

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – I • EXAMINATION – WINTER 2012****Subject code: 710806N****Date: 10-01-2013****Subject Name: Mechanical Engineering for Mechatronics (Int. Elective)****Time: 02.30 pm – 05.00 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) What do you mean by convergent scenario of the technical discipline? **06**
 (b) Explain with neat sketch the basic elements of the control system for an automatic camera. State steps that might be present in its sequential control. **08**
- Q.2** (a) What do you mean by minimum detectable signal? If the input noise of a sensor is sinusoidal in nature with a peak-to-peak value of 0.1 mv, what would be the MDS? **07**
 (b) Discuss the sensor characterization methods. How a sensor is electrically characterized? Support your answer with figures. **07**
- OR**
- (b) State the working principle of Hall effect sensor with figure. **07**
- Q.3** (a) Describe general hydraulic circuit with neat sketch. **07**
 (b) What is the process control valve size required for a valve that is required to control the flow of water when the maximum flow required is $0.002\text{m}^3/\text{s}$ & the permissible pressure drop across the valve at this flow rate is 100 Kpa? The density of water is $1000\text{Kg}/\text{m}^3$. **07**
- OR**
- Q.3** (a) Explain hydrostatic transmission. **07**
 (b) A pneumatic system is operated at a pressure of 1000Kpa. What diameter cylinder will be required to move a load requiring a force of 12KN? **07**
- Q.4** (a) Explain how a sequential valve can be used to initiate an operation only when another operation has been completed? **06**
 (b) What are thermal systems? How their modeling is done? **08**
- OR**
- Q.4** (a) Write a short note on trouble shooting of pneumatic systems. **06**
Q.4 (b) Propose a model for the metal wheel of a railway carriage running on a metal track. **08**
- Q.5** (a) Give the basic principle of design of machine tool structures for strength and for rigidity. **06**
 (b) Derive differential equations for permanent magnet d.c. motor. **08**
- OR**
- Q.5** (a) How the effect of varying tangential force helps minimizing stick slip motions? **06**
 (b) Explain preloading. How it is done? **08**
