Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEM-VIII Examination May 2012

Subject code: 181908

Subject Name: Machine Tool Design (Dept Elect-II)

Date: 08/05/2012 **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.**

Q.1 **(a)** Enlist various requirements of a machine tool. One of the requirements is machine tool should provide good surface finish, which depends on Machine tool vibrations. Explain how these vibrations can be controlled. **07**

(b) What are the advantages of hydraulic drives over other types of drives? Explain in brief important elements of a hydraulic drive **07**

Q.2 **(a)** List various methods of obtaining stepless / infinitely variable drives and explain with the help of neat sketch stepless friction drive **07**

(b) Analyze in detail the use and need of parallel and diagonal ribs in the lathe bed **07**

OR

(b) Define stiffness and rigidity of a machine tool and explain how static and dynamic stiffness can be analyzed. **07**

Q.3 **(a)** What are the advantages of using geometric progression for deciding the spindle speeds? Draw the open and cross type speed structure diagram and the possible ray diagrams for these speed structure diagrams for 2 X 2 drive having speeds N_1, N_2, N_3 and N_4. **07**

(b) Explain the mechanism for control of feed drive of a copying device which copies and produces a similar contour on the job. **07**

OR

Q.3 **(a)** Discuss in brief with a neat sketch hydrodynamically lubricated slideway stating its load carrying capacity, advantages and disadvantages **07**

(b) A steel work piece of diameter 100mm is to be for rough turned using a depth of cut 1.5mm/rev. Calculate the cutting force and feed force Considering specific cutting resistance of steel = 500N/mm^2 , allowance for rake angle = 0.1, allowance for wear = 0.15, F_v / F_h = 0.25, F_r / F_h =0.30, coefficient of friction = 0.2, weight of traversing parts = 500 N and correction factor for overturning moment = 1.2
Find the power rating of the cutting and feed drives if the maximum cutting speed = 315m/min, maximum feed rate= 0.5mm/rev, maximum depth of cut = 2.5mm and mechanical efficiency of kinematic chain for cutting and feed motions = 0.8 **07**

Q.4 **(a)** List various automatic machines and explain the working of automatic cutting off machine. **07**

(b) Explain in detail with the help of neat sketch the control of feed by limit switch **07**

OR

Q.4 **(a)** Compare various shapes of slideways in respect of their advantages and **07**

disadvantages

(b) Explain the method of eliminating backlash in the feed drive mechanism **07**

Q.5 **(a)** Give detailed classification of automatic blank feeding system and explain with neat sketch any one of them **07**

(b) How minimum shaft size calculated so as to minimize size of the gearbox. **07**

OR

Q.5 **(a)** What points should be considered for designing of spindle of a machine tool? **07**

(b) List various types of bearing and explain parameters on which their selection for supporting the spindle of machine tool depends on. **07**

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