VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD
B.E. (CBCS) IV-Semester Advanced Supplementary Examinations, July-2019

Introduction to Robotics
(Open Elective-III)

Time: **3** hours   Max. Marks: **60**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A *(10 × 2 = 20 Marks)*

1. Define the terms precision and accuracy as applied to robots.
2. How many degrees of freedom does a wrist mechanism have? What is the purpose of these degrees of freedom in the wrist?
3. Differentiate direct and inverse kinematics.
4. What do you mean by velocity feedback?
5. How do you sense the positional accuracy of a robot? What is the suitable type of sensor to measure the position?
6. What is the functional difference between internal state sensor and external state sensor?
7. How can we use robots for disaster management? Give two examples.
8. List various industrial applications of robots.
9. What is motion interpolation?
10. Define the term 'machine vision'.

Part-B *(5 ×8 = 40 Marks)*

11.a) Describe various robot configurations with neat sketches.   [4]

   b) List different drive systems used in robots. Explain any one of them.   [4]

12.a) Differentiate point to point and continuous path control used in robots with suitable examples.   [3]

   b) Calculate the homogeneous transformation matrix to represent the following sequence of operations: [5]
       i) Rotation of 60^0 about OX-axis   ii) Translation of 4 units along OY-axis
       iii) Translation of -6 units along OX-axis   iv) Rotation of 30^0 about OY-axis.

13.a) Explain working of proximity sensors with a neat sketch.   [4]

   b) Identify how artificial intelligence is useful in the area of robotics.   [4]

14.a) Discuss the applications of robots in the following fields: i) medical   ii) space   [4]

   b) What are micro and nanorobots? Explain their applications.   [4]

15.a) Explain the considerations in robot gripper selection and design.   [4]

   b) Compute the resultant rotation matrix that represents a rotation of 30^0 angle about the OY axis followed by a rotation of 45^0 angle about the OW axis followed by a rotation of 60^0 angle about the OU axis.   [4]

16.a) Discuss any one type of tactile sensor.   [4]

   b) Justify the use of robots in spray painting.   [4]

17.   Answer any ***two*** of the following:

   a) Outline various robot joints with neat sketches.   [4]

   b) Explain how robotics is a technology for the future.   [4]

   c) Describe important features of robot programming.   [4]

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