Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2182503 **Date: 15/11/2018**

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. **Use of PSG design data book permitted.**

			MARKS
Q.1	**(a)**	Evaluate- in cone variators for transmission between parallel shafts, transmission ratio is varied by moving the cone in inclined direction.	**03**
	(b)	Draw various design of machine tool spindle end showing standard taper angle.	**04**
	(c)	Design gear box for universal 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. Draw structural diagram and speed chart.	**07**
Q.2	**(a)**	Evaluate- feed box with gear cone with sliding key is not suitable for heavy duty lathe feed mechanism.	**03**
	(b)	What is spindle? Explain functions of spindle unit.	**04**
	(c)	Explain hydraulic step less regulation of speed and feed rates.	**07**
		OR	
	(c)	Discuss functions and requirements of spindle unit.	**07**
Q.3	**(a)**	With suitable figure show various profiles of slide ways.	**03**
	(b)	Discuss various methods to improve dynamic stiffness of machine tool.	**04**
	(c)	Discuss functions of machine tool structure and their requirements.	**07**
		OR	
Q.3	**(a)**	Give classification of bearings.	**03**
	(b)	Discuss design procedure of sliding contact bearing.	**04**
	(c)	A 150 mm diameter shaft supporting a load of 10 kN has a speed of 1500 r.p.m. The shaft runs in a bearing whose length is 1.5 times the shaft diameter. If the diametral clearance of the bearing is 0.15 mm and the absolute viscosity of the oil at the operating temperature is 0.011 kg/m-s, find the power wasted in friction.	**07**
Q.4	**(a)**	Give advantages of rolling contact bearings.	**03**
	(b)	Discuss various types of roller bearings.	**04**
	(c)	Design a self-aligning ball bearing for a radial load of 7000 N and a thrust load of 2100 N. The desired life of the bearing is 160 millions of revolutions at 300 r.p.m. Assume uniform and steady load,	**07**
		OR	
Q.4	**(a)**	Discuss wedge film journal bearings.	**03**
	(b)	Discuss properties of lubricants used for hydrodynamic bearing.	**04**
	(c)	Write a note on machine tool chatter.	**07**
Q.5	**(a)**	Explain dynamic equivalent load for rolling contact bearings.	**03**
	(b)	Discuss design procedure of wire rope sheave.	**04**
	(c)	Discuss the economic criteria that are important in evaluative product design.	**07**

OR

Q.5	**(a)**	Discuss criteria to be considered for selecting material handling equipments.	**03**
	(b)	Give classification of steel wire rope.	**04**
	(c)	Design a crane hook for lifting capacity of 7 tones. It is made from forged steel and has approximate triangular section. Take permissible tensile stress 130 N/ mm^2 for forged steel.	**07**

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