Total Marks: 70

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. - SEMESTER – VIII EXAMINATION – OCTOBER 2012 Code: 181908 Date: 25/10/2012

Subject Code: 181908

Subject Name: Machine Tool Design

Time: 02.30pm - 05.00pm

Instructions:

- 1. Attempt any five questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- **Q.1** (a) Explain design procedure of speed gear box. 07 What is ray diagram? for 2x2 gear box transmitting 10 HP power, which has **(b)** 07 the minimum Σ d? Where d is diameter of shaft. Which has better lavout? (a) Why machine tool structures are designed considering rigidity criteria, not Q.2 07 with the strength criteria? (b) Explain design procedure of feed gear box. 07 OR (b) Choice of hydraulic circuit depends on which factors? Explain selection of 07 electrical motor for a machine.
- Q.3 (a) Why geometric progression series is preferred over arithmetic progression 07 series? Discuss their merits and demerits.
 - (b) A 2x2 drive is required to be designed for transmitting 12 HP with speed 07 ranging from 400 rpm with $\varphi = 1.4$. Select suitable structural form and optimum ray diagram. **OR**
- Q.3 (a) Explain general requirement of machine tool.
 - (b) Explain machine tool design consideration for two criteria (a) Manufacturing 04 (b) Economy.
 - (C) Explain Step less regulation of speed and feed rates in machine tool. 03
- Q.4 (a) Explain function of machine tool structure and also discuss about their 07 requirement during design
 - (b) A steel work piece of diameter 80 mm is to be for rough turned using a depth of cut 1.2 mm/rev. Calculate the cutting force and feed force considering specific cutting resistance of steel = 400 N/mm², allowance for rack angle =0.1, allowance for wear =0.15, Fv/Fh=0.25, Fr/Fh=0.3, coefficient of friction =0.2, weight of transmitting parts = 400N and coefficient of factor for overturning moment =1.1

Find the power rating of the cutting feed drives if the maximum cutting speed =300 m/min, maximum feed rate =0.4 mm/rev, maximum depth of cut =2.5 mm and mechanical efficiency of kinematic chain for cutting and feed motion =0.8 **OR**

- Q.4 (a) Compare various section of bed and discuss how their rigidity of bed section 07 is increased
- Q.4 (b) Explain hydraulic circuit for shaping and grinding machine.
 Q.5 (a) List various automatic machines and explain the automatic cutting of machine.
 07
 - (b) Explain about design of hydrodynamic slideway 07

OR

Q.5(a) Explain about recirculating ball screws for machine tool.07(b) Explain design procedure for a spindle of lathe machine.07

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