

Reg No.: _____

Name: _____

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

Course Code: ME464
Course Name: Robotics and Automation

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks.

Marks

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| 1 | a) With the help of neat sketch explain the robot anatomy. | (4) |
| | b) With the help of neat sketch explain the working of stepper motor .Also mention its applications. | (6) |
| 2 | a) Explain the term work Envelope of a robot, also sketch the work envelope of a cartesian and cylindrical coordinate robot. | (5) |
| | b) Explain the working of a) Check valve b) Spool valve in hydraulics. What is the use of these valves? | (5) |
| 3 | a) With the help of neat sketch explain pitch, yaw and roll of end effector of a robot. | (6) |
| | b) Explain speed of motion in an industrial robot. | (4) |
| 4 | a) Explain the concept load carrying capacity of an industrial robot. | (2) |
| | b) With the help of neat sketch explain the working of piston motor. | (4) |
| | c) With the help of neat sketch explain the double acting cylinder. | (4) |

PART B

Answer any three full questions, each carries 10 marks.

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| 5 | a) Explain the different types of robot end effector. | (4) |
| | b) Explain the static and dynamic characteristics of sensors. | (6) |
| 6 | a) Explain the different types of mechanical gripper mechanisms used in robotics. | (6) |
| | b) Explain the principle of piezo electric sensor and also mention how they are used in robots. | (4) |
| 7 | a) With the help of neat sketch compare Two Fingered and Three Fingered Grippers. | (6) |
| | b) Bring out the working principle of Triangulation method in range finders. | (4) |
| 8 | a) Explain structured lighting approach with neat sketch. Also mention about how calibration is done. | (6) |

- b) Write a short note on adhesive grippers. (4)

PART C

Answer any four full questions, each carries 10 marks.

- 9 a) Explain the principal of sensing. Describe force sensing with strain gauge and wrist force sensor. (10)
- 10 a) With the help of neat sketch explain how a capacitive sensor is used to determine proximity of an object (6)
- b) Illustrate the Motion commands used in VAL with the help of example. (4)
- 11 a) With the help of neat sketch explain the working of CCD. (6)
- b) List the advantages and benefits of robot arc welding. (4)
- 12 a) With the help of neat sketch explain the DH parameters. (6)
- b) Explain the application of robots in machining operations. (4)
- 13 a) Derive the forward transformation of 2-Degree of freedom planar robot arm. (6)
- b) Explain the capabilities and limitations of lead through robot programming method. (4)
- 14 a) Derive the kinematic equations for a cylindrical coordinate robot. (6)
- b) With neat sketch explain pick and place operation done with the help of a robot (4)