16172

3 Hours / 100 Marks   Seat No.

Instructions : (1) *All questions are **compulsory**.*
(2) *Answer **each** next main question on a **new** page.*
(3) *Illustrate your answers with neat sketches **wherever** necessary.*
(4) *Figures to the **right** indicate **full** marks.*
(5) *Assume suitable data, if **necessary**.*
(6) *Use of Non-programmable Electronic Pocket Calculator is **permissible**.*
(7) *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) State the importance of mechatronics in various field of engineering.

   b) Explain in brief mechatronics. List its applications.

   c) What is optical encoder ? List its types.

   d) Distinguish between transducer and sensor.

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

   a) List advantages and disadvantages of CNC based drilling machine.

   b) Draw block diagram of practical ABS system. State its advantages.

2. Attempt **any four** :   **(4×4=16)**

   a) Draw and explain general block diagram of Robotic system.

   b) Explain in brief cam. State the types of cam. List two applications.

   c) Explain working of Belt. List types of Belt.

   d) Draw and explain electronic PID controller.

   e) Define sensor, signal conditioner, controller and actuator in mechatronic system.

   f) List out various position sensors. Explain any one in detail.

3. Attempt **any four** :   **(4×4=16)**

   a) Draw and explain Fuzzy logic controller.

   b) Compare Electronic controllers with pneumatic controllers.

   c) List different components of Industrial Robot. State functions of any two.

   d) Define DOF. Draw and explain six degrees of freedom.

   e) Draw and explain Rack and Pinion assembly.

   f) Classify bearing and explain any one in brief.

P.T.O.

Marks

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

    a) Draw block diagram of microcontroller based pick and place Robot. List the four movements required by this Robot.

    b) List advantages and applications of PLC.

    c) Draw block diagram of pneumatic system showing its basic components. State the functions of control value and air actuator.

    d) Explain the principle of operation of solenoid. State two parameters on which selection of solenoid is based.

  B) Attempt **any one** :   (1×6=6)

    a) Draw and explain schematic of PLC based automatic car parking barrier system.

    b) Draw a ladder diagram for following conditions of conveyor motor.

      I) Start push button to start the conveyor motor.

      II) Bottle moves past the photo sensor and the conveyor motor stops automatically after count of 25 bottles.

      III) The counter is to be reset to zero after 25 bottles.

      IV) The conveyor motor can be stopped manually at any time.

      V) The accumulated count of the counter is reset manually by means of count reset button.

5. Attempt **any four** :   (4×4=16)

  a) Draw and explain the working principle of Linear Velocity Transducer (LVT).

  b) Explain working principle of stroboscope with neat sketch.

  c) Draw and explain pneumatic proportional controller.

  d) Draw and explain block diagram of MEMS.

  e) List advantages and disadvantages of MEMS.

  f) For a signal conditioner explain the terms linearization and signal conversion.

6. Attempt **any four** :   (4×4=16)

  a) Give two applications of each :

    1) Eddy current sensor

    2) Optical sensor.

  b) Draw and explain implementation of proportional type Hydraulic controller.

  c) List different types of Gears and state two applications of each.

  d) Draw and explain the working principle of MEMS accelerometer.

  e) Draw a ladder diagram for

    I) To ON-off a motor with push button.

    II) To off a motor after 5 sec.

  f) Explain the working principle of capacitive sensor with neat diagram.

_____