

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VIII • EXAMINATION – WINTER • 2014

Subject Code: 182503**Date: 02-12-2014****Subject Name: Design of Product and Machine Tools****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.
4. Use of PSG Design Data Book is permitted.

- Q.1** Design a gear box for milling Machine having maximum and minimum speeds are 720 & 18 rpm respectively. Number of spindle speeds are 12 and drive is from an electric motor having 3.5 KW at 1400 rpm. **14**
- (i) Draw structural Diagram & Speed Chart.
 - (ii) Calculate number of teeth for all gears.
- Q.2 (a)** The following data is given for a full hydrodynamic bearing: **07**
- (i) Journal diameter: 100 mm
 - (ii) Bearing Length: 100 mm
 - (iii) Radial Load: 50 KN
 - (iv) Journal Speed: 1440 rpm
 - (v) Radial clearance: 0.12 mm
 - (vi) Viscosity of Lubricant: 16 cp
- Calculate:
- (i) Minimum film thickness.
 - (ii) Co-efficient of friction, &
 - (iii) Power lost in friction.
- (b)** Compare Hydrodynamic and Antifriction bearings in view of various parameters. **07**
- OR**
- (b)** Discuss functions and requirements of spindle unit **07**
- Q.3 (a)** Discuss General requirements of Machine Tools Design. **07**
- (b)** Explain Hydraulic Step less regulation of speed and feed rates. **07**
- OR**
- Q.3 (a)** Design a crane hook for lifting capacity of 10 tonnes. It is made from forged steel and has approximate triangular section. Take permissible tensile stress 85 N/mm² for forged steel. **07**
- (b)** Discuss various types of Beds used in machine tools, their construction and design features. **07**
- Q.4 (a)** Design a suitable ball bearing for a machine having radial load of 2000 N and a thrust load of 700 N at an operating speed of 3000 rpm. The load is steady without shock. The life of the bearing should be 15000 hours. The diameter of the shaft is 50 mm. **07**
- (b)** Discuss various Slide ways profiles with neat sketches. **07**
- OR**
- Q.4 (a)** Design a drum for winding wire rope for a crane from following data: **07**
 Load to be lifted: 3 tonnes,
 Diameter of wire rope: 25 mm,
 Height to which load is to be lifted: 10 meters,
 Assume suitable stresses for C.I.
- (b)** Discuss Economic considerations with reference to Product Design. **07**

- Q.5** (a) Discuss the observations that you made from the design of today's computer keyboard considering aspects of Product Design. **07**
- (b) Discuss the aim of speed and feed regulation in machine tool design. **07**
- OR**
- Q.5** (a) Write short note on " Antifriction Guide ways" **07**
- (b) Draw and discuss various sections of column commonly used in machine tools. **07**
