

May, 2023

**B.Tech.(EEIoT) - VI SEMESTER
Robotics & Automation (EEN-OE2-602)**

Time: 3 Hours

Max. Marks:75

- Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.

PART -A

- Q1 (a) Define the degree of freedom. (1.5)
- (b) What is the application of neural networks? (1.5)
- (c) What is meant by pitch, yaw and roll? (1.5)
- (d) Differentiate between Prismatic joint, Revolute joint & Spherical joint. (1.5)
- (e) What is fuzzy logic and Boolean logic? (1.5)
- (f) Name some feedback devices used in Robotics. (1.5)
- (g) Define Artificial Intelligence (AI). (1.5)
- (h) How does Virtual Reality Work? (1.5)
- (i) Compare the differences between SLAM and Localization. (1.5)
- (j) Briefly explain the following terms: (i) Payload (ii) Actuator (iii) Accuracy. (1.5)

PART -B

- Q2 (a) Classify the robots according to the coordinates of motion. With a sketch and example, explain the features of each type. (10)
- (b) What is the difference between microrobots and nanorobots? (5)
- Q3 (a) Discuss the salient features of stepper and servo motor with limitations. (5)
- (b) Describe the types of end effector & gripper mechanisms with simple sketches. (10)
- Q4 Explain the various programming methods used in robotics with examples and features of each. (15)
- Q5 (a) A frame {B}, which is rotated relative to frame {A} about Z by 30 degrees, translated 10 units in X_A , and translated 5 units in Y_A . Find A_P , where $B_P = [3.0, 7.0, 0]^T$. (5)
- (b) Explain the terms a) Compound Transformation b) Rotational Operator c) Translational Operator. (10)
- Q6 (a) How artificial intelligence, Machine Learning & Deep learning differ from each other? (10)
- (b) Figure shows a two link planar manipulator with two revolute joints. it also called RR or 2R mechanism. Double hash mark indicated on the axes show that they are

parallel. Assign link frames to manipulator and give the Denavit-Hertenberg parameters.

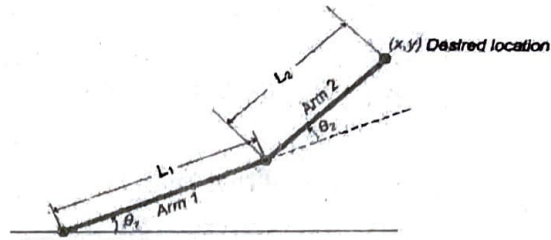


Fig1. Two link planar manipulator.

Q7

Write short notes on the followings:

(15)

- a) Types of control architectures
- b) Machine learning and AI
- c) Tele-robotics and Virtual Reality
