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

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

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

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)

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