11819

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) *Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.*

Marks

1. A) Attempt **any three** of the following :   **12**

    i) State and elaborate the importance of mechatronics in various field of engineering.

    ii) Define :

       a) sensor

       b) transducer with examples of each.

    iii) Draw PI controller using OP-AMP and explain in brief.

    iv) Explain the basic components of pneumatic systems with neat sketch.

   B) Attempt **any two** of the following :   **8**

    i) State the working principle of cam. List its types. Give any two applications of cam.

    ii) What is 'Part Programming' ? Enlist basic requirements for Part programming with suitable example.

    iii) Draw and explain strain guage accelerometer.

2. Attempt **any four** of the following :   **16**

   a) With diagram, explain working hall effect sensor.

   b) Explain in brief spherical Robot. Why it is called as spherical robot ?

   c) Explain operation of solenoid valve with neat diagram.

   d) Give the block diagram of CNC based drilling machine.

   e) Draw and explain the working of inductive and capacitive sensors.

   f) Draw and explain the block diagram of fuzzy logic controller.

Marks

3. Attempt **any four** of the following : 16

   a) What is the significance of signal conditioners ?

   b) State the types of Actuators. Draw and explain single acting cylinder.

   c) Explain in brief, how antilock braking system works.

   d) Draw block diagram of robot system. List functions of an end effector.

   e) Explain how the piezoelectric effect is used to measure acceleration. List the features of piezoelectric accelerometer.

   f) State the function of PLC. Draw a block diagram of basic PLC configuration.

4. Attempt **any four** of the following : 16

   a) Explain the mechatronics system with the help of block diagram and labelled the various elements.

   b) Explain the classification of robots on the basis of work place ? Give one example of each Robot.

   c) Draw the schematic and ladder diagram of PLC based automatic car park barrier system.

   d) Explain the implementation of proportional type hydraulic controller.

   e) List various photoelectric sensors. Explain any one of them in detail.

   f) Explain fuzzy logic control in fully automatic washing machine.

5. Attempt **any four** of the following : 16

   a) Draw block diagram of pick and place Robot. List the required movements of it.

   b) Explain MEMS accelerometer used as air bag sensors for car safety.

   c) Draw and explain LVDT accelerometer.

   d) Draw and explain PLC ladder diagram for ON-OFF control of lamp.

   e) Explain how torque is calculated using Torsion-bar torque transducer.

   f) Differentiate between pneumatic and hydraulic system.

6. Attempt **any four** of the following : 16

   a) Describe poppet valve with neat sketch.

   b) Give general configuration of CNC system. Give advanatges of CNC (Any two).

   c) Explain with various components of MEMS with neat diagram.

   d) Explain the concept of degree of freedom of Robot with sketch.

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

   f) State and explain working principle of tacho generator.

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