

## B. TECH.

## THEORY EXAMINATION (SEM-VI) 2016-17

## MECHATRONICS

Time : 3 Hours

Max. Marks : 100

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

SECTION-A

1 Attempt all parts: (2 x 10=20)

- a) Differentiate between Sensor & Transducer. Give one example of each.
- b) What is the principle of operation of Eddy current sensors?
- c) Why Signal Conditioning is required?
- d) Define Data Acquisition.
- e) Draw the symbol of 4/2 DCV and 4/3 DCV.
- f) What for Rack & Pinion used in Mechanical Actuation system?
- g) Give difference between Serial and Parallel Communication Interface.
- h) Draw Ladder Logic for AND & OR logic gates. Give their truth tables also.
- i) Why closed-loop controllers are preferred in automating a system?
- j) Derive a mathematical model for spring-mass-damper system.

SECTION-B

2 Attempt any FIVE from the following: (10 x 5 = 50)

- a) What is an encoder? How incremental encoder can be used to measure velocity?
- b) With the help of schematic diagram, explain the data acquisition system. What are the roles of filtering and amplification of signals in signal conditioning?
- c) Differentiate between Direction Control Valve and Process Control Valve.
- d) What are the three types of Pressure Control valve? Explain with the help of suitable diagram.
- e) Write down the system equation for Torsional spring-mass-damper system.
- f) With the help of neat sketch, explain the working and application of Electric Drive System.
- g) Discuss the architecture of a microcontroller.
- h) Discuss the architecture of PLC in detail. A motor is switched on by pressing a spring-return push button start switch, and the motor remains on until another spring-return push button stop switch is pressed. Draw the ladder logic for the same.

SECTION-C

Attempt any TWO from the following: (15 x 2 = 30)

3. Discuss a case study on Automobile Engine Control.
4. What are Micromechanical Systems? Explain the case study on Computer Printer.
5. Discuss operating principle of NC Machine in detail.