

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth semester B.Tech degree examinations (S), September 2020

Course Code: EC368**Course Name: 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) Compare spherical and cylindrical robot configurations | (8) |
| | b) How robots are classified according to JIRA? | (7) |
| 2 | a) Write a short note on Force-Torque sensors. | (5) |
| | b) Compare the different drive technologies of a Robot. | (10) |
| 3 | a) Explain the principle of operation of Stepper Motor. | (8) |
| | b) Apply the concepts of speed and direction control of an electric motor using a microprocessor. | (7) |

PART B*Answer any two full questions, each carries 15 marks*

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| 4 | a) What are the sources of noise? What are the different methods to reduce noise? | (7) |
| | b) What are the different levels of image processing? Mention different methods of image processing. | (8) |
| 5 | a) Explain about joint angle, joint distance, link length and link twist with the help of D-H representation. | (10) |
| | b) Compare Rotation matrix and Homogenous Transformation matrix. | (5) |
| 6 | a) Derive the rotation matrix for a sequence of rotations: Ψ about OX axis, θ about OY axis, ϕ about OZ axis. | (8) |
| | b) Derive the matrix representing the orientation change with Euler angles. | (7) |

PART C*Answer any two full questions, each carries 20 marks*

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| 7 | a) What is meant by singularities in the context of velocity kinematics? | (5) |
| | b) Explain about Mobile robots. | (5) |
| | c) Explain the structure of robot programming language. | (10) |

- 8 a) Write VAL commands for controlling end-effector motions of a robot. (5)
b) Explain the use of robots in medical applications. (10)
c) What is meant by manipulator Jacobian? (5)
- 9 a) Explain robot actuation and control methods with block diagrams (10)
b) Which are the robot programming methods? (10)
