

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
EIGHTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019

Course Code: AE466

Course Name: INDUSTRIAL ROBOTICS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

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|---|-------|--------------------------------------------------------------------------------------------------------------------------|------|
| 1 | a) | Discuss the terms, forward kinematics and inverse kinematics of a robot manipulator | (5) |
| | b) | Describe the anatomy of a robot with the help of a neat diagram. | (10) |
| 2 | a) | Differentiate slew motion and joint interpolated motion in robot trajectory planning | (5) |
| | b) | Describe Proportional, Proportional derivative and proportional integral control systems with the help of neat diagrams. | (10) |
| 3 | a) | Define the terms | (7) |
| | (i) | SCARA Robot | |
| | (ii) | Articulated Robot | |
| | (iii) | Spherical Robot | |
| | b) | Give a brief account of contribution of ON/OFF and Proportional controllers to a robot control system. | (8) |

PART B

Answer any two full questions, each carries 15 marks.

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|---|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 4 | a) | What are the design considerations for Grippers? | (5) |
| | b) | Classify different types of actuators used in robot manipulators. | (10) |
| 5 | a) | With a neat sketch illustrate the simple pick-and-place operation of the robot. | (5) |
| | b) | Discuss the material handling and material transfer application of robots | (10) |
| 6 | a) | Explain the various power transmission devices used in Robotics? | (7) |
| | b) | Explain in detail how the robots are successfully applied to accomplish the loading and/or unloading function in the following production operations:-
(i)Stamp Pressing (ii)Plastic Moulding | (8) |

PART C

Answer any two full questions, each carries 20 marks.

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|---|----|-----------------------------------------------------------------------------------------------------|-----|
| 7 | a) | Illustrate the difference between powered lead through and manual lead through programming methods. | (5) |
| | b) | Describe the three basic modes of operation of a robot programming language operating system. | (5) |

- c) A salesman has to travel four cities A, B, C and D. He wishes to travel to all four cities using the shortest possible path and going to each city only once. He wishes to begin and end the trip at city A. Assuming distance between the cities, configure the solution as a tree. (10)
- 8 a) Discuss about the machine interference in a multiple robot system. (5)
- b) Define interlock in robotic work cell design. (5)
- c) Classify Robot Cell Layouts With neat sketches (10)
- 9 a) Illustrate the AI Techniques for problem representation and problem solving (10)
- b) Discuss in detail about the work cell controllers. (10)
