Total No. of Questions : 12]

P1354

SEAT No. :

[Total No. of Pages : 3

[4164] - 445

May - June - 2012

B.E. (Mechanical)
ROBOTICS
**(2008 Pattern) (Sem. - II) (Elective - III)**

Time :3 Hours]   *[Max. Marks :100*

Instructions :-

1) Answer three questions from Section - I and three questions from Section -II.
2) Answers to the two sections should be written in separate books.
3) Figures to the right indicate full marks.
4) Neat diagrams must be drawn wherever necessary.
5) Use of logarithmic tables slide rules, Mollier charts, electronic pocket calculator and steam tables is allowed.
6) Assume suitable data, if necessary.
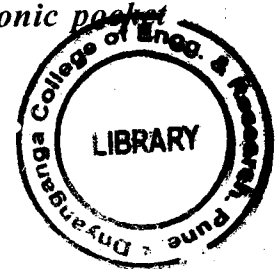
SECTION - I

Q1) a) Explain briefly the use of a robot in a palletizing operation. [4]

   b) What is an industrial robot? State its applications in industry? [6]

   c) Sketch and explain various types of joints in manipulator mechanisms.[6]

OR

Q2) a) Explain with the help of a neat sketch the basic components of a robot connected as a system. [6]

   b) Sketch and explain 3 DOF associated with wrist. [6]

   c) Explain the recent trends in industrial robots. [4]

Q3) a) Explain briefly various drive methods used for robot gripper systems.[6]

   b) Discuss various considerations for selection of a gripper. [4]

   c) Write short note on photosensors. [6]

OR

Q4) a) Explain vacuum grippers, with reference to the principle, use and applications. [6]

   b) Discuss briefly the various kinds of sensors used in robotics. [4]

   c) What is a "universal gripper"? Explain briefly. [6]

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Q5) a) State the comparison of robot drive system with its advantages and limitations. **[6]**

b) What are the feature and application of "hydraulic actuators"? **[6]**

c) Explain different steps in trajectory planning. **[6]**

OR

Q6) a) Compare hydraulic and electrical actuators in robots. **[6]**

b) Write a note on industrial robot control system. **[6]**

c) State the features of "pneumatic actuators". **[6]**

SECTION - II

Q7) a) Explain Denavit-Hartenberg parameters with suitable examples and sketch.**[8]**

b) A planner 2R manipulator has link lengths 11= 100mm and 12 = 70mm. State and explain whether the manipulator can reach points P, Q, R separately. Where P is at (15,15), Q is at (15,70) and R is at (15,170)**[8]**

OR

Q8) a) Explain Newton's - Euler's dynamic formulation? **[8]**

b) A moving frame is rotated about a fixed frame in the following manner,

i) Rotation of 90° about U.

ii) Rotation of 1800° about Z.

iii) Rotation of 90° about Y.

iv) Rotation of −90° about X.

v) Rotation of 90° about V.

vi) Rotation of −90° about U.

A point has co ordinates (15,−27,38) with respect to moving frame. Map the point in the fixed frame. **[8]**

Q9) a) Explain different types of speed reduction and transmission systems used in robots. **[6]**

b) Explain use of robot in plastic molding. **[6]**

c) What do you mean by robot vision? Explain briefly. **[6]**

OR

*Q10)*a) Explain briefly "Vision hardware". **[6]**

b) Write various technical features required of robot for spot welding and spray coating applications. **[6]**

c) Discuss the term stiffness with reference to gears, belts and shafts. **[6]**

*Q11)*a) Explain manual mode of programming in robot. **[6]**

b) State various robot languages. Discuss them in brief. **[4]**

c) Compare between Computer control and robot software control? **[6]**

OR

*Q12)*a) Explain generation of robot programming languages. **[4]**

b) Explain Wait, DELAY, SIGNAL command with suitable examples. **[6]**

c) How is sensing in robot programming classified? Explain briefly. **[6]**

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