Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**M. E. I$^{ST}$ Semester–Remedial Examination – July- 2011**

**Subject code: 710806N**

**Subject Name: Mechanical Engineering for Mechatronics**

**Date:13/07/2011** **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.**

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|---|---|---|---|
| **Q.1** | **(a)** | Describe the design of a Mechatronic system and the modules involved. | **07** |
| | **(b)** | Explain the automatic washing machine with a block diagram. How does the mechanical system complement the electronic one? | **07** |
| **Q.2** | **(a)** | Give the classification of transducers & list the selection specification for the transducers. | **07** |
| | **(b)** | Describe the operation of a proximity sensor. | **07** |
| | | **OR** | |
| | **(b)** | What are light sensors? Describe a digital optical encoder | **07** |
| **Q.3** | **(a)** | Explain the working principle of a hydraulic motor. Describe the working of a vane motor with a neat diagram. | **07** |
| | **(b)** | What are pneumatic actuators? Discuss the different types of pneumatic actuators. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Give the general classification of hydraulic valves. Describe a pressure relief valve with a neat sketch. | **07** |
| | **(b)** | Using the symbols in a pneumatic system, draw a circuit to sequentially move a single acting cylinder and then a double acting cylinder. | **07** |
| **Q.4** | **(a)** | Explain a system model of an R-C-L (Electrical elements) circuit. How is it analogous to the mechanical system? | **07** |
| | **(b)** | Build a mathematical model for a standard Hydraulic system. Assume the parameters. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Give the mathematical model of any two types of hydraulic actuators. | **07** |
| | **(b)** | Describe the working of a DC servo motor and give its applications. | **07** |
| **Q.5** | **(a)** | What are the factors to be considered while designing guide ways? Discuss the different types of guide ways. | **07** |
| | **(b)** | What are re circulating ball screws? Why are they used in CNC machines? | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Describe with a neat sketch a planetary roller screw. | **07** |
| | **(b)** | Discuss the different types of bearings used in modern machine tools. What do you mean by preloading of bearings? | **07** |

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