Printed Page:-   **Subject Code**:- **AME0512**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: V - CARRY OVER THEORY EXAMINATION - APRIL 2023

Subject: Mechatronics Systems

 Time: 3 Hours   **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

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SECTION A   **20**

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1. Attempt all parts:-

1-a.   The world 'Mechatronics' is the combination of_____   (CO1)   1

           (a) Mechanics + Electronics

           (b) Mechanics + Electrical

           (c) Mechanics + Control

           (d) Electrical + Electronics

1-b.   'Sophia' is a example of_____ (CO1)   1

           (a) Programming Language

           (b) Mobile Robot

           (c) Humanoid Robot

           (d) Co-bot

1-c.   _____ is/are the properties of a sensor. (CO2)   1

           (a) Sensitivity

           (b) Accuracy

           (c) Range

(d) All of the mentioned

1-d. _____ Sensors measure the distance to the target by measuring the time between the emission and reception. (CO2)   1

       (a) Ultrasonic

       (b) Proximity

       (c) Touch

       (d) None of these

1-e. Which of the following motor rotates in discrete angular steps? (CO3)   1

       (a) Servo motor

       (b) DC motor

       (c) Stepper motor

       (d) Linear Induction Motor (LIM)

1-f. Which of the following is not an example of actuator? (CO3)   1

       (a) Electric motor

       (b) Servo motor

       (c) Stepper motor

       (d) Relay

1-g. Which one of the following is an energy transfer element of electrical power system? (CO4)   1

       (a) High pressure air

       (b) High pressure liquid

       (c) Electrical motor

       (d) None of the above

1-h. Which one of the following components is used to store certain volume of air? (CO4)   1

       (a) Air tank

       (b) Compressor

       (c) Valves

       (d) FRL

1-i. _____ is the example of open loop system. (CO5)   1

       (a) Thermostat Heater

       (b) Washing Machine

       (c) Electric Fan

(d) Modern Air Conditioner

1-j.   Which of the following are components of PLC? (CO5)   1

    (a) Microprocessor

    (b) I/O Devices

    (c) Memory

    (d) All of the mentioned

2. Attempt all parts:-

2.a.   Name the few emerging areas of mechatronics.   (CO1)   2

2.b.   Explain ADC. (CO2)   2

2.c.   What is stepper motor? (CO3)   2

2.d.   List any four types of pressure control valves. (CO4)   2

2.e.   What is meant by analog & digital system? (CO5)   2

SECTION B   30

3. Answer any <u>five</u> of the following:-

3-a.   Define closed and open loop system with diagram.   (CO1)   6

3-b.   What is the role of mechatronics in manufacturing. (CO1)   6

3-c.   Explain low pass, high pass, band pass filter. (CO2)   6

3-d.   Explain the working principle and application of Inductive Proximity sensor. (CO2)   6

3.e.   Define actuator. Explain the different types of actuators with diagram. (CO3)   6

3.f.   Discuss at least 10 graphical representations used in hydraulic system. (CO4)   6

3.g.   What Is PLC? Write the advantage and disadvantage of PLC. (CO5)   6

SECTION C   50

4. Answer any <u>one</u> of the following:-

4-a.   Explain Mechatronics system with its scope and application. (CO1)   10

4-b.   Write short notes on Robotics, Autotronics and Avionics with example. (CO1)   10

5. Answer any <u>one</u> of the following:-

5-a.   Explain transmission signal with its types. (CO2)   10

5-b.   Explain the working principle of LVDT with neat sketch. (CO2)   10

6. Answer any <u>one</u> of the following:-

6-a.   What is the concept of Electromechanical actuation? Explain the working of solenoid operated valves. (CO3)   10

6-b. Explain the working principal of stepper motor with neat sketch. And also give its advantages and disadvantages. (CO3) — 10

7. Answer any <u>one</u> of the following:-

7-a. Sketch and explain the working of hydraulic actuation system. (CO4) — 10

7-b. What is the objective of directional control valve? Design a circuit for 5/3 directional control valve. (CO4) — 10

8. Answer any <u>one</u> of the following:-

8-a. What is the function of controller? Discuss any one type of controller in detail. (CO5) — 10

8-b. What is Ladder Logic programming? Write a Ladder program for AND logic gate. (CO5) — 10