PART – B (5×13=65 Marks)

11. a) With neat sketches explain the classification of robot based on (3+3+3+4)

i) Generation

ii) Configurations

iii) Work volume

iv) Degrees of Freedom

(OR)

b) Explain the following :

i) Dynamic stabilization of robots.

ii) Various control loops of robots. (6+7)

12. a) With a neat sketch explain how image is processed and analyzed in the Robot vision system.

(OR)

b) With neat sketches explain the working principle of

i) Hydraulic drives

ii) Pneumatic drives

iii) Fiber optic sensor. (4+4+5)

13. a) Explain the following :

i) Force control of robotic manipulator.

ii Pneumatic manipulator control circuits. (6+7)

(OR)

b) With neat sketches explain the working principle of

i) Magnetic gripper

ii) Cam actuated gripper

iii) External gripper

iv) Vacuum gripper. (3+3+3+4)

14. a) i) In a TRR configutaion Robot length of links I_1 = 38 cm, I_2 = 18cm respectively. If I_1 and I_2 making an angle of 42° and 88° w.r. to XZ-Plane and the base is twisted an angle of 28° w.r. to X-axis. Find the end position of the robot. (6)

ii) Find the joint angles Θ_1 and Θ_2 of the two DOF robot (RR configuration) having link length of 28 cm and16 cm. If the end effectors position is X = 24, Y = 14. (7)

(OR)

b) i) Explain the hill climbing techniques. (6)

ii) Every 30 work parts, the cutting tools in the machine are changed which takes 3.0 minutes. The uptime efficiency of the robot is 97%; and the uptime efficiency of the machine tool is 98% which rarely overlap. Determine the hourly production rate. (7)

15. a) Explain the following :

i) Machine interface

ii) Robot cell design. (6+7)

(OR)

b) Discuss with an example and neat sketch, how robots are used in material transfer applications.

PART – C (1×15=15 Marks)

16. a) Discuss the applications of robot in spray painting and touch free heart surgeries. (7+8)

(OR)

b) Write a palletizing program to pick the parts protruding from the pallet and place them in a location some distance apart. The parts are arranged orderly in rows and columns.

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Reg. No. :

Question Paper Code : 40930

07/05/18 FN

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Sixth/Eighth Semester
Electronics and Communication Engineering
EC6003 – ROBOTICS AND AUTOMATION
(Common to : Medical Electronics)
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What is a DDR ? What is its advantage ?
2. Justify whether the following statement is TRUE or FALSE.
   Degrees of freedom depend upon the number of actuators used in a robot.
3. What are the applications of machine vision system ?
4. Define Tactile Sensor.
5. What are the design considerations to be followed while designing a gripper ?
6. Distinguish between gripper and tool.
7. List various first generation programming lanuages.
8. If a point P = 4i + 3j – 8k rotates about X axis in CCW direction for 30° and then translates 5 units along X axis and 6 units along Z axis, find the new point.
9. How to select a robot in a particular job ?
10. What are the applications of robots in Non-Manufacturing ?