

17660

**21819**

**3 Hours / 100 Marks**

Seat No.

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- 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. Attempt any FIVE :**

**20**

- (a) List any four advantages of Mechatronic System.
- (b) Distinguish between a transducer and a sensor.
- (c) Draw the block diagram of CNC based drilling machine.
- (d) Describe the implementation of proportional type of controller using hydraulic controller.
- (e) Draw block diagram of Robot system. List functions of end effector.
- (f) State and elaborate the importance of mechatronics in various field of engineering.
- (g) State the applications of rack and pinion.

**2. Attempt any FOUR :****16**

- (a) Draw and explain LVDT accelerometer.
- (b) Describe the working of PLC based automatic car park barrier system with block diagram.
- (c) Explain MEMs microactuator with neat diagram.
- (d) Draw the PLC ladder diagram of ON-OFF control of lamp. Write the input and output devices.
- (e) Compare pneumatic and hydraulic system.
- (f) Draw and describe Hall effect sensor.

**3. Attempt any FOUR :****16**

- (a) Draw and explain fuzzy logic controller.
- (b) List velocity sensors and explain any one type with neat diagram.
- (c) State four advantages of CNC system. What are G codes and M codes ?
- (d) State the working principle of 'Solenoid Valve' with neat sketch.
- (e) Explain the construction of spherical robot in brief. State its degree of freedom.
- (f) Give advantages and disadvantages of CNC based drilling machine.

**4. Attempt any TWO :****16**

- (a) State the working principle of Cam. List its types. Give any four applications of Cam.
- (b) Explain microcontroller based antilock brake system with neat block diagram.
- (c) Explain with sketch torque measurement using (i) Stroboscope method, (ii) Capacitive method.

**5. Attempt any FOUR :****16**

- (a) State the working principle of capacitive sensor with neat diagram.
- (b) State the function of 'Signal Conditioner' in measurement system.
- (c) How a PLC can be used to handle an analog input ? Justify.
- (d) Draw and explain pneumatic PID controller.
- (e) Classify the robots based on workspace.
- (f) Write a note on 'Evolution of Mechatronics'.

**6. Attempt any TWO :****16**

- (a) Describe with sketch (i) Poppet valve, (ii) Spool valve.
  - (b) Draw construction of Cartesian and cylindrical robots and explain their degree of freedoms.
  - (c) Develop a ladder diagram for to control conveyor belt motor equipped with the :
    - (i) Counter of item.
    - (ii) Start & Stop functions.
    - (iii) Change of direction function.
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