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M.E./M.Tech. Degree Examinations, May/June 2017
SECOND SEMESTER

MECHATRONICS ENGINEERING

MS16201 - INDUSTRIAL ROBOTICS
(Regulation 2016)

Q. Code: 775142

Time: Three hours

Maximum : 100 marks

Answer ALL questions

PART A - (10 X 2 = 20 Marks)

1. What are the basic components of a robot?
2. Give the classification of robot based on its coordinate system.
3. Differentiate direct and indirect kinematics.
4. What are the various drive systems used in robotics?
5. What are the various functions of a sensor in robotics?
6. Name any two types of lighting sources in a machine vision system.
7. What is the significance of teach pendant?
8. What is the manual lead through programming?
9. Give applications of robots in space and underwater.
10. List the three basic types of robot work cell layout.

PART B - (5 X 16 = 80 Marks)

11. (a) Explain in detail about the features of polar and jointed-arm robots with neat diagram. (16)
(OR)
(b) (i) Justify the utilization of robots in industrial automation. (6)
(ii) Describe about the point-to-point and continuous path control in robots with suitable examples. (10)
12. (a) (i) Derive expressions for forward and reverse transformations of a 2-DoF arm. (8)

- (ii) A point P is represented by a position vector $6\mathbf{i}+12\mathbf{j}+4\mathbf{k}$. The point is rotated 30° about X-axis, followed by a translation of 22 units along Z-axis. Determine the final position of point P. (8)

(OR)

- (b) (i) Classify the end effectors in robot arm. (6)
(ii) Explain about any two gripper mechanisms with neat sketch. (10)

13. (a) (i) Explain about the functioning of a range sensor with neat sketch. (8)
(ii) Write a short note on the applications of a machine vision system. (8)

(OR)

- (b) Explain various steps involved in image processing. (16)

14. (a) (i) Describe about the powered lead through method of programming robots with its limitations. (8)
(ii) Elaborate about manual lead through method of programming robots with its merits and demerits. (8)

(OR)

- (b) Describe various AI techniques for representing knowledge in the perspective of robotics. (16)

15. (a) (i) Explain about in-line robot workcell and its features with neat diagram. (10)
(ii) Explain about the need of robots in remote environment with suitable sketch. (6)

(OR)

- (b) Explain in detail about the utilisation of robots in manufacturing, space and underwater with one application. (16)