

Time: 3 Hours

Total Marks: 80

N. B.

- 1) Question No.1 is compulsory.
- 2) Attempt any three questions from remaining five questions.
- 3) All questions carry equal marks.

- Q1. Write notes on any FOUR [20]
- (a) Recent developments and future trends of robots
 - (b) D-H parameters
 - (c) Digitization of machine vision
 - (d) Economics of Robotic system
 - (e) Robot task planning
- Q2. (a) Mention various types of sensors used in robotic system. Explain any one of the temperature sensor with neat sketch. [10]
- (b) Enlist the challenges in two legged balancing in humanoids. How are these overcome in modern humanoids? [10]
- Q3. (a) Draw neat sketch of any one of the AC motor used in robots. Discuss working principle and applications of it. [10]
- (b) Discuss robot motion and task level language. [10]
- Q4. (a) Obtain the Homogeneous Transformation Matrix (HTM) of Forward Kinematics of three-link arm robot as shown in Fig.4 (a) [10]

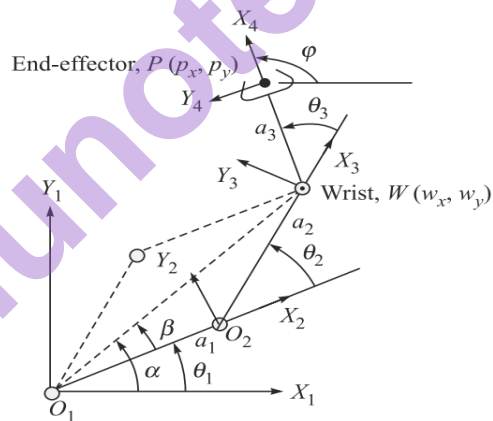


Fig. 4a: A three-link arm robot

- (b) Discuss image processing and analysis in the context of machine vision. [10]
- Q5. (a) Explain problem solving approach of intelligent robot with an industrial example. [10]
- (b) Discuss assembly and inspection operations performed by the industrial robot with a suitable example. [10]
- Q6. (a) Discuss state space search in industrial robot. [10]
- (b) Explain robot applications in manufacturing and material transfer. [10]
