IC 1404 - ROBOTICS

Unit I
PART-A

1. Explain the types of rotary joint notations
2. What is meant by robot pay load
3. What is meant by robot anatomy
4. What are the three degrees of freedom associated with the arm and body motion
5. What are the benefits of industrial robots.
6. What is resolution.
7. Name the commonly used robot configuration system.
8. Sketch the revolving joint and show the relative joint motions.
9. Define a robot.
10. What is meant by work volume.

PART-B

1.Using line sketch explain the construction and working of the four types of industrial robots. Show the work envelope for each type.

2.(i) Sketch the robot wrist and explain the three joint notations
   (ii)Briefly explain the important applications of robots

3.(i)List four common robot configurations and explain with neat sketch
   (ii)Draw the types of joints used in robots and explain its applications

4.How do you classify robots. Explain the working of polar coordinate robots with neat sketches.

5.(i)Write a sample specification of a robot
   (ii)Write the notation scheme for designating robot configuration and illustrate with
        simple sketches

6. Justify the use of robots in Indian industries. Describe various parts of robots with sketches

Unit II

PART-A

1. List any two unique features of a stepper motor
2. List any two limitations of magnetic grippers
3. List the type of drives used in robots
4. What is a RCC device? for what purpose is it used in a robot
5. What is hydraulic motor.
6. What are tools.
7. Define end effector.

8. What are the types of grippers.
9. What is a stripping device.
10. Give some examples of tools as robot end effector.

PART-B

1.(i)Using the suitable application example explain the construction and working of internal and external grippers

  (ii)Write the critical note on the types of mechanical grippers

2.With suitable illustration explain in detail the four types of robot drive systems. Make a comparative analysis of their features

3.With a neat sketch explain the working of a AC servo drive

4.Explain the working of a stepper motor

5.List the types of end effectors and illustrate with sketches.

6.What are the types of grippers .briefly discuss.

7. Differentiate various types of robot drives .How do you select a drive for robot.discuss with illustrations.

Unit III

PART-A

1. Give an application example of a proximity sensor
2. Define a frame grabber
3. Classify the position sensors
4. Brief on the working of inductive type proximity sensor
5. Give two examples of contact sensors.
6. What are the applications of vision sensor.
7. Name some feedback devices used in robotics.
8. What are the types of encoders.
9. What is frame grabber.
10. What are the functions of machine vision system.

PART-B (16 Marks Questions)

11. List the internal sensors and explain the functioning (any two) with neat sketches
12. (i)Write down three functions of a vision system and explain with a suitable sketch
     (ii)For a image digitized at 128 points per line and 128 lines, determine (1) the total number of bits to represent the grey level values required if an 8 bit A/D converter is used to indicate various shades of gray (2)the reduction in data volume if only black and white values are digitized
13. List the various steps and explain the working of the machine vision system for a typical part identification problem.
14. With suitable applications brief explain the following:
     (i)Optical encoders
     (ii)Laser range meters

(iii)Capacitive type touch sensors

(iv)Ultrasonic proximity sensors

15. How do you classify sensors used in robots. Describe the working principle of any one type range sensor.

16. (a) Describe the working of a digital camera.

   (b) Discuss on image storage and lighting techniques.

Unit IV

PART-A

1.   What is the need of studying robot kinematics
2.   What is teach pendent
3.   Perform the following transformation on point (25,10,20) : trans (8,5,0)
4.   What is the command used to execute the speed of the robot in VAL programming
5.   What is kinematics
6.   What is trajectory planning.
7.   What are the methods of robot programming.
8.   What is teachpendent.
9.   What is forward kinematics.
10. What is reverse kinematics.

PART-B

11. Write a critical note on robot kinematics for 2 D

12. Writ a critical note on the VAL programming commands and write a program for a typical pick and place operation,.

13. List the commands used in VAL II programming and describe its functions.

14. (i)Write down the capabilities and limitations of lead through method of programming

   (ii)With a example differentiate forward and inverse kinematics

15. Derive the expression for direct and inverse kinematics of 4 degrees of freedom robot manipulator.

16. Describe the various statements and commands used in VAL programming language. Enunciate the capabilities, advantages and limitations of textual languages.

Unit V
PART-A

1.   List any two application examples of a remote guided vehicle
2.   Explain the importance of economic analysis of robots
3.   Calculate the payback period for a robot project with the following data
        Net annual cash flow   Rs. 45,000
        Investment cost   Rs. 1,00,000
4.   Which data are required to perform economic analysis of a robot project

5. What is economic analysis.
6. What are the direct savings of robot applications in an industry.
7. What is palletizing.
8. What are the methods of economic analysis.
9. Explain the payback method.
10. What is a "dead man switch".

PART-B

1. List and explain indirect costs and savings in a robot applications project
2 Explain the logical sequence of steps in implementing robotics
3. (i)Discuss the factors that influence the safety for robots during industrial operations
   (ii)Write a note on the steps for implementation of robots in industries
4. Write a critical note on any two method for economic analysis of industrial robots.
    Compare the relative merits and demerits of both the types.
5. Enunciate the steps involved in plant survey and selecting a robot for implementation
of robots in an industry.
6. A robot used for a machine loading is priced at Rs. 46000/- the special gripper , sensor
and feeder costs are Rs.36000/- . the robot will replace one operator. The operator rate is
Rs.16 per hour and the operator works for 250 days per year and 8 hours per day. What is
the return on investment for one- shift and two shift operation. Assume annual
maintenance cost as 10% of the robot cost and planning horizon as 5 years.