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**Question Paper Code : 21382**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Eighth Semester

Electronics and Instrumentation Engineering

EE 2023/EE 603 — ROBOTICS AND AUTOMATION

(Common to Eighth Semester – Instrumentation and Control Engineering and  
Sixth Semester – Electrical and Electronics Engineering)

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write the laws of robotics.
2. Differentiate between the kinematics and dynamics.
3. What is gear ratio?
4. Write the role of tactile sensor.
5. What is active gripper?
6. Define the term mechanical manipulator.
7. What is forward kinematics and where it can be applied?
8. What are all the advantages of off-line robot programming?
9. What are the functions of work cell controller?
10. List any four non-manufacturing application areas of robotics.

PART B — (5 × 16 = 80 marks)

11. (a) Discuss about the various generation of Industrial robots used in Engineering applications in detail. (16)

Or

- (b) Explain the different types of robots with respect to its characteristics and power sources. (16)

12. (a) Describe the different stages of machine vision system and its types of illumination systems. (16)

Or

- (b) Describe the various types of drive system for robots and its limitations. (16)

13. (a) Describe the open and closed loop control system used in robotics with block diagram. (16)

Or

- (b) Classify the different types of mechanical gripper with simple sketches along with its industrial application. (16)

14. (a) (i) Write short note on robot dynamics. (8)

- (ii) Consider two frames {A} and {B}. The frame {B} is rotated with respect to frame {A} by  $30^\circ$  around z-axis and the origin of {B} is shifted with respect to the origin of {A} by [5, 10, 15]. The  $Z_A$  and  $Z_B$  axes are parallel. A point P is described in {B} by (4, 2, 3). Describe the same point with respect to {A} using the transformation matrix  ${}^A_B T$ . (8)

Or

- (b) Describe any two types of wall climbing algorithm with suitable flow chart. (16)

15. (a) (i) Write short note on applicability of robots in industrial environment. (8)

- (ii) Discuss about the general robot selection procedure for assembly operation chosen by you. (8)

Or

- (b) Write a detailed note on robot computer interface and robot cell design. (16)