# 17660

**21415**

**3 Hours / 100 Marks** **Seat No.** | | | | | | | | |

***Instructions*** : (1) All Questions are *compulsory*.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
(5) Use of Non-Programmable Electronic Pocket Calculator is permissible.
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

**1. (A) Attempt any THREE :** **3 × 4 = 12**

(a) Explain the scope of Mechatronics in industry. Give any four examples.
(b) Differentiate between 'Sensor' and 'Transducer'.
(c) Explain electronic PID controller with the help of diagram.
(d) State the working principle of 'solenoid valve' with neat sketch.

**(B) Attempt any ONE :** **1 × 6 = 6**

(a) Explain the construction and working of LVDT accelerometer with the help of diagram.
(b) What is 'Part Programming' ? Enlist basic requirements for Part programming with suitable example.

**2. Attempt any TWO :** **2 × 8 = 16**

(a) What is the significance of signal conditioners ? Explain the need of following in Mechatronic system
  (i) Isolator
  (ii) Filter
  (iii) Amplifier
  (iv) Data converter

(b) Develop a ladder diagram / programming using PLC for following :
  (i) To ON-OFF a motor
  (ii) To control conveyor belt motor.

(c) What is belt ? Explain the operation of belt. List the different types of belt & give one example of each.

**P.T.O.**

**3. Attempt any FOUR :** **4 × 4 = 16**

(a) When to select 'P-I' controller ? Give any two applications of P-I controller.

(b) Explain the Mechatronics system with the help of block diagram and labelled the various elements.

(c) State the working principle of capacitive sensor with neat diagram.

(d) Differentiate between pneumatic and hydraulic system.

(e) Enlist any eight applications of 'ROBOT'.

(f) Explain in brief, how antilock braking system works.

**4. (A) Attempt any THREE :** **3 × 4 = 12**

(a) Explain in brief 'Hall effect sensor'.

(b) What are the advantages and disadvantages of Mechatronics System ?

(c) Define 'PLC' and draw its labelled diagram.

(d) How robots are classified on the basis of work place ? Give one example of each Robot.

**(B) Attempt any ONE :** **1 × 6 = 6**

(a) State the working principle of Gear and give its applications.

(b) What is 'MEMS' ? Explain with neat block diagram.

**5. Attempt any FOUR :** **4 × 4 = 16**

(a) State the principle of 'Tachogenerator' with the help of diagram.

(b) Enlist the advantages of Microcontroller (any four).

(c) What are 'Linear Actuators' ? State any four applications.

(d) Explain how MEMS accelerometer is used as airbag sensor for car system.

(e) Draw block diagram for CNC drilling machine and explain its working.

(f) How PLC based automatic car parking system works ? Explain in brief.

**6. Attempt any FOUR :** **4 × 4 = 16**

(a) List and explain the components of a hydraulic system.

(b) What is 'Degree of Freedom' ? List the functions of end effecter.

(c) Explain in brief Cartesian robot.

(d) Draw the block diagram of robot system. Explain the role of sensor in robot system.

(e) Draw the block diagram of PLC based car parking system. Explain its working.

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