EXTC
Robotics
19

K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22

(Autonomous College Affiliated to University of Mumbai)

Subject Code: ~~1UEXDLC7043~~ EXDLC7043 Subject Name: Robotics Date:10/12/2022

Nov – Dec 2022
(B.Tech) Program: EX
Examination: LY Semester: VII
Course Code: 1UEXDLC7043 and Course Name: ROBOTICS
Duration: 2.5 Hours **Max. Marks: 60**

Instructions:
(1)All questions are compulsory.
(2)Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	Define Inverse Homogeneous Matrix?	2	2	U
ii)	State the specification of Robot.	2	1	U
iii)	Explain limitation of On-off controller.	2	3	U
iv)	Define Joint parameters of Robotic Arm.	2	2	U
v)	How Robotics sensors are classified?	2	3	Ap
vi)	List down important component of Reinforcement learning.	2	6	R
vii)	State features of ROS framework.	2	4	U
viii)	Define Exploit strategy of agent in Reinforcement learning.	2	6	U
Q.2	Solve any four questions out of six.	16		
i)	An incremental shaft encoder with 2 emitter detector pairs and 12 slots around the circumference is used to monitor the angular position of a high-speed motor shaft. The precision of the load shaft is measured and found to be 0.05 degrees per count. What is the gear ratio between the high speed shaft and the load shaft?	4	1	Ap
ii)	Compare Electric and Hydraulic Drive used in robotic System	4	3	Ap
iii)	Find Inverse Homogeneous transformation matrix (A_{21}) for frame 2 with respect to frame 1, coordinate system of frame 2 is located at (2, 3, 5).	4	2	Ap

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	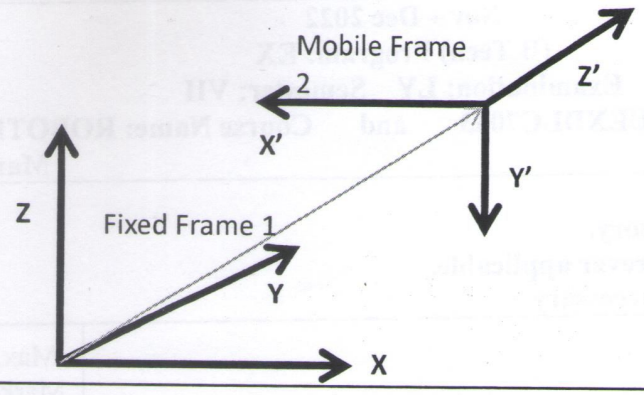			
iv)	What is the advantage of using ROS software, compared to other framework built for Robotics?	4	4	U
v)	Explain the file system level of ROS organized on hard disk.	4	4	U
vi)	Explain Dijkstra's algorithm for path planning.	4	5	U
Q.3	Solve any two questions out of three.	16		
i)	Write a Short note on Robot Programming using VAL.	8	4	U
ii)	Describe different robot Work envelope and its components.	8	1	U
iii)	Define state transition Probability, Measurement Probability, Belief and Prediction.	8	5	U
Q.4	Solve any two questions out of three.	16		
i)	For the suspension system for robot chassis, derive differential equation and Transfer function for position of chasis.	8	2	Ap
ii)	For Microbot Alpha Robotic ARM Configuration, assign DH coordinates using DH rules and assign DH parameter.	8	3	Ap
iii)	Find a Composite Rotation Matrix for robot arm if its Mobile coordinate frame is rotated by angle 30 degree about f1, 60 degree about m2 and 30 degree about m3. Assume both mobile frame and fixed reference frame are coincident.	8	6	Ap

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