*4098*

# Mechanical Measurement and Metrology
## (1110)

**P. Pages : 3**

**Time : Three Hours**                                    **Max. Marks : 100**

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory & attempt **any two** bits out of a, b, c from each questions.
5. Assume suitable additional data if required giving proper justification.
6. Neat diagrams must be drawn wherever necessary.

1. a) Explain with block diagram "Data Acquisition system".          **10**

   b) Explain CRO with block diagram its uses & its application.       **10**

   c) Explain with sketches.                                           **10**
      i) Hysteresis
      ii) Drift
      iii) Sensitivity
      iv) Threshold
      v) Repeatability

2. a) What are the types of pyrometer ? Explain briefly any two types of them with neat sketch.     **10**

   b) Explain in brief.                                                **10**
      i) Mcleod Gauge.
      ii) Bourdon tube.

   c) Explain in brief.                                                **10**
      i) Eddy current Dynamometer.
      ii) Hydraulic Dynamometer.

**3.** a) Design the general type Go and NO - Go gauge for components having 20 H7 F8 fit.　　　　**10**
Given :

   i)　i (micron) = 0.45 $(D)^{1/3}$ + 0.001 D

   ii)　Upper Deviation of 'f' shaft = -5.5 $D^{0.41}$

   iii)　20 mm falls in the diameter step of 18 mm to 30 mm.

   iv)　IT 7 = 16 i

   v)　IT 8 = 25 i

   vi)　Wear Allowance 10% of Gauge Tolerance.

   b) How does the comparator differ from measuring instrument. Explain the construction & working of sigma comparator.　　**10**

   c) Differentiate between.　　**10**

   i)　Precision and Accuracy.

   ii)　Line standard and End standard.

**4.** a) Describe the construction, working and application of profile projector. Explain 2 types of images obtained in profile projector.　　**10**

   b) Explain briefly :　　**10**

   i)　Angle Dekker.

   ii)　Autocollimator.

   c) i)　A spur gear of 3mm module has 40 teeth calculate the following properties pitch circle diameter. Addendum Dedendum working height & base pitch for a pressure angle 20⁰.　　**5**

   ii)　For m 24x3 mm external threads Calculate the diameter of the best wire size and the difference between the size under the wires and the effective diameter.　　**5**

**5.** a) The following table gives the inspection data on completed spark **10**
plugs.
Inspection data on completed spark plugs.
(2000 spark plugs in 20 lots of 100 each).

| Lot Number | Number of defectives | Fraction defectives | Lot Number | Number of defectives | Fraction defectives |
|---|---|---|---|---|---|
| 1 | 5 | 0.050 | 11 | 4 | 0.040 |
| 2 | 10 | 0.100 | 12 | 7 | 0.070 |
| 3 | 12 | 0.120 | 13 | 8 | 0.080 |
| 4 | 8 | 0.080 | 14 | 2 | 0.020 |
| 5 | 6 | 0.060 | 15 | 3 | 0.030 |
| 6 | 5 | 0.50 | 16 | 4 | 0.040 |
| 7 | 6 | 0.060 | 17 | 5 | 0.050 |
| 8 | 3 | 0.030 | 18 | 8 | 0.080 |
| 9 | 3 | 0.030 | 19 | 6 | 0.060 |
| 10 | 5 | 0.050 | 20 | 10 | 0.100 |
| | | | | Total = 120 | |

Construct an Appropriate control chart.

b) Write short note on. **10**

   i)   TQM.

   ii)  Six sigma

c) Explain in brief. **10**

   i)   Laser Telemetric system

   ii)  CMM.

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