Printed pages: 02 **Sub Code: MME203**

Paper Id: **Roll No:**

M.TECH
(SEM-II) THEORY EXAMINATION 2017-18
ROBOTICS & CONTROL

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a) Summarize the merits and demerits of hydraulic actuators.

b) Describe the technical features to be considered while designing a robot.

c) What is pressure regulating valve?

d) Prioritize the factors to be considered in the selection and design of grippers.

e) Define the term Robotics.

f) What are factors that slow down the growth and implementation of robotics technology?

g) What are proximity sensors?

h) Explain its any two applications in robotic systems.

i) Evaluate the Robot Characteristics.

j) What is a work space in robot?

SECTION B

2. Attempt any three of the following: 10 x 3 = 30

a) What are the different classifications of industrial manipulators based on geometric configuration? Also give the work envelope of each configuration.

b) What are tactile sensors? Discuss tactile sensors with example.

c) Explain the different steps in trajectory planning.

d) What is the speed control system in robot?

e) Explain the application scenario of each of the following manipulator configurations.
(i) SCARA Manipulator.
(ii) Articulated Manipulator.

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

a) Describe with neat sketches the features, merits, limitations and applications of Magnetic gripper and Vacuum Gripper.

b) What is an actuator? What are the different types of actuator used for robots? Explain the working of a hydraulic actuator system.

4. Attempt any *one* part of the following: 10 x 1 = 10

a) Differentiate between servo and non-servo manipulators. Explain the parallel actuated and closed loop manipulators.

b) Explain the parameter of links and joints. What are the kinematics and dynamics mechanical systems?

5. Attempt any *one* part of the following 10 x 1 = 10

a) Short notes (i) Adaptive control in robot (ii) Position and path in robot

b) Write the homogeneous transformation matrix for a rotation of 90 degrees about the Z axis followed by a rotation of 90 degrees about the axis, followed by a translation of (3, 7 and 9).

6. Attempt any *one* part of the following 10 x 1 = 10

a) Explain any four types of robot programming. Discuss the important requirements of programming languages.

b) Discuss MOTION commands used in robot programming. Differentiate between VAL and RAIL robot programming language.

7. Attempt any o*n*e parts of the following: 10 x 1 = 10

a) Obtain the forward and reverse kinematics of a 3R planar Manipulator.

b) With suitable diagrams explain Pitch, Yaw and Roll motions as concerned with a robotic manipulator