

Code: 9A03603

B.Tech III Year II Semester (R09) Supplementary Examinations December/January 2014/2015

**METROLOGY**

(Mechanical Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions  
All questions carry equal marks

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- 1 (a) What are the essential conditions for obtaining interference fits and clearance fits?  
(b) Is it possible to drill a 25 mm nominal hole to an accuracy of  $25_{-0.02}^{+0.02}$  mm using standard drill and drilling machine available. A shaft is to be machined to obtain a clearance fit in above hole such that the allowance should be 0.01 and maximum clearance should not be more than 0.08 mm. What should be the tolerance on the shaft?  
(c) Cold drawn shafts up to  $\pm 0.01\text{mm}$  are available and an interference fit is to be designed for a 50 mm nominal size hole. Determine the tolerances for hole if maximum and minimum interferences are to be 0.07 mm and 0.01 mm.
- 2 What are the methods of calibrating slip gauges? Discuss about any one method in detail.
- 3 (a) Define the term straightness. What are the methods of defining straightness error?  
(b) Autocollimator and reflector carriages are used to measure the straightness of a machine bed. Moving the carriage away from autocollimator over 750 mm, the readings increase uniformly by 30 seconds. An increase in reading is also obtained when the leading edge of the carriage is raised slightly. Calculate the amount and form of flatness error, showing how these are derived from angular readings.
- 4 Discuss about the terminology of surface texture with neat sketch. How do you differentiate between roughness, waviness and form error?
- 5 (a) What is the "best size" wire? Derive an expression for the same in terms of the pitch and angle of the thread.  
(b) What are the various types of pitch errors found in screws? How these errors effect the effective diameters of a screw thread?
- 6 (a) Explain the parallelism of tailstock sleeve to saddle movement.  
(b) Explain the alignment test of spindle centre and tail stock centers in vertical planes.
- 7 (a) Describe a gear tooth Vernier caliper and show how this is used for checking gears.  
(b) A spur gear of 4 mm module has 45 teeth. Calculate the following proportions (i) Pitch circle diameter. (ii) Addendum. (iii) Dedendum. (iv) Tooth working height. Assume the clearance to be 0.25 module. Compute the base pitch of the gear if the spur gear has a pressure angle of  $20^{\circ}$ .
- 8 (a) Explain different types of chemical conversion coatings.  
b) ( Write the applications of paints, resins, lacquers and varnishes.

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