

Code No: **R32032**

Time: 3 hours

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Set No. 1

III B.Tech II Semester Supplementary Examinations, April - 2018 ROBOTICS

(Mechanical Engineering)

Max. Marks: 75

Answer any FIVE Questions All Questions carry equal marks

a) b)	Sketch and explain the four basic robot configuration. What is the future scope of Robotics?							[8M] [7M]
a) b)	What is end effector? Explain the different types of end effectors. How many DOFs are required to position an end-effector at any point in 3-D space? Justify.							[8M] [7M]
a) b)	What do you mean by homogeneous coordinates? Explain. Explain in detail the various interpretations of Homogeneous transformation matrix.							[7M] [8M]
a)	Find the D-H matrix for R-R manipulators.						[7M]	
b)	Solve the inverse kinematics problem for the joint angles θ_1 , θ_2 , θ_3 , θ_4 , θ_5 , and						[8M]	
	θ_6 .	Ioint i	Α	a	a (d	1	
		1	θ_1	-90^{0}		d1	-	
		2	θ_2	0^0 <	a ₂	0	-	
		3	θ_3		a ₃	0	-	
		4	θ_4	-90 ⁰	a ₄	0		
		5	θ_5	90 ⁰	0	d5		
		6	θ_6	0^0	0	d6		
`	What do you maan by Internal Cincylarities?							
5 a) what do you mean by Internal Singularities?								[8M]
b)	Compute the Jacobian Martix for a three link planar arm with Revolute joints.							[7M]
a)	Define the following commands [] i) WAIT ii) SIGNAL iii) DELAY							[9M]
b)	List out the constraints for planning joint interpolated trajectory.							[6M]
a) b)	Explain the operation of optical encoder used in robot as a feedback device. Compare and contrast hydraulic and Electrical actuators.							[8M] [7M]
	Explain how to design a robot for an automobile industry to carry out welding [15 Operation.							
	 a) b) b) a) b) b) a) b) b) a) b) b) c) <	 a) Sketch and What is the What is the What is the What is the How many space? Just a) What do you by Explain in ematrix. a) Find the D-by Solve the in θ₆. a) What do you by Compute the in the Compute the Solve the in the Home the Solve the in the Home the Solve the in the Solve the in the Solve the in the Home the Solve the in the Home the	 a) Sketch and explain the What is the future scope a) What is end effector? In How many DOFs are space? Justify. a) What do you mean by Explain in detail the variant matrix. a) Find the D-H matrix for boost of the inverse kine θ₆. 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Joint i θ α 1 θ₁ -90⁰ 2 θ₂ 0⁰ 3 θ₃ 0⁰ 4 θ₄ -90⁰ 5 θ₅ 90⁰ 6 θ₆ 0⁰ a) What do you mean by Internal Singularities? b) Compute the Jacobian Martix for a three link a) Define the following commands i) WAIT ii) SIGNAL iii) DEI b) List out the constraints for planning joint inte a) Explain the operation of optical encoder used b) Compare and contrast hydraulic and Electrica Explain how to design a robot for an automoto Operation. 	 a) Sketch and explain the four basic robot configuration. b) What is the future scope of Robotics? a) What is end effector? Explain the different types of end b How many DOFs are required to position an end-effect space? Justify. a) What do you mean by homogeneous coordinates? Explate b) Explain in detail the various interpretations of Homogen matrix. a) Find the D-H matrix for R-R manipulators. b) Solve the inverse kinematics problem for the joint angle θ₆. 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Joint i θ α a d d 1 θ₁ -90° 0 d1 2 θ₂ 0° a₂ 0 3 θ₃ 0° a₃ 0 4 θ₄ -90° a₄ 0 5 θ₅ 90° 0 d5 6 θ₆ 0° 0 d5 6 θ₆ 0° 0 d5 6 06 a) What do you mean by Internal Singularities? b) Compute the Jacobian Martix for a three link planar arm with Revolation WaIT ii) SIGNAL iii) DELAY b) List out the constraints for planning joint interpolated trajectory. a) Explain the operation of optical encoder used in robot as a feedback Compare and contrast hydraulic and Electrical actuators. 	 a) Sketch and explain the four basic robot configuration. b) What is the future scope of Robotics? a) What is end effector? Explain the different types of end effectors. b) How many DOFs are required to position an end-effector at any point in 3-D space? Justify. a) What do you mean by homogeneous coordinates? Explain. b) Explain in detail the various interpretations of Homogeneous transformation matrix. a) Find the D-H matrix for R-R manipulators. b) Solve the inverse kinematics problem for the joint angles θ₁, θ₂, θ₃, θ₄, θ₅, and θ₆. b) Joint i 0 a a a d d 1 2 0 0 42 0 d 1 2 0 0 43 0 0 44 0 4 -90° a_4 0 0 5 0 0 d 5 6 0 6 0 0 0 d 5 6 0 6 0 0 0 d 5 6 0 6 0 0 0 d 5 6 0 6 0 0 0 d 5 6 0 6 0 0 0 d 5 6 0 6 0 0 0 d 5 6 0 6 0 0 0 d 5 6 0 6 0 0 0 d 5 6 0 6 0 0 0 d 5 6 0 6 0 0 0 d 5 6 0 6 0 0 0 d 5 6 0 0 d 5 6 0 0 0 d 5 6 0 0 0 d 5 6 0 0 0 d 5 6 0 0 0 d 5 6 0 0 0 d 5 6 0 0 0 d 5 6 0 0 d 5 0 0 d 5 6 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 0 d 5 0 d 5 0 0 d 5 0 d 5 0 0 d 5 0 d 5 0 0 d 5 0