

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018

INDUSTRIAL AUTOMATION AND MECHATRONICS

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Define automation.
2. Name any two mechatronics devices.
3. Give the names of any two temperature sensors.
4. Draw the symbol of a 4/2 solenoid operated DCV.
5. Differentiate between micro controller and micro processor.

(5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. List out the advantages of automation.
2. Explain the term non-linearity error in sensors.
3. Explain debouncing in mechanical switches. What is its software solution ?
4. Explain the working of an electric relay with a neat sketch.
5. Explain with a neat sketch, the working of a vane motor.
6. Draw the block diagram showing the architecture of a PLC.
7. What are the factors to be considered for the selection of a PLC ?

(5×6 = 30)

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

- III (a) Differentiate between open loop and closed loop control system. 8
 (b) Explain the advantages and disadvantages of mechatronics system. 7

OR

- IV (a) Differentiate between fixed and programmable automation. 8
 (b) Distinguish between traditional and mechatronics design with suitable example. 7

UNIT — II

- V (a) Explain how a linear variable differential transformer (LVDT) be used for measuring displacements. 8
 (b) Differentiate between the following dynamic characteristics of a sensor.
 (i) Response time (ii) Time constant 7

OR

- VI (a) Explain the working of a turbine flow meter with a suitable sketch. 8
 (b) List out the factors to be considered while selecting a suitable sensor. 7

UNIT — III

- VII (a) Draw the symbol of a pressure sequence valve and explain how it can be used for sequencing two double acting cylinders. 8
 (b) Explain the working of a thyristor (SCR) as a solid state switch. Also draw its voltage current characteristics. 7

OR

- VIII (a) Explain with a block diagram, the working of a hydraulic actuation system. Also draw the circuit with symbols. 8
 (b) Differentiate between variable reluctance and permanent magnet stepper motor. 7

UNIT — IV

- IX (a) Explain any four fault detection techniques used in measurement, control and data communication systems. 8
 (b) Explain the use of timers in PLC programming with suitable examples. 7

OR

- X (a) Compare the mechanical and mechatronics design solutions for a timed switch. 8
 (b) Write a ladder program to operate 3 output lamps from the following data. Three input switches, A, B and C are connected to the PLC. The output lamp 1 should switch on, if there is at least two inputs. The lamp 2 should switch on only, if all the three inputs are switched on. If all the input switches are in off position lamp 3 should be switched on. 7