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 (2021-2022)

Course Code & Course Name : Induatrial Automation and Robotics

Name of the Faculty : DrS.Sudhagar

Year/Sem/Sec : III/ VI/ ECE

UNIT I – INTRODUCTION

PART A

1. What is a production system?
2. Production systems consist of two major components. Name and briefly define them.
3. What are manufacturing systems, and how are they distinguished from production systems?
4. Manufacturing systems are divided into three categories, according to worker participation. Name them.
5. Three basic types of automation are defined.
6. What is fixed automation and what are some of its features?
7. What is programmable automation and what are some of its features?
8. What is flexible automation and what are some of its features?
9. What are some of the reasons why companies automate their operations?
10. What is the USA Principle? What does each of the letters stand for?
11. Identify five of automation and process improvement strategies.
12. What is an automation migration strategy?
13. What are the three phases of a typical automation migration strategy?
14. What is automation?

15. Name the three basic elements of an automated system.
16. What is the difference between a closed-loop control system and an open-loop control system?
17. What is safety monitoring in an automated system?
18. Identify the five levels of automation in a production plant.

Part B

1. Identify ten strategies for automation and process improvement. (16)
2. Name the three basic elements of an automated system and explain them with block diagram.(16)
3. Identify the five levels of automation in a production plant. Briefly explain each levels of automation.(16)
4. Explain in detail Automation Migration Strategy with suitable sketch.(16)
5. Name the advanced automation functions and explain them in detail.(16)

UNIT II – MATERIAL HANDLING

Part A

1. What is material handling?
2. Name the **AS/RS**.
3. What is conveyor system?
4. What is automated guided vehicle?
5. What are Material handling system equation?
6. Handling systems classification
7. What are the Material handling equipment?
8. Define Unit load design.
9. List the factors considered while designing material handling system.
10. Identify the vehicle guidance technology in AGV.

Part B

1. Explain in detail about Automated Guided Vehicles in material handling system (16)
2. Explain the Material transport equipment in detail. (16)

3. Explain in detail about automated storage and retrieval system also list its advantages and applications. (16)
4. Explain in detail about Conveyer system and its types. (16)
5. Explain briefly design consideration in Material Handling system. (16)

UNIT III – FUNDAMENTALS OF ROBOT

Part A

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

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

UNIT IV – ROBOT SENSORS AND END EFFECTORS

Part A

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. 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

1. a. Explain with neat sketch the LVDT. (8)
   b. Explain the principle of Ultrasonic Sensors. (8)
2. a. With neat sketch explain the working principle of Piezo Electric Sensors. (8)
   b. Write short notes on Load Cells of Force Sensors.(8)
3. a. Briefly explain Acceleration Sensor. (8)
   b. Write a brief note on Range Sensing.(8)
4. a. Write note on Gripper selection and design. (8)
   b. Write a note on Magnetic Grippers. (8)
5. Discuss with neat sketch different types of Mechanical gripper.(16)

UNIT V – ROBOT DRIVES

Part A

1. What is actuator?
2. What are the factors which must be considered while choosing the drive system for robots?
3. List the advantages and dis-advantages of hydraulic drive?
4. List the advantages and disadvantages of pneumatic actuators?

5. List the advantages and dis-advantages of Electrical actuator?
6. What are the elements of the closed loop control system ?
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

1. a. Draw the neat sketch explain the construction and working principle of hydraulic actuator. (12)
   b. State the Principles of Harmonic Drives (4)
2. a. Explain the working of a stepper motor. (10)
   b. List out the merits and demerits of hydraulic and pneumatic actuator. (6)
3. a. Pneumatic actuator with neat sketch. (8)
   b. Working of a stepper motor. (8)
4. Various drive system used with an industrial robot come their features. (16)
5. Discuss with neat sketch mechanical drive system. (16)