Assignment No. 1
CLO-1 (C2)
EE-381 – Robotics-1

Deadline: 28th Feb 2024

Author 1: Name: _____ CMS No.: _____

Author 2: Name: _____ CMS No.: _____

Note: Submit the solution of the assignment in hard form.

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1. **Demonstrate** the following properties of rotation matrix:
   - Columns and rows of the rotation matrix are mutually orthogonal. [5 marks]
   - $\left(R_j^i\right)^T = \left(R_j^i\right)^{-1}$. [5 marks]
   - $R(\theta_1)R(\theta_2) = R(\theta_1 + \theta_2)$. [5 marks]

2. **Identify** the type of Robot Configuration that the ABB 140 Robot (see Fig.1) has. Also, plot the work envelope of robots shown in Fig. 1 and Fig. 2. [10 marks]

Fig. 1: ABB 140 Robot.

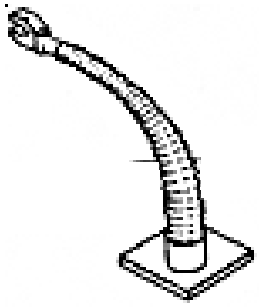

Fig. 2: Spine configuration of robot.

3. Drive the 3D rotation transformation matrix around x, y and z axis without using the dot product and **explain** through plotting frames. [15 marks]

Authors Contributions. Mention each author's contribution at the end of each question (**Mandatory**).

Author 1.
Author 2.

Copying. Copying is highly discouraged and it will lead to **a significant loss (90-95 %) of marks.**

* Copying includes using **sentences, variables, code, formats from others and AI tools**. Discussion is appreciated, but attempt the tasks on your own (which would make it look original).