Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 712805 **Date: 24-06-2014**

Subject Name: Design of Machine Tools

Time: 02:30 pm - 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.**

Q.1 **(a)** Differentiate between Machine and Machine tool. Explain the general requirements of machine tool design. **07**

(b) Explain the óGeometric Progressionô (GP) law for stepped regulation of speed in a multi-speed gear box. Compare it with AP and HP laws. **07**

Q.2 **(a)** Explain the Significance of the following terms in the design of a multi-speed gear box: **07**

(i) Range ratio

(ii) Number of transmission groups.

(b) Draw the ray and speed diagram for a six speed gear box having structure equation z = 2(1) 3(2). State the necessary assumptions taken. **07**

OR

(b) Explain various mechanical elementary transmission for transforming rotary motion into translatory motion. **07**

Q.3 **(a)** What are Ray and Speed diagrams? How do they differ from structure diagrams? Explain the important conclusions that can be drawn from the ray diagrams. **07**

(b) Explain the general procedure of designing a thin-walled beam structure for Strength criteria. **07**

OR

Q.3 **(a)** Draw the structure diagram and gear box layout for the following structure equations and determine the maximum transmission range for each equation. **07**

(i) 2(1) 2(2) 3(4)

(ii) 2(6) 2(1) 3(2)

(b) Explain the various design criteria that considered for design of column in a machine tool. **07**

Q.4 **(a)** Explain the various factors that affects on the selection of materials for a machine tool structures. **07**

(b) Explain design procedure of slideways for stiffness. **07**

OR

Q.4 **(a)** Explain with a neat sketch the various protecting devices used for slideways. **07**

(b) Explain the design procedure of a recirculating ball type power screw with necessary features. **07**

Q.5 **(a)** Design the spindle on the following basis: **07**

(i) Deflection of spindle axis due to bending

(ii) Deflection of spindle axis due to compliance of spindle supports.

(b) Explain about the dynamic characteristics of the cutting process. **07**

OR

Q.5	**(a)**	State the general procedure for assessing dynamic stability of EES- cutting process closed loop systems.	**06**
	(b)	Differentiate between Antifriction bearings and Sliding bearings.	**04**
	(c)	Explain any one standard geometrical acceptance test with suitable figure, measuring instruments and permissible error for shaping machine tool.	**04**

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