Exam Seat No:_____ **Enrollment No:**_____

C.U.SHAH UNIVERSITY

WADHWAN CITY

University (Winter) Examination -2013

Course Name :M.Tech(Mech) Sem-I **Subject Name: -Robotics & Machine Vision** **Mark:70**

Duration :- 2:30 Hours **Date : 10/01/2014**

Instructions:-

(1) Attempt all Questions of both sections in same answer book / Supplementary.
(2) Use of Programmable calculator & any other electronic instrument is prohibited.
(3) Instructions written on main answer Book are strictly to be obeyed.
(4) Draw neat diagrams & figures (If necessary) at right places.
(5) Assume suitable & Perfect data if needed.

SECTION-I

Q-1 Attempt the following.

	1.	One of the axes of a robot is a telescoping arm with a total range of 0.5 m. The Robot's control memory has an 8- bit storage capacity. Determine the control resolution for the axis.	02
	2.	What is the difference between control resolution & spatial resolution for robot manipulators?	02
	3.	Differentiate forward & inverse Kinematics.	02
	4.	What is end effector?	01
Q-2	(a)	Explain Segmentation and Thresholding in machine vision.	04
	(b)	Describe image processing and analysis in detail for robotic vision system.	05
	(c)	Write an algorithm for Region growing of Binary Images in vision system..	05

OR

Q-2	(a)	Explain analog to digital signal conversion for machine vision system.	04
	(b)	Enlist Features and applications of the robot languages.	05
	(c)	Explain with neat sketch "Charged Coupled Device (CCD) in Machine Vision System.	05
Q-3	(a)	Explain Different Robot Configurations with Figure.	07
	(b)	Explain in detail "D-H representation of forward kinematics" with algorithm.	07

OR

Q-3	(a)	Explain different types of drives used in robotic system in detail.	07
	(b)	Write down following for a Six-DOF Stanford manipulator as shown in fig. (1). On page number Two of Question Paper. (i) Frame assignment diagram (ii) Table of joint parameters.	07

SECTION-II

Q-4 Attempt the following.

	1.	Define following Terms. (i) Joint Distance (ii) Link twist angle	02
	2.	Define the robot as per RIA & BRA.	02
	3.	How many D.O.F are required for any industrial robot? Why?	02
	4.	What do you mean by Manipulator?	01
Q-5	(a)	Explain "Robot Control System".	04
	(b)	Explain "Stepper motor" in control system.	05
	(c)	Explain Robot Application in "Material Transfer & Machine Loading /Unloading System".	05

OR

Q-5	(a)	Explain Tactile Sensors.	04
	(b)	Give basic types of encoders used in robotic control system. Explain each in detail.	05
	(c)	Write short note on – "Proximity and range sensors".	05
Q-6	(a)	Explain "Different types of Gripper Mechanisms".	07
	(b)	Fig. (2) Shows the linkage mechanism and dimensions of a gripper used to handle a work part for a machining operation. Suppose it has been determined that the gripper force is to be 100 N. Compute the required actuating force to deliver this force of 100 N. All Dimensions are in mm.	07

OR

Q-6	(a)	Explain "Lead Through Programming Methods".	07
	(b)	Explain "Remote Center Compliance (RCC) Device" for Assembly Operation.	07

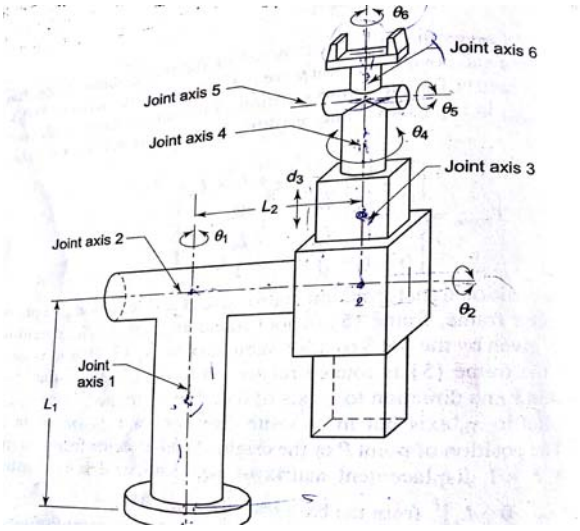

Fig. (1). Q-3(b) OR

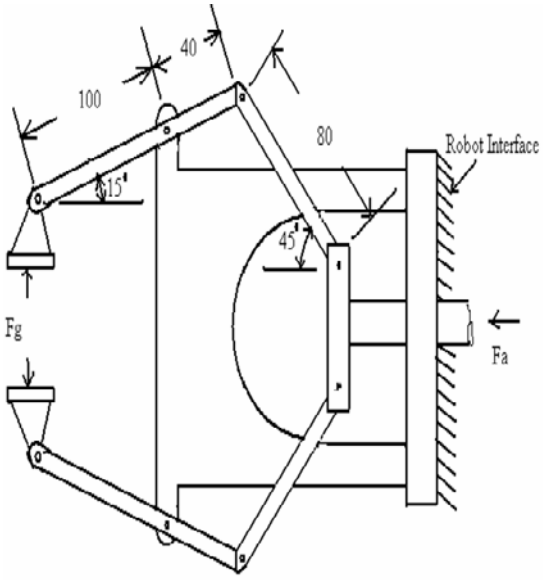

Fig. (2). Q-6(b)

************10-14************