Q. Code:194940

Reg. No. | | | | | | | | | | | | | |

M.E / M.TECH. DEGREE EXAMINATIONS, MAY 2024

Second Semester

IR22203 – ROBOTICS FOR INDUSTRIAL AUTOMATION

(Mechanical Engineering)

(Regulation 2022)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Acquire basic knowledge on industrial robots.	**3**
CO 2	Be able to select the suitable end effectors and vision systems for various applications.	**3**
CO 3	Design and analyze the manipulators of robots.	**3**
CO 4	Be able to develop the programme and select the control system for robotic applications.	**3**
CO 5	Select the appropriate robots for different industrial applications.	**3**

PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	What do you mean by Degree of Freedom?	**1**	**2**
2.	State the various coordinate systems.	**1**	**2**
3.	List any four parts of a robot and its functions.	**1**	**2**
4.	Explain Articulated robot.	**1**	**3**
5.	How do you perform the gripper force analysis for a mechanical gripper?	**2**	**3**
6.	We know that various types of grippers help manufactures automate the inspection and assembly process? Mention some of its types.	**2**	**3**
7.	Discuss about frame grabber.	**2**	**2**
8.	Give any 4 applications of the vision system.	**2**	**2**
9.	Outline the key difference between forward kinematics and inverse kinematics.	**3**	**2**
10.	What do you mean by the term transformation?	**3**	**2**
11.	Discuss about the term “Robot Dynamics”.	**3**	**2**
12.	Explain about joint and world coordinates.	**3**	**2**
13.	Discuss about Textual robot language.	**4**	**3**
14.	Illustrate process control systems?	**4**	**2**
15.	What do you mean by first generation and second generation programme?	**4**	**2**
16.	What do you mean by a Linear control.	**4**	**2**
17.	Extend your idea about COBOTS.	**5**	**2**
18.	Name any four sensors used in robots.	**5**	**2**
19.	Outline any 4 applications of robotics in industries.	**5**	**2**
20.	Robots help in parts mating. Interpret.	**5**	**3**

PART- B (5 x 10 = 50 Marks)

			Marks	CO	RBT LEVEL
21. (a)	**(i)**	Explain Pitch, Yaw and Roll with a neat sketch.	**(5)**	**1**	**3**
	(ii)	Illustrate any 2 types of pairs with a neat sketch.	**(5)**	**1**	**3**

(OR)

(b)	Sketch and examine the different types of work envelope.	**(10)**	**1**	**3**
22. (a)	Explain the various selection consideration involved in using the end effectors.	**(10)**	**2**	**3**

(OR)

(b)	Briefly explain about the terms Feature extraction and Object recognition.	**(10)**	**2**	**3**
23. (a)	For the diagram given below, formulate the DH parameters.	**(10)**	**3**	**4**

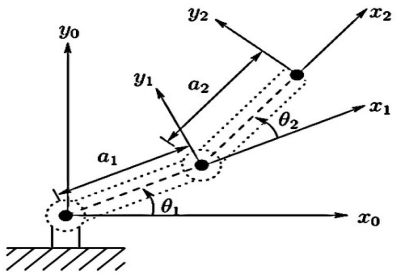


Figure 1

(OR)

(b)	With an example of your own, perform forward transformation of a vector involving both translation and rotation.	**(10)**	**3**	**4**
24. (a)	Briefly explain about two types of programming that were used in robotics.	**(10)**	**4**	**3**

(OR)

(b)	By considering a robot work space with 8 x 8 addressable points, analyse the concept of joint interpolation to move from point (1,1) to point (7,4) in the grid.	**(10)**	**4**	**3**
25. (a)	Write a short note on a) Hopping robot b) Legged robot.	**(10)**	**5**	**3**

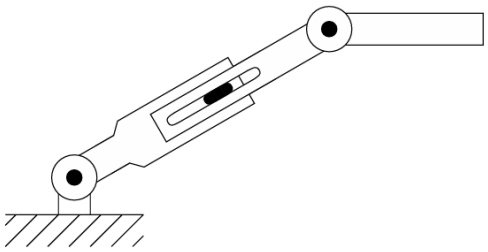
(OR)

(b)	How robots can be employed to do 100% inspection in a mass production industry.	**(10)**	**5**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	Consider the three-link planar manipulator shown below. Derive the forward kinematic equations using the DH-convention.	**(10)**	**3**	**5**



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