Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 2182503 Date: 30/04/2018

Subject Name: Design of Product and Machine Tools

Time: 10:30 AM to 01:00 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)**	Enlist requirements of machine tool design.	**03**
	(b)	Explain need for speed regulation.	**04**
	(c)	Design a gear box for milling machine having maximum and minimum speeds are 720 and 18 rpm respectively. Number of spindle speed are 12 and drive is from an electrical motor having 3.5 KW at 1400 rpm. Draw structural diagram and speed chart.	**07**
Q.2	**(a)**	Explain step less regulation of speed and feed rates.	**03**
	(b)	Give general recommendation for developing the gearing diagram.	**04**
	(c)	Give classification of speed and feed boxes.	**07**
		OR	
	(c)	Discuss various sources and effects of vibration.	**07**
Q.3	**(a)**	Discuss requirements of machine tool structure.	**03**
	(b)	Give functions and types of guide ways.	**04**
	(c)	Explain basic design procedure of machine tool structure.	**07**
		OR	
Q.3	**(a)**	Give classification of bearings.	**03**
	(b)	Discus properties of sliding contact bearings.	**04**
	(c)	A full journal bearing of 50 mm diameter and 100 mm long has a bearing pressure of 1.4 N/mm^2. The speed of the journal is 900 r.p.m. and the ratio of journal diameter to the diametral clearance is 1000. The bearing is lubricated with oil whose absolute viscosity at the operating temperature of 75°C may be taken as 0.011 kg/m-s. The room temperature is 35°C. Find: (1) The amount of artificial cooling required, and (2) The mass of the lubricating oil required, if the difference between the outlet and inlet temperature of the oil is 10°C. Take specific heat of the oil as 1850 J / kg / °C.	**07**
Q.4	**(a)**	Enlist protecting devices for slide ways and explain any one of them.	**03**
	(b)	Briefly explain various shapes of slide ways.	**04**
	(c)	Explain methods of adjusting clearances in slide ways.	**07**
		OR	
Q.4	**(a)**	Enlist causes of failure of antifriction bearings.	**03**
	(b)	Give comparison between journal and antifriction bearing.	**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**
Q.5	**(a)**	Enlist criteria for selection of material handling equipment.	**03**
	(b)	Give classification of lay of steel wire ropes.	**04**
	(c)	Design a crane hook for lifting capacity of 5 tonnes. It is made from forged steel and has approximate triangular section. Take permissible tensile stress 80 N/mm^2 for forged steel.	**07**

OR

Q.5	**(a)**	Define product. Give structure of product design.	**03**
	(b)	Discuss various factors to be considered for prepare a product design specifications.	**04**
	(c)	Discuss a specific case study on product design.	**07**

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