R18 Regulation *Subject code:* 2E7CE

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech VII Semester Regular Examinations, November 2022

ROBOTICS

(Professional Elective)

(Mechanical Engineering)

Maximum Marks: 70 Date:09.12.2022 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 List out the types of automation.
2 What is meant by accuracy of robot?
3 Differentiate between Forward kinematics and reverse kinematics.
4 What is homogeneous transformation?
5 What is trajectory planning?
6 Why are servomotors preferred with stepper motor in robot applications?
7 List the types of encoders.
8 Define Linear hydraulic actuator.
9 What are the different types of material handling operation?
10 What are the benefits of industrial robot?

Part-B

Answer All the following questions. (5X10M=50Marks)

11 Classify the end effector. Draw the different mechanism used in the gripper and give their application. 10M

OR

12 A. In RR robot the origin of the global coordinate system is at J1 has two links of length 800mm. determine the coordinate of the end effector point if the joint rotations are 65 deg at both joints, and determine joint rotations if end effector is located at (10,20). 6M
B. Discuss about Jacobian work envelope with example. 4M

13 A. Discuss the different inputs to an inverse kinematics algorithm. 6M
B. Derive the forward kinematic equation of RR robot. 4M

OR

14 Determine the Homogeneous transformation matrix to represent the following sequence of Operations. (i) Rotation 60° about the OX axis ii) Then translate 4 units along X-axis. 10M

15 Determine the expression for joint torques for a planar R-P robotic manipulator using Lagrangian – Euler Formulation. 10M

OR

16	Explain the trajectory planning for continuous co-ordinate system.	10M
17	Name some feedback devices used in robotics. Explain them.	10M
	OR	
18	A. Describe the four types of photo electric sensors.	5M
	B. Explain in detail the tactile and non-tactile sensors.	5M
19	A. What is spot welding? Describe briefly the operations involved in robotic spot welding.	6M
	B. What are advantages of robotic welding over manual welding?	4M
	OR	
20	A. Static characteristics of work which promote the application of robots.	5M
	B. Discuss robot application for assembly and inspection.	5M