

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 712805N**Date: 06-01-2013****Subject Name: Design of Machine Tools****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Write structural formulae for a 12 speed gear box and select the best suitable from them. Explain the criteria to select best structural diagram. **07**
(b) Explain the design criteria for stiffness of machine tool structure. **07**
- Q.2** (a) Explain the functions of machine tool structures and their requirements. **07**
(b) Discuss layout of cylindrical grinding machine. **07**
- OR**
- (b) Explain why G.P. is preferred over other progressions. **07**
- Q.3** (a) Explain the dynamic characteristic of the cutting process. **07**
(b) What is meant by machine tool testing? Explain a test carried on lathe to check the axial slip of spindle with sketch. Why is it necessary to carry this test? **07**
- OR**
- Q.3** (a) In turning operation the cutting force components were $P_z=130\text{kgf}$, $P_x=120\text{kgf}$, $P_y=130\text{kgf}$. If the carriage weighs 150kgf, Determine the pulling force for conventional slideways and ball recirculating guideways. The coefficients of sliding and rolling friction are 0.15 and 0.001 cm respectively and the diameter of ball is 10mm. **07**
(b) Explain the methods of adjusting clearances in slideways with sketch. **07**
- Q.4** (a) Explain the design criteria of slideways for wear resistance. **07**
(b) Explain the functions of bed. How the rigidity of bed can be improved? **07**
- OR**
- Q.4** (a) Discuss the importance of following terms on design of the machine tools. **07**
i) Rigidity ii) Productivity
iii) Accuracy & iv) Reliability
(b) Explain various materials that can be used for spindle. **07**
- Q.5** (a) Explain three main alignment tests to be carried on milling machine. **07**
(b) Discuss stability analysis in reference to machine tool dynamics. **07**
- OR**
- Q.5** (a) What is meant by preloading of anti friction bearings? State various methods of preloading. **07**
(b) Explain the optimum spacing between spindle supports. **07**
