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**Question Paper Code : 81490**

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

*Elective*

Engineering Design

ED 9258/ED 958/UED 9158/10222 EDE 24 — INDUSTRIAL ROBOTICS AND  
EXPERT SYSTEMS

(Common to M.E. Computer Aided Design, M.E. CAD/CAM and M.E. Product  
Design and Development)

(Regulation 2009/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is work volume?
2. What is direct kinematics?
3. Name the velocity sensing devices.
4. List the application for vacuum grippers.
5. What is tactile sensor?
6. What is robotic vision system?
7. What is robot work cell?
8. Name the types of robot cell layout.
9. What is lead through programming?
10. What is KBES in robotics?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss about the scope of industrial robots. (8)  
(ii) Sketch and explain robot anatomy. (8)

Or

- (b) (i) An LL robot has two links of variable length. Assuming that the origin of the global coordinate system is defined at joint  $J_1$ , determine :  
– The coordinate of end-effector point if the variable link lengths are 5 m and 3 m.  
– Variable link length if the end-effector is located at (5,3). (4 + 4)  
(ii) Discuss about the method of orientation and location of object. (8)

12. (a) (i) Explain the working principle of pneumatic rotary actuator. (8)  
(ii) Discuss about hydraulic servo drive. (8)

Or

- (b) (i) Discuss the working principle of rotary encoder. (8)  
(ii) Explain about the magnetic gripper. List its application. (8)

13. (a) (i) Explain about any one range sensing sensor with an example. (8)  
(ii) Explain about edge enhancement with an example. (8)

Or

- (b) (i) Explain pattern recognition. (8)  
(ii) Explain contrast stretching. (8)

14. (a) (i) Discuss about any one type of robot cell layout with an example. (8)  
(ii) Explain about multiple robots in working place. (8)

Or

- (b) (i) Explain the method of evaluating the cycle time with a suitable example. (8)  
(ii) Discuss about machine interface in robotic cell. (8)

15. (a) (i) Explain the characteristics of task level languages. (8)  
(ii) Discuss about artificial intelligence in robot application. (8)

Or

- (b) (i) Explain the method of motion interpolation. (8)  
(ii) Discuss the problem reduction in artificial intelligence. (8)
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