A_2 = 0.577$, $D_3 = 0$, $D_4 = 2.115$).

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