

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER – VIII EXAMINATION – WINTER 2016

Subject Code: 182503**Date: 21/10/2016****Subject Name: Design of Product and Machine Tools****Time: 02:30 PM to 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.
4. Any own databook is permitted.

- Q.1** (a) Design a feed box for feed range $s=0.1$ to 1.11 . Mm/rev. in $u=2$ stages. **07**
 $o=1.41$
- (b) Explain general requirements of a machine tool design. **07**
- Q.2** (a) A ball bearing is subjected to radial load of 10 KN and thrust load of 4 KN. **07**
The inner ring rotates at 1000 rpm. The average life is 5000 hrs. What basic load rating must be used to select a bearing for this purpose.
- (b) Compare Hydrodynamic and Antifriction bearings in view of various parameters. **07**
- OR**
- (b) Explain how the lubricant is selected? **07**
- Q.3** (a) Deep groove ball bearing SKF 6207 carries a combined load of 1820 N radially and 1365 N axially at 1200 rpm. The outer ring rotates and the bearing is subjected to moderate shock. Find the average expected life of this bearing in hours. **07**
- (b) A block and tackle consists of three sheave fixed block and three sheave movable block. Take pulley c is 1.05 resistance factors. Determine load that can be lifted when pull in rope is 750 N. Determine also size of rope taking permissible tension in rope $=2.8d^2$. Where d = dia of rope in mm. Find factor of safety. **07**
- OR**
- Q.3** (a) Design a crane hook for a 60KN capacity. The hook is forged from steel having a safe normal stress of 130 N/mm^2 . **07**
- (b) Discuss design criteria for Machine Tools structures. **07**
- Q.4** (a) Discuss various types of Beds used in machine tools, their construction and design features. **07**
- (b) Discuss Economic considerations with reference to Product Design. **07**

OR

- 07**
- Q.4** Following data is given for a Full hydrodynamic bearing:
Journal diameter: 100 mm
(ii) Bearing length: 100 mm
Radial load: 75KN
(iv) Journal speed: 1440 rpm
(v) Radial Clearance: 0.15mm
(vi) Viscosity of lubricant: 16 cp
Calculate: (i) Minimum film thickness, (ii) Co-efficient of friction and (iii) Power loss in friction.
- (b) Discuss functions and requirements of spindle unit. **07**
- Q-5** (a) Select suitable rolling contact bearing for the spindle support of a machine tool **07**
having following data:
(i) Shaft diameter: 60 mm
(ii) Radial Load: 2000 N
(ii) Axial Load: 400N
(iv) Average spindle speed: 800 rpm
(v) Life of bearing: 10000 hrs.
- (b) Discuss the role of Aesthetics in product design. **07**
- OR**
- Q-5** (a) Explain geometric harmonic and logarithmic progression. Find speed steps for Following conditions. $N_{min}=12$ rpm. $N_{max}=510$ rpm $z=8$. For all progressions. **07**
- (b) Write short note on “Feed box with Tumbler gear” **07**
