

2014

Time : 3 hours

Full Marks : 80

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Answer any five questions in which

Q. No. 1 is compulsory.

1. Choose the correct option of the following :

2×10 = 20

(a) Laws of robotics are defined by :

- (i) Isaac Newton
- (ii) Isaac Asimov
- (iii) Einstein
- (iv) R. L. Virdi

(b) Which of the following is not basic element of a robot ?

- (i) Proximity sensor
- (ii) Manipulator linkage

(iii) PWM amplified

(iv) Steering mechanisms

(c) Cartesian configuration is also called :

(i) Rectilineat

(ii) Cylindrical

(iii) Spherical

(iv) Articulated

(d) The number of degrees of freedom of a

robot wrist is :

(i) 6

(ii) 3

(iii) 2

(iv) 0

(e) The tool which can be used as end effector is :

(i) Vaccum cup

(ii) Grinding wheel

(iii) Magnetic gripper

(iv) None of the above

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(2)

Contd.

(f) PWM stands for :

(i) Proximity wide manipulator

(ii) Pulse width modulator

(iii) Programming with machine

(iv) None of the above

(g) D-H parameter stands for :

(i) Dynamic-Homogeneous Parameter

(ii) Denavit-Hartenberg Parameter

(iii) Dipole-Hertzian Parameter

(iv) None of the above

(h) The robot kinematics is of _____ types.

(i) 4

(ii) 3

(iii) 2

(iv) Random

(i) AGV stands for :

(i) Advanced Guided Vision

(ii) Automated Guided Vechile

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(3)

(Turn over)

- (iii) Articulated Grinding Vehicle
 - (iv) None of the above
- (j) The number of D-H parameters is :
- (i) 5
 - (ii) 3
 - (iii) 2
 - (iv) 4
2. (a) Explain Wait, Delay, Signal Command with suitable examples in robot programming language. 8+7 = 15
- (b) How is sensing in robot programming classified ? Explain briefly.
- (c) Explain briefly "vision hardware". 3+6+6 = 15
3. (a) Explain the recent trends in industrial robots.
- (b) What do you mean by robot kinematics ?
- (c) What is the importance of homogeneous transformation matrix ? 5+5+5 = 15

4. (a) List various issues related to design of the mobile robots. Explain path (motion) planning in mobile robot.
- (b) Enumerate difference between open-loop and closed-loop robotic systems. 9+6 = 15
5. (a) List various end-effectors of the robots. Draw and explain any four types of end effectors.
- (b) Describe, in detail, various transmitters and actuators with the help of diagrams. 8+7 = 15
6. (a) Discuss briefly about touch sensors used in robotics.
- (b) Explain the principles of servomotor. 8+7 = 15
7. Write short notes on any three of the following : 5x3 = 15
- (a) PID Controller

(b) Proximity Sensor

(c) PWM Amplifiers

(d) Mobile Robot



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(6)

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