(3 Hours) [Total Marks :80

N.B. : (1) Questions No. 1 is **compulsory**.
    (2) Solve any three questions out of remaining questions.
    (3) Assume suitable data if required and mention it clearly.

1. Answer the following :-   20
    (a) What are the objectives of quality control.
    (b) Differentiate between precision and accuracy.
    (c) Explain the concept of waviness and Roughness
    (d) Compare pneumatic and Mechanical Comparators.

2. (a) A hole and shaft assembly designed as $H7_p5$, having nominal diameter 28 mm is   10
being manufactured. The gauges for compound inspection are proposed on the
basis of fallowing information
    (i) 28 H 7 has upper deviation of 21 microns.
    (ii) 28 p5 has fundamental deviation of + 22 microns and tolerance of 9
        micron.
    (iii) $H = 4$ $H_1 = 2.5$
    (iv) $Y = 3$ $Y_1 = 2.5$
    (v) $Z = 3$ $Z_1 = 1.5$ (All with std. Units)
Show dispersion of tolerance on gauges.

    (b) Define and classify various types of cost of quality with suitable examples.   10

3. (a) Define and indicate following gear tooth parameter on an involute tooth profile   10
sketch :
    (i) Base pitch
    (ii) Root Diameter
    (iii) Working depth tooth
    (iv) Dedendum
    (v) P.C.D.
    (b) Explain P and nP charts with their applications   10

4. (a) With the help of graphical presentation explain following parameters used in   10
surface texure measurement.
    (i) R_a (ii) R_y
    (iii) R_z (iv) Sampling length
    (b) What is best wire size? Explain three wire method used in thread measurement.   10

5. (a) Explain the phenomenon of interference of light. Explain how it can be applied   10
in flatness measurement of surface.

  (b) Following data gives details of quality control with respect to weight of certain   10
object :

Weight required = 500 grams

Tolerence ± 3 grams

Porcess study details = 20 sample of size 5

$$\sum \bar{x} = 9960, \quad \sum R = 100$$

Draw control chart and comment on process capability.

(For subgroup size of 5, Az = 0.58, D4 = 2.11, D3 = 0)

6. (a) Explain with neat sketch working of Tool marker's microscope.   10

  (b) Define following terms in SQC   10

      (i) LTPD

      (ii) AQL

      (iii) Consumers Risk

      (iv) Producer Risk.