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

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 182503 **Date:02/05/2018**

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. **PSG Design data book permitted**

Q.1	**(a)**	Design a gear box for lathe 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 also calculate number of teeth for all gears.	**12**
	(b)	Explain working of face plate variators with sketch.	**02**
Q.2	**(a)**	Prove that the loss of economic cutting speed is constant over the whole range of spindle speed in GP series.	**07**
	(b)	Discuss functions and requirements of spindle unit.	**07**
		OR	
	(b)	Explain hydraulic step less regulation of speed and feed rates.	**07**
Q.3	**(a)**	Discuss step by step design procedure of sliding contact bearing.	**07**
	(b)	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**
		OR	
Q.3	**(a)**	Discuss commonly used bed structures and wall arrangements and their applications with neat sketch.	**07**
	(b)	Give complete design procedure of eye hook has circular cross section.	**07**
Q.4	**(a)**	Discuss basic dynamic load rating and dynamic equivalent load for rolling contact bearings.	**07**
	(b)	A single row angular contact ball bearing number 310 is used for an axial flow compressor. The bearing is to carry a radial load of 2500 N and an axial or thrust load of 1500 N. Assuming light shock load, determine the rating life of the bearing.	**07**
		OR	
Q.4	**(a)**	With suitable figure explain operating principle of hydrodynamic journal bearing.	**07**
	(b)	List types of feed boxes and explain any one with neat sketch.	**07**
Q.5	**(a)**	Explain calculations of number of bend for steel wire of material handling system with appropriate sketch.	**07**
	(b)	Enlist and discuss factors to be considered for preparing product design specifications of electric iron.	**07**
		OR	

Q.5 **(a)** Explain various stages of product development process. **07**

(b) Design a crane hook for lifting capacity of 7.5 tonnes. It is made of forged steel and has approximate triangular section. Take permissible tensile stress 125 N/mm^2 for forged steel. **07**

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