22383

12425 03 Hours / 70 Marks Seat No. Instructions – (1) All Questions are Compulsory. (2) Answer each next main Question on a new page. (3) Figures to the right indicate full marks. (4) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall. Marks 1. Attempt any FIVE of the following : 10 a) Define Robot and give any two applications of it. b) Compare forward and inverse kinematics in robotics. (Two points) Define angular displacement and angular acceleration in c) robotics. d) Define motion planning and mention the types of motion planning. e) Mention any two requirements of robot language. Define dynamics and forward velocity in robotics. f) **g**) Define precision and repeatability.

Marks

2.		Attempt any <u>THREE</u> of the following :	12
	a)	Differentiate between Electrical and pneumatic actuators.	
	b)	Explain single slider crank mechanism with diagram.	
	c)	Draw the block diagram of architecture of robot programming and give any two Robot language.	
	d)	Explain structure of a robot language with block diagram.	
3.		Attempt any THREE of the following :	12
	a)	State the significance and use of jacobian Matrix.	
	b)	Draw and explain block diagram of mechanical actuator system.	
	c)	Mention any four safety measure in robots.	
	d)	Compare between kinematic model and Dynamic Model.	
4.		Attempt any THREE of the following :	12
	a)	Mention different types of end effectors with its applications.	
	b)	Mention the significance of kinematics.	
	c)	Describe Jacobian matrix with Jacobian equation in robotics.	
	d)	Difference between online and offline robot programming.	
	e)	Derive DH parameter for RP(Revolute-Prismatic) robot.	
5.		Attempt any TWO of the following :	12
	a)	Explain the different types of robotic joints with its diagram.	
	b)	Explain D-H parameters of SCARA robot	
	c)	Describe lagrange-Euler method and state its equation of motion in dynamics.	
6.		Attempt any TWO of the following :	12
	a)	Derive the rotational operator matrix for ROT(X, α)	
	b)	i) Mention Significance of teach pendent.	
		ii) Difference between joint space and Cartesian space trajectory.	
	c)	A frame B is rotated about X axis of the Universal coordinate system by 90 degrees without translation. Let the position of a point Q in B is given by $[10 \ 2 \ 8]^{T}$. Find out \overline{Q}_{u} .	
