Question Paper

Exam Date & Time: 13-May-2023 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES
END SEMESTER THEORY EXAMINATION - MAY 2023
IV SEMESTER B.Sc (Applied Sciences) in Engg.
INDUSTRIAL ROBOTS [IMET 244 - S2]

Marks: 50 **Duration: 180 mins.**

Answer all the questions.

Missing data, if any, may be suitably assumed

1) A) Explain the taxonomy of robots based on motion capability. Describe the classification of robots with relevant example. (3)

B) Explain different types of joints and different configurations of robot (with work volume, joint notation scheme) with the help of neat sketches. (3)

C) Sketch the manipulators for LLL, TLL, TRL and TRR joint schemes. Draw the work envelope and give an example for each. (4)

2) A) Consider the two link manipulator shown in Figure 1 (4)

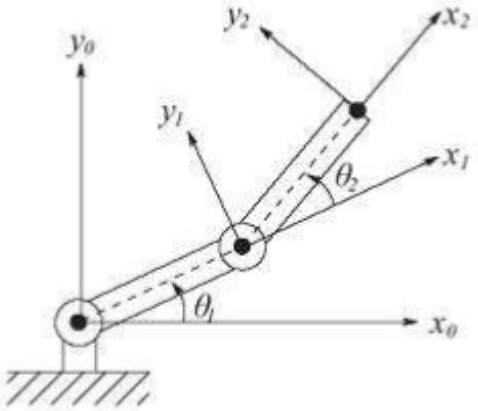

Figure 1.

If coordinates are given as-
$O(0,0)$, $P1(\sqrt{3}, 1)$, $P2(1 + \sqrt{3}, 1 + \sqrt{3})$
Calculate the link lengths L_1 and L_2.

B) Illustrate different motion types generally considered for path control of an industrial manipulator with suitable examples. Explain the rules while defining a robot trajectory? (3)

C) Explain the types of power systems needed to drive a robot. (3)