Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 712805N **Date: 17-06-2013**

Subject Name: Design of Machine Tools

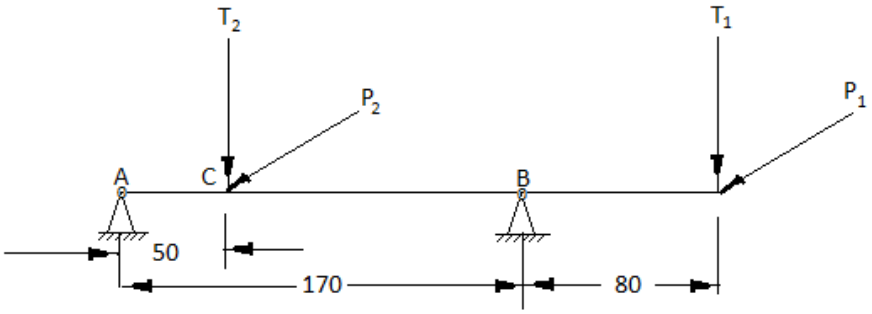
Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Assume suitable additional data if required stating clearly the assumptions made in your answer book.**
5. **Illustrate your answer with neat sketches wherever required.**

Q.1 **(a)** Explain basic considerations in design of machine tool drives. **04**

(b) **10**



ALL DIEMSIONS ARE IN mm

Design a hollow lathe spindle, if the ratio of O.D. to I.D. of spindle is 2. The power on the spindle is 4.5 kW and it is rotating at 750 rpm. The peripheral and radial forces on the spindle are P_2 = 215 kgf and T_2 = 78 kgf. A horizontal force P_1 = 210 kgf and a vertical force T_1 = 60 kgf are acting on the spindle nose. The spindle dimensions and loading are as shown in above figure.

Q.2 **(a)** What are Ray and Speed Diagrams? How do they differ from Structure Diagrams. **07**

(b) What do you understand by the term Range Ratio ? Explain how is the value of this term decided ? **07**

OR

(b) Explain the functional requirements of a spindle unit in machine tools. **07**

Q.3 **(a)** Explain the term **07**

(i) Maximum Loss of Economic Cutting Speed

(ii) Transmission Range

(b) Explain various methods for speed changing in all geared drives. **07**

OR

Q.3 **(a)** Why is geometric progression preferred over arithmetic and harmonic progression in the design of multi-stage gear box? **07**

(b) Explain the different methods used to improve the rigidity of machine tool columns with neat sketches. **07**

Q.4	**(a)**	Explain the functions of bed. How the rigidity of bed can be improved?	**07**
	(b)	Explain the recirculating ball type lead screw with neat sketches.	**07**
		OR	
Q.4	**(a)**	State the general procedure for assessing dynamic stability of EES-cutting process closed loop systems.	**07**
	(b)	Explain the classification of guide ways used in machine tools.	**07**
Q.5	**(a)**	Discuss the various acceptance tests for machine tools.	**07**
	(b)	Discuss shape and profile of machine tool slide ways with their merits and demerits.	**07**
		OR	
Q.5	**(a)**	State the functions and requirements of machine tool structures.	**07**
	(b)	What are the different sources of vibrations in machine tools? How that can be eliminated?	**07**

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