ROBOTICS AND AI
Instructor: Saptarshi Jana

Class X
Assignment 5-10

Due Date: 07.11.25   **60 marks**

INSTRUCTIONS

- *Don't copy*

- *Don't use AI*

Assignment 5
Design and Visualize in TinkerCad

Question 1: Design a 3D model of a Robot arm with 3 R joints (Revolute) in Tinkercad. *(10 marks)*

Tinkercad Credentials: 1. https://www.tinkercad.com/joinclass/F2TLHGIR9
2. Join with log-in code: <Yourname without any spaces>

Assignment 6
Sensors in Robotics

Question 1: List and explain any four types of sensors used in robotics with one example each. *(3 marks)*

Question 2: Differentiate between Internal and External sensors in a robot. Give two examples of each type. *(3 marks)*

Question 3: Describe how a proximity sensor and a vision sensor function in a warehouse robot to ensure safe navigation. *(4 marks)*

Assignment 7
Actuators

Question 1: Define actuators and state their importance in robotic systems. *(3 marks)*

Question 2: Classify actuators into linear and rotary types. Explain each with suitable examples. *(3 marks)*

Question 3: Explain how actuators work in combination with sensors to perform a pick-and-place operation in an industrial robot. *(4 marks)*

Assignment 8
Controller in Robotics

Question 1: What is a controller in a robotic system? State its primary function. *(3 marks)*

Question 2: Differentiate between manual and automatic control systems with examples. *(3 marks)*

Question 3: Draw and label a block diagram showing Input → Controller → Robot → Feedback, and explain how the system maintains accuracy. *(4 marks)*

Assignment 9
Integration of Sensors, Actuators and Controller

Question 1: Explain how sensors, actuators, and controllers are interrelated in a robotic system. *(3 marks)*

Question 2: Using an example, describe how the angular position of a robotic arm is measured and controlled. *(3 marks)*

Question 3: Design a simple conceptual workflow showing how input data from sensors is processed by the controller to drive actuators in a mobile robot avoiding obstacles. *(4 marks)*

Assignment 10
Python: 2 - Control Flow

Question 1: Write a Python program to input three numbers and find the greatest and smallest among them. **Hint:** Use conditional statements (`if`, `elif`, `else`). Don't use max(), min()*(3 marks)*

Question 2: Write a Python program that inputs marks of five subjects, calculates the average, and displays the grade according to the following rules:
(4 marks)

Average Marks	Grade
90 − 100	A+
80 − 89	A
70 − 79	B
60 − 69	C
50 − 59	D
Below 50	Fail

Question 3: Write a Python program to print a pyramid pattern of stars (∗) using loops. **Hint:** Use nested `for` loops — one for rows and another for spaces and stars. *(3 marks)*

Example:

```
If number of rows = 5, then output:
    *
   ***
  *****
 *******
*********
```