Register Number:……..

KUMARAGURU college of technology
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B.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Sixth Semester

MECHATRONICS ENGINEERING

U18MCI6202**:** Robotics Engineering

COURSE OUTCOMES

CO1: Explain the robotic terminologies for various configurations

CO2: Select an appropriate gripper for a given application and use a gripper for pick and place application

CO3: Calculate the forward kinematics, inverse kinematics, and Jacobian for a serial robot

CO4: Apply Lagrangian and Newton-Euler methods to analyze dynamic characteristics of a robot

CO5: Describe various robot motion planning algorithm and robot interfaces

CO6: Explain and practice various programming techniques used in industrial robots

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	Define Work space.	CO1	[K_2]
2.	What are the three degrees of freedom associated with the arm and body motion?	CO1	[K_2]
3.	List the five 5 factors that need to be considered in selecting grippers.	CO2	[K_2]
4.	State the limitations of magnetic gripper.	CO2	[K_2]
5.	Differentiate between Forward kinematics and reverse kinematics.	CO3	[K_2]
6.	Explain the four Denavit - Hartenberg parameters.	CO3	[K_2]
7.	State trajectory planning.	CO4	[K_2]
8.	Illustrate the Fieldbuses used in Interfaces.	CO5	[K_2]
9.	Mention the ways of accomplishing lead through programming.	CO6	[K_2]
10.	Classify the methods of robot programming.	CO6	[K_2]

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

11.	a)	Explain the types of robots based on functions.	8	CO1	[K_2]
	b)	Discuss the different types of robots based on the application.	8	CO1	[K_2]
12.	a)	Explain the different mechanisms used in vacuum grippers with neat sketch.	8	CO2	[K_2]
	b)	Explain the different mechanisms used in mechanical grippers with a neat sketch.	8	CO2	[K_2]
13.	a)	Discuss Denavit- Hardenberg Representation of forward kinematics equations of robots.	10	CO3	[K_3]
	b)	Explain the Jacobian's importance in estimating the robotic tool velocity.	6	CO3	[K_3]
14.	a)	Explain the Newton-Euler method to calculate the torque of a robotic system.	10	CO4	[K_3]
	b)	Describe the basics of trajectory planning.	6	CO4	[K_2]
15.	a)	Explain the motion planning algorithm in detail.	8	CO5	[K_2]
	b)	Discuss Cartesian space vs configuration space.	8	CO5	[K_2]
16.	a)	Describe the functions of important building blocks of ROS with net sketches.	8	CO6	[K_2]
	b)	Discuss the Visualization using RViz in Robot programming.	8	CO6	[K_2]

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