



Note :1) Q. No.1 is compulsory.

- 2) Attempt **any THREE** questions out of remaining **FIVE** questions.
- 3) **All** questions carry **equal** marks.
- 4) assume suitable data wherever necessary.

1. Answer **any Four** questions:

- a) Explain Line standards and End standards and distinguish between them. 5
 - b) Explain Hole based system of tolerances. How it is different from shaft based system. Give an example for each. 5
 - c) Briefly explain: Ten point average method and RMS value method for measuring surface roughness. 5
 - d) What is involute function? Derive an expression for the same for involute gears. 5
 - e) What do you mean by best wire size diameter? Derive an expression for the same in case of screw threads. 5
 - f) Briefly explain optical flats and their types. How to make use of them to check convexity, concavity and flatness of a surface. 5
2. a) Design a set of limit gauges to check the shaft and hole assembly; by indicating the component and gauge tolerance dispersion by IS practice, based on the following data: i) Shaft 34.950 / 34.925 mm; mating with 35H₇ hole so as to have maximum clearance = 100 μm. (show the calculations for hole limits based on this). ii) H = H₁ = 4; Z = Z₁ = 3.5; Y = Y₁ = 3 (All in usual units). 14
 - b) Explain the following in brief: sampling length, lay and R_a. 6
3. a) When measuring the outside diameter of an external screw thread gauge of 3.5 mm pitch, a 30.5 mm diameter cylindrical standard was used. The micrometer reading over the standard and the gauge were 12.2446 and 13.3748 mm respectively. Calculate the thread gauge outside diameter? 7
 - b) What is fiducial indicator and how it is useful while measuring major diameter? 5
 - c) In the measurement of surface roughness the heights of 10 successive peaks and valleys over a datum line for a specified sampling length were found as follows: 45, 25, 40, 30, 35, 18, 42, 25, 35, 24 μm. what is the Ra roughness value of the surface.? 8
4. a) Obtain an expression for involute function of a straight tooth spur gear. 5
 - b) Define circular pitch and base pitch of a straight tooth spur gear. How they are related. Show with a neat sketch. 5
 - c) What is base tangent method in case of gear tooth thickness measurement? Obtain an expression for the same. What are the merits of this method? 10

[TURN OVER]