Roll No. .....

23054

M. Tech. 1st Semester (Mech. Engg.)
(Manufacturing & Automation)
Examination – January, 2016
MECHATRONICS AND PRODUCT DESIGN

Paper : 833/M-605-A

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. All questions carry equal marks.

1. Define Mechatronics. What are the central elements of Mechatronics system ? Draw the ladder diagram of a NAND system. 20

2. (a) Explain about the mechanical system design of an automatic car park barrier. 10

(b) Explain the significance of amplifiers and describe the working of inverting, non-inverting and summing amplifiers. 10

3. (a) What is a proximity switch ? State its two applications. 10

(b) What is a strain gauge ? Explain types, advantages, disadvantages and the application of strain gauges. 10

4. Draw a labeled diagram of 8085 microprocessor showing pin configuration. How ALU of 8051 functions ? 20

5. (a) What is a stepper motor ? State its working principle. Give *two* applications. 10

(b) Explain with suitable example the open loop control system and closed loop control system. 10

6. (a) Explain the use of data acquisition system. Draw the circuit of a counter type A/D converter and explain its operation. 10

(b) Derive the model equation of a mechanical system with spring, mass and damper. 10

7. (a) Discuss briefly the various fluid systems building blocks. 10

(b) Derive a differential equation for hydraulic mechanical system of lifting load. 10

8. Explain the working of ball screws, solenoids, line actuators and controllers in CNC machines. 20
