Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – WINTER 2015

Subject Code:182503 **Date:07/12/2015**

Subject Name: Design of Product & Machine Tools.

Time: 2:30pm to 5:00pm **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)** Design a gear box for Lathe Machine maximum & minimum speeds are 650 & 35 rpm respectively. Number of spindle speeds are 18 and drive is from electric motor giving 3.75KW at 1440 rpm. **14**

1. Draw structural and speed diagram
2. Sketch the layout of the gear box.
3. Calculate the number of teeth on all gears.

Q.2 **(a)** Compare Hydrodynamic and Antifriction bearings in view of various parameters. **07**

(b) Select suitable rolling contact bearing for the spindle support of a machine tool having following data: **07**

(i) Shaft diameter: 60 mm
(ii) Radial Load: 2000 N
(iii) Axial Load: 400N
(iv) Average spindle speed: 800 rpm
(v) Life of bearing: 10000 hrs.

OR

(b) Following data is given for a Full hydrodynamic bearing: **07**

(i) Journal diameter: 100 mm
(ii) Bearing length: 100 mm
(iii) 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.

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 process applied to Machine Tools. **07**

OR

Q.3 **(a)** Explain effect of Machine Tool compliance on machining accuracy. **07**

(b) A simple lifting arrangement lifts maximum of 30KN load. Design the rope for the arrangement. Take number of bands=4. **07**

Q.4 **(a)** Discuss economic criteria that are important in evaluative product design. **07**

(b) Discuss design criteria for Machine Tools structures. **07**

OR

Q.4 **(a)** Discuss the observations that you made from the design of today's mobile phones. **07**

	(b)	Discuss commonly used bed structures and wall arrangements & their applications with neat sketches.	**07**
Q.5	**(a)**	List types of Feed boxes & explain any one with neat sketch.	**07**
	(b)	Explain methods of adjusting clearance in slide ways.	**07**
		OR	
Q.5	**(a)**	Write short note on design of 'Antifriction Guide ways'.	**07**
	(b)	Write short note on "Hydraulic Step less Regulation of Speed & Feed rates"	**07**

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