

Roll No.

23003/23054

**Mechanical Engg. Manufacturing
Technology and Automation 1st Semester**

Examination – January, 2012

MECHATRONICS AND PRODUCT DESIGN

Paper : M-605

Time : Three hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions.

1. (a) Define Mechatronics. What are the key elements of Mechatronics system ? Explain with example. 10
- (b) Draw the circuit of an S-R flip flop using NAND gates. Modify it to include clock. Derive J-K circuit from S-R flip flop circuit & explain its, truth table. 10
2. (a) Explain the addressing mode of 8085 with suitable example for each. 10

- (b) Explain the working of inverting, non-inverting and summing amplifiers. 10
3. (a) What is a strain gauge ? Explain with neat sketches, the wire wound, Foil-type and capacitive strain gauge. 10
- (b) What is Mechanical Actuation System ? What are the devices used in such systems ? 10
4. (a) Give a comparison between analog type and digital type instruments. 10
- (b) Draw the circuit of a counter type A/D converter and explain its operation. 10
5. (a) Explain briefly a mathematical model of a car moving on a road. 10
- (b) Discuss briefly the various fluid systems building blocks. 10
6. Derive a differential equation for hydraulic mechanical system of lifting load. 20
7. (a) How the use of MATLAB and SIMULINK softwares are used in designing mechatronics product ? Explain with example. 10
- (b) Explain the working of ball screws, solenoids, line actuators and controllers in CNC machines. 10

8. Write down a short explanation to express your understanding on any *five* of the following terms : 4 × 5 = 20

- (a) Tactile sensor
- (b) LVDT
- (c) Filtering
- (d) Relays
- (e) Microcontrollers
- (f) Feed forward control system
- (g) Temperature sensors