

Reg. No. :

**Question Paper Code : 80646**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Mechanical Engineering

ME 6010 — ROBOTICS

(Common to Automobile Engineering and Production Engineering)

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define world coordinate system and tool coordinate system in a robot system.
2. What do you understand from the notation TRR of a robot?
3. What are the disadvantages of pneumatic drives in robotics?
4. What is meant by a Gripper and what are the types of the gripper?
5. What is the common imaging device used for robot vision system?
6. What is meant by windowing?
7. Differentiate between the forward and inverse kinematics and give its application.
8. What is a teach pendant?
9. State any three economic justification techniques for robotic installation.
10. Mention the limitations of implementing robots in industry.

PART B — (5 × 16 = 80 marks)

11. (a) Explain any five work envelop of a robot with suitable diagram and mention its application.

Or

- (b) Explain the various specification that one should look forward to purchase a commercial robot.

12. (a) Classify the end effector. Draw the different mechanism used in the gripper and give application.

Or

- (b) (i) Discuss the design and selection parameters of three fingered grippers. (10)

- (ii) Compare the servo motor with stepper motor for industrial robot along with your justification. (6)

13. (a) Explain the following: (i) LVDT (ii) Hall Effect sensor and (iii) Piezo electric sensor. Give the limitations of all three sensor mentioned.

Or

- (b) Explain the various techniques in Image Processing and Analysis. Describe the industrial applications of image processing in the field of mechanical engineering.

14. (a) (i) Illustrate the forward kinematics of a 3 DoF industrial robot with rotational joints. Mention the advantages of forward kinematics over inverse kinematics. (12)

- (ii) State the parameters involved in Denavit-hartenberg method. (4)

Or

- (b) Explain the statements of VAL robot programming language with at least two example command. Write a VAL program for pick-and-place operation for your assumed environment.

15. (a) Discuss the various steps to be taken for implementing robots in industry and safety issues. Write the advantages of using robots in industry.

Or

- (b) Suppose the total investment on the robot is estimated to be Rs. 50,000. There is one shift operation of 2000 hours and 1 man replaced. Assuming labor rate including direct overheads to be Rs. 80/hour, robot running costs including maintenance and depreciation to be Rs. 1,00,000 and added value of increased output be Rs. 1,20,000 determine the payback period.