MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

(Approved by AICTE, New Delhi, Accredited by NAAC & Affiliated to Anna University)
Rasipuram - 637 408, Namakkal Dist., Tamil Nadu.

Department of Mechanical Engineering
Question Bank - Academic Year (2020-21)

Course Code & Course Name : 16MEE14 - Industrial Robotics

Year/Sem/Sec : IV/VII

Unit-I: Fundamentals of Robot
Part-A (2 Marks)

1. Define an Industrial Robot.
2. What is meant by accuracy of robot?
3. List the benefits of industrial robots?
4. What is meant by pitch, yaw and roll?
5. What is work volume?
6. Name the important specifications of an industrial robot.
7. Give the four basic robot configurations available commercially?
8. Define payload capacity of Robot?
9. What is meant by robot anatomy?
10. What is repeatability of robot?

Part-B (16 Marks)

1.(i)	Discuss the different types of robotic Movements	(8)
(ii)	Briefly explain work envelope	(8)
2.(i)	Sketch and explain the four basic robot configurations classified according to the coordinate.	(10)
(ii)	Write short notes on Joint Notation Scheme.	(6)
3.	Write short notes on technical specification in Robotics.	(16)
4 (i)	Explain the main Robot anatomy with neat sketch.	(10)
(ii)	List out the advantage and disadvantage of robots	(6)
5.(i)	Draw and describe the types of joints used in robots.	(8)
(ii)	Discuss the four types of robot controls.	(8)

Unit-II : Robot Drive Systems and End Effectors

Part-A (2 Marks)

1. Give some examples of Robot End Effector.
2. What is meant by Gripper?
3. Differentiate between internal grippers and external grippers.
4. What are the types of Mechanical Grippers?
5. List any two limitations of magnetic grippers.
6. Give some examples of tool as robot End effector.
7. Name some feedback devices used in robotics.
8. List out the types of Drive systems used in Robots.
9. Write the characteristics of actuating systems.
10. List any two unique features of a stepper motor.

Part-B (16 Marks)

1.	(i)	Draw the neat sketch explain the construction and working principle of hydraulic actuator.	(12)
	(ii)	State the Principles of Harmonic Drives	(4)
2.	(i)	Explain the working of a stepper motor.	(10)
	(ii)	List out the merits and demerits of hydraulic and pneumatic actuator.	(6)
3.	(i)	Explain Internal Gripper and External Gripper.	(8)
	(ii)	Discuss with sketch Vacuum gripper.	(8)
4.	(i)	Write note on Gripper selection and design.	(8)
	(ii)	Write a note on Magnetic Grippers.	(8)
5.		Discuss with neat sketch different types of Mechanical gripper.	(16)

Unit-III : Sensors and Machine Vision

Part-A (2 Marks)

1. Define sensors and transducer.
2. What are the basic classifications of sensors?
3. Name some feedback devices used in robotics.
4. Classify the position sensors.
5. What are the functions of machine vision system?
6. What is meant by Feature Extraction?
7. List the various techniques in image processing and analysis.
8. What is frame grabber?
9. What is meant by Region growing?
10. List the desirable features of a sensor.

Part-B (16 Marks)

1.	(i)	Explain with neat sketch the LVDT.	(8)
	(ii)	Explain the principle of Ultrasonic Sensors.	(8)
2.	(i)	With neat sketch explain the working principle of Piezo Electric Sensors.	(8)
	(ii)	Write short notes on Load Cells of Force Sensors.	(8)
3.	(i)	Briefly explain Acceleration Sensor.	(8)
	(ii)	Write a brief note on Range Sensing.	(8)
4.		Discuss briefly the functions of Machine Vision.	(16)
5.		Explain in detail the Image Processing and Analysis.	(16)

Unit-IV : Robot Kinematics and Robot Programming

Part-A (2 Marks)

1. What is robot kinematics?
2. Give the reasons for defining points in a program.
3. What is redundancy?
4. Define transformations of matrices
5. List the methods of robot programming
6. What is teach pendant?
7. What are irregular smooth motions?
8. Differentiate online and offline programming
9. What is straight line interpolation?
10. List out the different types of robot language.

Part-B (16 Marks)

1.		Derive the forward and reverse transformation of 2-Degree of freedom and 3- degree of freedom arm.	(16)
2.		Briefly explain the Robot Programming Languages in detail.	(16)
3.	(i)	Explain the teach pendant for Robot system.	(8)
	(ii)	Write down the capabilities and limitations of Lead through methods.	(8)
4.		Write a program for pick and place robot and explain the commands used.	(16)
5.	(i)	Write a simple program in VAL language for suitable arc welding.	(10)
	(ii)	Discuss MOTION commands used in robots.	(6)

Unit-V : Implementing and Robot Economics

Part-A (2 Marks)

1. What are the different types of material handling operation?
2. Write some applications of AGV
3. List out types of AGV vehicles
4. Differentiate palletizing and depalletizing.
5. Differentiate MTTR and MTBF
6. What are the steps to be followed by the company in order to implement robot programs in its operations?
7. List the different methods of economic analysis.
8. Define EUAC method.
9. Define payback period
10. Write a note on ROI method

Part-B (16 Marks)

1.		Briefly explain AGV & RGV types of robots in detail.	(16)
2.	(i)	Discuss the various Vehicle Guidance Technology.	(8)
	(ii)	List the Application and advantages of AGVs.	(8)
3.	(i)	Briefly explain potential safety hazards.	(6)
	(ii)	Discuss the steps to be followed by the company in order to implement robot programs in its operations.	(10)
4.		Briefly explain the economic analysis of Robots in detail.	(16)
5.		Explain briefly Play back method and EUAC Method.	(16)