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**Question Paper Code:49508**

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2019

Elective

Electronics and Instrumentation Engineering

14UEI908- ROBOTICS AND AUTOMATION

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. For a robot unit to be considered a functional industrial robot, typically, how many degrees of freedom would the robot have? CO1- R  
(a) 6 (b) 5 (c) 4 (d) 2
2. Maximum number of variable required to define the motion of body in space. CO1- R  
(a) 4 (b) 6 (c) 2 (d) 1
3. Basic components of pneumatic drive systems except CO2- R  
(a) Gripper (b) Compressor  
(c) Pneumatic conditioner (d) Pneumatic valve
4. Frame grabber is used to CO2- R  
(a) Archive the image (b) Segment the image  
(c) Process the image (d) Capture and store digital image
5. Drives are also known as CO3- R  
(a) actuators (b) controller (c) sensors (d) manipulator
6. Magnetic type gripper need \_\_\_\_\_ CO3- R  
(a) smooth surface to hold (b) surface without any hold  
(c) one side of surface to hold (d) corner less surface to hold
7. \_\_\_\_\_ is the mathematical optimization technique which belongs to family of local search. CO4- R  
(a) Hill climbing (b) Research and rescue  
(c) Surveillance (d) Agriculture

8. The 2-DOF universal joint is the combination of intersecting of CO4- R
- (a) Two revolute joints (b) Two prismatic joints
- (c) Two Helical joints (d) Two planner joints
9. Identify the material processing operation CO5- R
- (a) Pick and place (b)Material loading (c) Spot welding (d) Die casting
10. A PUMA robot usually consists of CO5- R
- (a) Six revolute axes (b) Five revolute axes
- (c) Four revolute axes (d) Three revolute axes

PART – B (5 x 2= 10Marks)

11. Write Asimov's law of robotics? CO1-R
12. Name the advantages and limitation of a hydraulic drive. CO2-R
13. List some examples of robot end effectors. CO3- R
14. State the robot language elements. CO4- R
15. Describe the various layouts of robot cell. CO5- R

PART – C (5 x 16= 80Marks)

16. (a) Classify the robots based on degrees of freedom and drive technology. CO1- App (16)
- Or
- (b) Draw the block diagram of robotic system and explain the functions performed by every block of it. CO1- App (16)
17. (a) Differentiate tactile and non'tactile sensors. Sketch and explain the Working of an acoustic sensor. CO2- App (16)
- Or
- (b) Explain the function of machine vision systems in robotics. CO2- U (16)
18. (a) Compare the function of electronics and pneumatic manipulator control circuits. CO3- Ana (16)
- Or
- (b) Classify and explain the robot end-effectors from the view point of control. Discuss the design considerations in the robot end-of-the-arm tooling. CO3- Ana (16)
19. (a) (i) Interpret the function of different types of programming language used in robotics. CO4- U (8)
- (ii) Outline the concepts of Hill Climbing Techniques CO4- U (8)

Or

- (b) Explain inverse kinematics for a robotic arm to determine the joint angle for a desired position of the arm. CO4- Ana (16)
20. (a) Exemplify the application of robot in manufacturing and non-manufacturing field CO5- U (16)
- Or
- (b) Discuss and detail about the robot computer interface and robot cell design. CO5- U (16)

