Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SIXTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019
Course Code: MR302
Course Name: ROBOTICS ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 5 marks.

1	Define 3 laws of robotics	5
2	Explain harmonic drives	5
3	Write a note on magnetic grippers	5
4	Draw and explain the working of LVDT	5
5	Write the matrix equation for rotation about X and Y axis.	5
6	Write a note on translational operators	5
7	Explain teach by showing method	5
8	Differentiate world coordinate and tool coordinate systems in robot programs.	5

PART B
Answer any three questions, each carries 10 marks.

9 a) From which word the term robot is derived? Give the RIA definition of robot   3

   b) Fixed part of manipulator can be named as what? Explain in 1 or 2 sentences   3

   c) Draw the structure of any one configuration of robot   4

10 a) Explain the terms   6

        (i)   Spatial resolution

        (ii)   Accuracy

        (iii)   Repeatability

   b) What is work volume? Draw the work volume of any one of the robot   4
      configuration

11 a) Differentiate hydraulic pump with hydraulic motor with figures   6

   b) Elucidate belt drives briefly   4

12 a) How mechanical grippers are classified according to the type of kinematic device   10
      used? Explain each one with neat figure

13 a) What are the desirable features of sensors?   5

   b) With neat diagram explain absolute encoder   5

PART C
Answer any two questions, each carries 15 marks.

14 a) An LL robot has two links of variable length. Assuming that the origin of the global coordinate system is defined at joint J1, determine

   (i)   The coordinate of the end effector point if the variable length links are 3m and 5m.   15

   (ii)   Variable link lengths if the end effector is located at (3,5)

15 a) What is the purpose of transformation equation in robotics? Explain with neat sketches.   12

   b) Write the matrix equation for rotation about Z axis.   3

16 a) Describe WAIT, SIGNAL and DELAY commands   9

   b) Explain the applications of robots in material handling areas   6

17 a) List and explain the requirements of robot programming language in detail   15