Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**ME - SEMESTER– II (Old course)• REMEDIAL EXAMINATION – SUMMER 2015**

**Subject Code: 1720805** **Date:14/05/2015**

**Subject Name: Machine tool design**

**Time: 02:30 pm to 5:00 pm** **Total Marks: 70**

**Instructions:**

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

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|---|---|---|---|
| **Q.1** | **(a)** | Explain the selection of electric motors in machine tools considering various factors. | **07** |
| | **(b)** | List the different CAD software used for machine tool design and explain the any one of them with specific features. | **07** |
| **Q.2** | **(a)** | Discuss the design requirements of machine tools in detail. Also explain design approach used for design of machine tools. | **07** |
| | **(b)** | Explain the importance of dynamics of machine tools structure. | **07** |
| | | **OR** | |
| | **(b)** | Explain the process of assessing dynamic stability of the equivalent elastic system (EES). | **07** |
| **Q.3** | **(a)** | Explain (i) deflection of spindle axis due to bending and (ii) deflection of spindle axis due to compliance of spindle supports in connection with spindle design (derive the necessary equations related to this). | **07** |
| | **(b)** | Explain the different shapes and materials used for machine tools slide ways / guide ways. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain the design criteria used for slide ways design. | **07** |
| | **(b)** | Explain the different materials used for machine tools spindles. | **07** |
| **Q.4** | **(a)** | Discuss the design aspects of modern CNC machine tools in detail. | **07** |
| | **(b)** | Design a machine tool gear box for headstock of a turret lathe from following given data :<br>Minimum speed = 56 r.p.m. Maximum speed = 1000 r.p.m.<br>No. of spindle speeds = 6 Speed of motor = 720 r.p.m.<br>Speed of input gearbox shaft = 236 r.p.m. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Explain the feed drives / servomechanism (any one) used in CNC machine tools. | **07** |
| | **(b)** | Explain the design procedure used for design of machine tool gear box. | **07** |
| **Q.5** | **(a)** | Explain the basic design aspects used in machine tools structure design(derive the necessary equations related to this). | **07** |
| | **(b)** | Explain the design of head stock for machine tools. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Explain the design of columns for machine tools. | **07** |
| | **(b)** | Explain the design of antifriction recirculating ball type lead screw. | **07** |

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