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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- SEPTEMBER 2018

B. Tech 7th Semester

COURSE CODE: 17B1WEC733 MAX. MARKS: 15

COURSE NAME: ROBOTIC SYSTEMS AND CONTROL

COURSE CREDITS: 3 MAX. TIME: 1 Hrs.

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Make assumptions incase if find any information missing.

1. [4 marks] Define a robotic control system. Explain all the sub-systems of a robot in brief. Which of the basic parts of a robot unit would include the computer circuitry that could be programmed to determine what the robot would do?

2. [4 marks] Describe internal state sensors and external state sensors. Explain in detail the working principle of any one internal state sensor and one external state sensor.

3. [4 marks] Why inverse kinematics problem is not unique and direct kinematics problem is unique? Justify your answer with sketches.

4. [3 marks] Consider the three degree-of-freedom planar robot arm shown in figure below. The arm consists of one fixed link and three movable links that move within the plane. All the links are connected by revolute joints whose joint axes are all perpendicular to the plane of the links. There is no closed-loop kinematic chain; hence, it is a serial link mechanism. Formulate the forward-kinematics equations relating the position and orientation of a robot end-effecter, or any significant part of the robot, to actuator or active joint displacement for the given planar robotic manipulator.

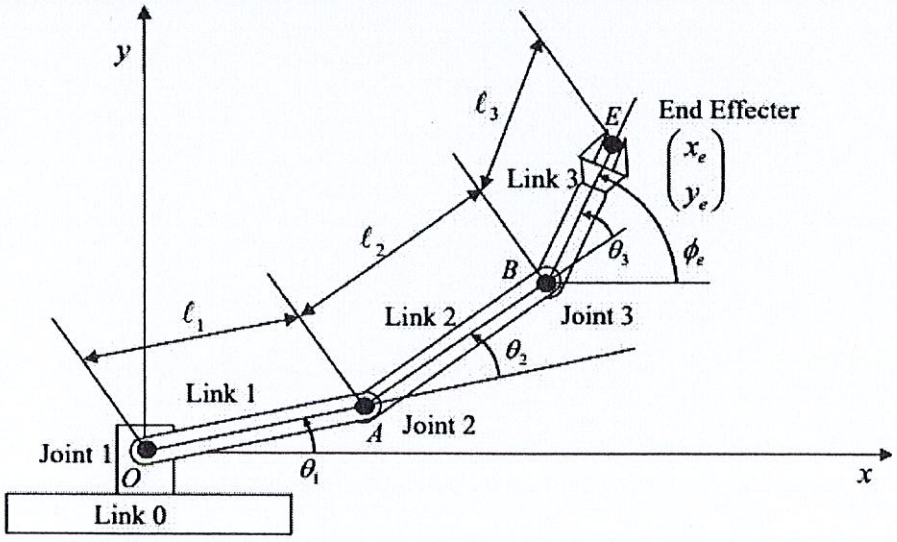

Figure: Three dof planar robot with three revolute joints