Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER II (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2720903 **Date: 27/05/2016**

Subject Name: Machine Tool Design

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. **Design Data book is permitted.**

Q.1	**(a)**	Explain the recent developments in machine tool elements design.	**07**
	(b)	Design an eight speeds sliding gearbox for a drill press from the following data Minimum speed 80 RPM, maximum speed 900 RPM, motor power = 7.5 KW at 1440 RPM, reduction through V belt drive between motor and input shaft = 1:2 Draw the structural diagram and speed chart.	**07**
Q.2	**(a)**	Explain the rules and step by step design procedure of speed gearbox.	**07**
	(b)	Explain in details Design for Stiffness.	**07**
		OR	
	(b)	Explain in details Design for Strength.	**07**
Q.3	**(a)**	Explain the design of machine tool slide ways in detail.	**07**
	(b)	What is ray diagram? For 2 X 2 gear box transmitting 10 hp power which has a minimum Σ d? Where d is the diameter of shaft. Which has better layout?	**07**
		OR	
Q.3	**(a)**	Explain the design of machine tool spindles based on strength and stiffness.	**07**
	(b)	Compare the Arithmetic progression and Geometric progression laws used to find the speed steps in Gear box design of machine tool.	**07**
Q.4	**(a)**	Explain design procedure for a spindle of lathe machine.	**07**
	(b)	State the method of realizing preselective control system using: (i) Rack and Pinion (ii) Hydraulic Shifting.	**07**
		OR	
Q.4	**(a)**	Explain about the modular structures used in machine tools.	**07**
	(b)	Explain in detail with help of neat sketch the control of feed by limit switch.	**07**
Q.5	**(a)**	Show that $\sigma_b^{2/3}/\gamma$ is an index of the ability of a material to resist bending.	**07**
	(b)	Evaluate a variety of section of bed and discuss how their rigidity of bed section is increased.	**07**
		OR	
Q.5	**(a)**	Explain Control Systems for Speed and Feed Changing.	**07**
	(b)	Show, with neat sketches, atleast two methods of preloading a ball lead screw. Also deduce an expression that the magnitude of preload is normally equal to 1/3 of the total load.	**07**

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