

Hours: 03

- Note :
1. Question number 1 is **compulsory**
 2. Solve any **Three** questions from remaining **Five** questions
 3. **Assume** suitable data if required.
 4. Draw neat sketches wherever necessary.

- Q.1 Attempt any **Four** questions of the followings. 20
- (a) Distinguish between Line standard and End standard. Write a short note on construction and wringing of slip gauges?
 - (b) The assembly 40D8/k7 represents a clearance fit. Justify with proper diagrams.
 - (c) What are the adverse effects of a poor surface finish? Define Primary and Secondary textures.
 - (d) How chordal gear tooth thickness measurement method is superior to pitch line method of measurement? Also list the draw backs of gear tooth vernier.
 - (e) Obtain an expression for best size of wire in the case of screw thread measurement and also define the same.
 - (f) With a neat diagram explain the interference phenomenon.
- Q.2 (a) Explain Taylor's principle of gauge design and list its shortcomings with suitable examples 08
- (b) A turned shaft is to rotate in a reamed hole at low peripheral velocity. Determine the size of 'GO' 12 and 'NO GO' gauges for components having 30H8/c7 being given with usual notations.
- i (Microns) = $0.45 \sqrt[3]{D} + 0.001 D$ (D in mm), The upper deviation for shaft $c = 0.52 D^{0.2}$
30 mm falls in the diameter step of 18 to 30.
- Q.3 (a) With a neat sketch explain the working principle of Parkinson gear tester? 07
- (b) A spur gear of 4 mm module has 45 teeth. Calculate the following properties: 06
PCD, Addendum, Ddendum, and Tooth working height. Assume the clearance to be 0.25 m.
If above spur gear has $\phi=200$, compute base pitch of gear?
- (c) Obtain expressions for 'h' and 'w' in case of constant chord method for a straight tooth spur 07 gear?

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- Q.4 (a) With a neat diagram show at least six elements of metric screw thread and define all those parameters. Also explain with a neat sketch the procedure to measure root diameter using Vee prisms? 10
- (b) 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? 06
- (c) Briefly explain the errors associated with a screw thread. What do you mean by drunkenness of the thread? 04
- Q.5. (a) 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: 06
- 46, 24, 45, 35, 38, 15, 45, 28, 36, 22 μm**
- What is the Rz roughness value of the surface?
- (b) Explain with a neat sketch the operation of Tomlinson Surface Meter? 09
- (c) Write short note on *Interchangeability*. 05
- Q.6 (a) Sketch a line diagram of optical arrangements of an NPL gauge interferometer and illustrate the appearance of field of view as seen in the eye piece? 07
- (b) Explain with a block diagram the principle of operation of back pressure pneumatic comparator. Define various sensitivities associated with it and derive an expression for overall magnification of the comparator in terms of average separation 08
- (c) Write short notes on *any ONE*: 05
- i) Strain gauge. ii) Torque measurement iii) CMM
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