Register Number: ……..

**B.E DEGREE EXAMINATIONS: APRIL/MAY 2014**

(Regulation 2009)

Sixth Semester

**AUTOMOBILE ENGINEERING**

AUE131**:** Robotics

**Time: Three Hours** **Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. The Notation scheme used to designate Cartesian coordinate system is
   a) LLL b) TRL
   c) TRR d) TLL
2. In order to position the end effector of robot, the joint used is
   a) Wrist joint b) Arm and body joint
   c) End effector joint d) Grip joint
3. The end effector used to grasp and hold the object is
   a) Wrist b) Robot arm
   c) Gripper d) Face plate
4. Actuator that provides output in the form of discrete angular motion increment is
   a) Servo motor b) Generator
   c) Tachometer d) Stepper motor
5. The information associated with the contact between manipulator hand and objects are obtained by
   a) Touch sensor b) Range sensor
   c) Position sensor d) Proximity sensor
6. Digitization of special coordinates will be referred as
   a) Image scanning b) Image sampling
   c) Intensity d) Quantization
7. The position of the end of arm in world space defined by a link is referred as
   a) Reverse transformation b) Inverse transformation
   c) Forward transformation d) Robot transformation
8. The following is one of the robot programming language
   a) AI b) SARS
   c) PLEMA d) AML
9. The preferred anatomy for spray coating application of robot is
   a) Joint arm b) Polar coordinates
   c) Cartesian coordinates d) Cylindrical coordinates
10. The method used to assess the time consumption, if robot performs task is
    a) MTM b) RTM
    c) STM d) LTM



**PART B (10 x 2 = 20 Marks)**

11. Mention the different applications of robots.
12. List out the physical characteristics of robot that affects the work envelope.
13. Mention some applications where tools are used as end effectors.
14. What are the factors to be considered in selection and design of grippers?
15. Mention the use of sensors in robots.
16. What are the functions of machine vision system?
17. Rotate the vector v = 5i +3j + 8k by an angle $90^{\circ}$ about x –axis.
18. List out any four robot programming languages.
19. Mention the safety considerations in robot work place.
20. What are the technical features required for material transfer application of robot?

**PART C (5 x 14 = 70 Marks)**

21. a) i) Illustrate four basic coordinate systems with neat sketch. (8)
    ii) Sketch and describe three degrees of freedom associated with robot wrist. (6)

    **(OR)**

    b) Write short notes on
    i) Speed of motion ii) Pay load

22. a) Discuss in detail, the robot drive system for an industrial application.

    **(OR)**

    b) i) Describe with neat sketch, the operation of mechanical grippers. (7)
    ii) Sketch and describe magnetic grippers. (7)

23. a) i) Sketch and describe triangulation and structured lighting approach for range sensing. (6)
    ii) Explain with neat sketch, the working of ultrasonic sensor and optical proximity sensor. (8)

**(OR)**

b) i) What is the significance of image data reduction? Mention its schemes. (4)

ii) Describe the different ways to segment the image data. (10)

24. a) Derive Denavit-Hartenberg matrix to describe translational and rotational relationship between links of robot.

**(OR)**

b) i) Describe lead through programming method in detail. (6)

ii) Write a simple robot program for palletizing operation. (8)

25. a) Discuss in detail, the steps in implementing robots for an industry.

**(OR)**

b) Describe the methods to analyze and compare the investments in industrial robot

**********