Reg.No:_____

Karunya UNIVERSITY

Karunya Institute of Technology and Sciences
(Declared as deemed to be university under section-3 of the UGC Act, 1956)

School of Electrical Sciences

Department of Electrical & Electronics Engineering

Model Question paper

Subject Title: **ROBOTICS AND FACTORY AUTOMATION** **Time: 3 Hours**
Subject Code: **EE348** **Maximum Marks: 100**

Answer ALL questions (5 x 20 = 100 Marks)

1. **Compulsory**
   (a) With necessary diagrams, explain the Robotic system and its anatomy. (12)
   (b) Explain the following terms: (4 X 2)
   i. Accuracy.
   ii. Degree of median.
   iii. Repeatability.
   iv. Speed.
2. (a) Explain the characteristic of a hydraulic actuators used in Robots. (10)
   (b) Compare stepper motors with D.C servomotors as robot drives. (10)

   (OR)
3. (a) What is the role of power transmission by mechanical devices in a robot? Explain any two devices.
   (b) Explain the working of the following types of grippers.
   (i) Mechanical grippers
   (ii) Vacuum grippers
4. Explain the following sensors.
   (i) Position sensors
   (ii) Touch sensors
   (iii) Tactile sensors
   (iv) Force sensors

   (OR)
5. What are the different image processing and analyzing procedures done in a robot? Explain in detail.

6. (a) Discuss the different inputs to an inverse kinematics algorithm. Explain the solution of a simple inverse kinematic algorithm.

   (b) Explain the Resolved motion position controller architecture.

   (OR)

7. Find the Homogeneous transform matrix for a rotation about fixed coordinate frame Z_0 axis, followed by rotation about fixed coordinate frame x_0 and translation is followed by (4, 8, 9).
8. (a) Explain the four major parts of a PLC system with neat diagram.
   (b) For the following Boolean equation,

$$X = A + B(A + \overline{B}C + \overline{A}CD) + ABCD$$

   (a) Write out the logic for the unsimplified equation.
   (b) Simplify the equation.
   (c) Write out the ladder logic for the simplified equation.

(OR)

9. (a) With the help of a diagram, explain the concept of a CNC machine. Differentiate CNC machine from a robot.
   (b) Draw the block diagram of SCADA system with PLC as a remote terminal unit and explain.