Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**B.E. - SEMESTER – VIII EXAMINATION – OCTOBER 2012**

**Subject Code: 181908 Date: 25/10/2012**

**Subject Name: Machine Tool Design**

**Time: 02.30pm - 05.00pm Total Marks: 70**

## 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** |
| | **(b)** | What is ray diagram? for 2x2 gear box transmitting 10 HP power, which has the minimum Σ d ? Where d is diameter of shaft . Which has better layout? | **07** |
| **Q.2** | **(a)** | Why machine tool structures are designed considering rigidity criteria , not with the strength criteria ? | **07** |
| | **(b)** | Explain design procedure of feed gear box. | **07** |
| | | **OR** | |
| | **(b)** | Choice of hydraulic circuit depends on which factors? Explain selection of electrical motor for a machine. | **07** |
| **Q.3** | **(a)** | Why geometric progression series is preferred over arithmetic progression series? Discuss their merits and demerits. | **07** |
| | **(b)** | A 2x2 drive is required to be designed for transmitting 12 HP with speed ranging from 400 rpm with φ =1.4 . Select suitable structural form and optimum ray diagram. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain general requirement of machine tool. | **07** |
| | **(b)** | Explain machine tool design consideration for two criteria (a) Manufacturing (b) Economy. | **04** |
| | **(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 requirement during design | **07** |
| | **(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/mm$^2$,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<br>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 | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Compare various section of bed and discuss how their rigidity of bed section is increased | **07** |
| **Q.4** | **(b)** | Explain hydraulic circuit for shaping and grinding machine. | **07** |
| **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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