

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 2712807**Date: 12-01-2015****Subject Name: Advanced Machine Tool Design****Time: 02:30 pm - 05:00 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) Explain importance of stability analysis in dynamics of machine tools. **07**
 (b) Explain the recirculating ball type lead screw with neat sketches. **07**
- Q.2** (a) Explain about machine tool testing. **07**
 (b) State the functions and requirements of machine tool structures. **07**
- OR**
- (b) What are the different sources of vibrations in machine tools? How that can be eliminated? **07**
- Q.3** (a) Explain the classification of guide ways used in machine tools. **07**
 (b) Explain the different methods used to improve the rigidity of machine tool Columns with neat sketches. **07**
- OR**
- Q.3** (a) Draw the structure diagram and gear box layout for the following structure equations and determine the maximum transmission range for each equation. **07**
 (i) $2(1) \ 2(2) \ 3(4)$
 (ii) $2(6) \ 2(1) \ 3(2)$
 (b) Write short note on: Hydraulic transmission and its elements. **07**
- Q.4** (a) Explain the general procedure for accessing dynamic stability of EES. **07**
 (b) Explain the model techniques in design of machine tool structures. **07**
- OR**
- Q.4** (a) Explain about the dynamic characteristics of the cutting process. **07**
 (b) Explain any one standard geometrical acceptance test with suitable figure, measuring instruments and permissible error for shaping machine tool. **07**
- Q.5** (a) Design the spindle on the following basis: **07**
 (i) Deflection of spindle axis due to bending.
 (ii) Deflection of spindle axis due to compliance of spindle supports.
 (b) Explain the functions of bed. How the rigidity of bed can be improved? **07**
- OR**
- Q.5** (a) Differentiate between Antifriction bearings and Sliding bearings. **05**
 (b) The following data refers to a radial drilling machine gearbox: **09**
 Electric motor $\approx$ 10 kW, 1440 r.p.m.
 Minimum speed - 70 r.p.m. Maximum speed $\approx$ 1800 r.p.m.
 No. of speed steps $\approx$ 8
 Speed reduction from motor shaft to input gearbox shaft = 1.6 : 1
 Draw the structural diagram, speed chart and layout diagram of gearbox.
 Find number of teeth also.
