M.E. Second Semester (Mechanical Engineering) (CAD / CAM) (F.T.) (CGS)

13495 : Robotics and Robot Application : 2 MCC 3

P. Pages : 2 | AU - 3297

Time : Three Hours | Max. Marks : 80

Notes :
1. All question carry marks as indicated.
2. Answer **three** question from Section A and **three** question from Section B.
3. Assume suitable data wherever necessary.
4. Illustrate your answer necessary with the help of neat sketches.
5. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION – A

1. a) Describe the major components of a robotic system with the help of neat sketches. **7**

b) Discuss the typical specifications of robot that define robots performance capabilities. **6**

2. a) How will you classify the grippers? Explain any two types of grippers with the help of suitable sketches. **7**

b) What are encoders? Explain the absolute types of encoder with the help of neat sketch. **6**

3. a) Sketch and explain the hydraulic drive system used to control the motion of a robotic arm. **7**

b) Explain different types of interlocking commands and quote example of each. **6**

4. a) Describe various joint notation schemes in robots. Draw the suitable sketches. **7**

b) Explain the principle and working of force and torque transducers used in robots state in what applications these transducers can be used? **7**

5. a) What are the end-effectors in robots? Give at least four different examples of the end of the arm tooling used in robots for different applications. **7**

b) What is robot controller? Describe the typical functions of robot controller. **6**

SECTION – B

6. a) Discuss how the robots used for processing operations are different from handling operations. **7**

b) Explain the tasks performed by robots in FMS environment with the help of suitable example. **6**

7. a) Explain the forward and reverse transformation of 3D of 2 D robot arm. **7**

b) Explain the use of robot for machining operation. suggest the tooling, drive systems and sensors for the given operation. **7**

8. a) Distinguish between AS/RS and material handling robots. **7**

b) Describe the types of kinematics of a robot manipulator. Discuss the problems associated with inverse kinematics. **6**

9. a) Discuss the distinguishing characteristics associated with the robots in assembly operation. **7**

b) Explain link parameters, joint variables and arm matrix. **6**

10. a) A vector $V = 2i + 3j + 5k$ is rotated by 45° about the z-axes of the reference frame. It is again rotated by 45° about the x-axes of the rotated frame. Find the rotated coordinates. **7**

b) Two points $Q_{uvw}(3,2,4)^T$ and $B_{uvw}(2,3,6)^T$ are to be translated by distances +3 units along ox-axis and – 2 units along oz-axis. **6**
Using the homogeneous transformation matrix, determine the new points a_{xyz} and b_{xyz}.

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