**24225**

**3 Hours / 70 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.  Attempt any FIVE of the following :**  **10**

(a)  Sketch neat block diagram of real time mechatronics system.

(b)  Draw neat symbol of 5/2 – way spring return DCV and specify meaning of 5 and 2.

(c)  Define Sensor. Enlist any two sensors.

(d)  Give two advantages & two disadvantages of mechatronics system.

(e)  State any two-applications of Robot.

(f)  Enlist types of Belt & draw any one of them.

(g)  List types of End effector.

**2.  Attempt any THREE of the following :**  **12**

(a)  Describe Rack & Pinion with neat sketch.

(b)  Give four G-code and M-code in CNC-Programming with function.

(c)  Describe the mechatronics system architecture with neat diagram.

(d)  Compare Pneumatic and Hydraulic system. (Any four)

**3.** **Attempt any THREE of the following :** 12

    (a)   Draw and describe photo-electric sensor.

    (b)   Describe spool type pneumatic DCV.

    (c)   Define Gear. State different types of Gear.

    (d)   Draw & explain block diagram of Robot.

**4.** **Attempt any THREE of the following :** 12

    (a)   Describe working principle of Globoidal CAM with neat sketch.

    (b)   Draw neat labelled diagram of puppet valve.

    (c)   Describe working of Strain Gauge.

    (d)   Describe following components of mechanical system with neat sketch. Write force equation :

        (i) Spring (ii) Damper (iii) Mass

    (e)   Describe significance of Degree of Freedom (DOF) in Robotics.

**5.** **Attempt any TWO of the following :** 12

    (a)   Describe working principle of LVDT for its 3-cases with neat sketch, also draw its characteristics.

    (b)   Describe CNC-machine operating for Drilling operation with neat block diagram.

    (c)   Draw neat constructional diagram of following :

        (i)    Single Acting Cylinder

        (ii)   Double Acting Cylinder

        (iii)  Gear type Rotory Actuator

**6.** **Attempt any TWO of the following :** 12

    (a)   Draw & describe Electromagnetic Transducer.

    (b)   Draw block diagram of Hydraulic system & enlist the components which are present in Hydraulic system & not present in pneumatic system.

    (c)   Describe microcontroller based pick and place Robot.

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