

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-IV Examination June- 2010****Subject code: 142002****Subject Name: BASIC MECHATRONICS****Date: 21 /06 /2010****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.

Q.1 (a) What is mechatronics? Describe the key elements of the mechatronics system with day to day life example. **07**

(b) Derive equations used to make simulink model of PMDC motor showing electrical cut variables and mechanical cut variables. **07**

Q.2 (a) What are the categories of control valves? Explain any one in detail with neat sketch. **07**

(b) Explain Brushless permanent magnet DC motor control along with transistor switching circuit and switching sequence. **07**

OR

(b) Explain strain gauge load cell. **03**

Explain light sensor. **04**

Q.3 (a) Draw the simulink model of DC shunt Motor using following data: $K_a \cdot K_f = 0.015 \text{ Nm/A}$, $K_e = 0.066 \text{ Vs/Rad}$, $R = 3.3 \text{ Ohm}$, $b = 0$, $R_f = 4.75 \text{ Ohm}$, $J = 0.000003 \text{ Kg/m}^3$. **07**

(b) What are the types of stepper motors? Show how stepper motor is controlled. **07**

OR

Q.3 (a) Explain difference between microprocessor and Microcontroller. Also explain types of buses in detail of Intel 8085 Microprocessor **07**

(b) 1) Explain mechatronics design process. **04**

2) Briefly explain any one of the acceleration sensors. **03**

Q.4 (a) What is braking and what are the types of braking achieved in electrical motors. **07**

(b) Control of DC motor using darlington pair and PWM method with neat sketches of circuits & waveforms **07**

OR

Q.4 (a) Explain basic principle of DC motor, types of DC motor in detail with their characteristics. **07**

(b) Explain Repeatability & reproducibility, also explain step input and ramp input with suitable examples **07**

Q.5 (a) Explain the types of cam and followers with neat sketches. **07**

(b) What are the elements of hydraulic and pneumatic systems? Explain any one of each system in detail. **07**

OR

Q.5 (a) Write short note on force sensors also explain the working of LVDT and resistance strain gauge with neat sketches. **07**

(b) Describe the NC, CNC and DNC machines with their types and neat sketches. **07**
