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**Question Paper Code: 59375**

B.E./B.Tech. DEGREE EXAMINATION, MAY 2022

Open elective

Civil Engineering

15UEE975 - PRINCIPLES OF ROBOTICS

(Common to CSE, ECE, MECH, EIE ,IT and Chemical, Agriculture & bio medical Engineering)

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Drives are also known as CO1- U  
(a) Actuators      (b) Controller      (c) Sensors      (d) Manipulator
2. The Robot designed with Cartesian coordinate systems has CO1- U  
(a) Three linear movements      (b) Three rotational movements  
(c) Two linear and one rotational      (d) Two rotational and one linear movement  
movement
3. Variable speed drive is a piece of equipment that regulates the CO2- U  
(a) speed      (b) rotational force  
(c) torque      (d) all the above
4. The Horsepower of motor which has RPM and Torque is 3000 & CO2- App  
6 in-lbf respectively is \_\_\_\_\_  
(a) 0.286      (b) 1.2      (c) 2800      (d) none of these
5. Which of the following terms IS NOT one of the five basic parts of a CO3- U  
robot?  
(a) Peripheral tools      (b) end effectors      (c) controller      (d) drive

6. For a robot unit to be considered a functional industrial robot, typically, how many degrees of freedom would the robot have? CO3- U  
 (a) three                      (b) four                      (c) six                      (d) eight
7. How can less work be done using pulleys? CO4- U  
 (a) Increase the height of the pulley                      (b) Add stronger rope or string  
 (c) Add more pulleys                      (d) Remove pulleys
8. A sensor used in path determination robot CO4- U  
 (a) ultrasonic sensor      (b) IR sensor      (c) proximity sensor      (d) echo sensor
9. Which of the following places would be LEAST likely to include operational robots? CO5- R  
 (a) warehouse              (b) factory              (c) hospitals              (d) private homes
10. Automation with little human touch is known as CO5-R  
 (a) Automation                      (b) Automation  
 (c) Semi worker                      (d) Manual work

PART – B (5 x 2= 10 Marks)

11. Define Robotics. CO1- U
12. Analyze the difference between electronic and pneumatic manipulators. CO2- Ana
13. What is application of machine vision system? CO3- U
14. Distinguish Kinematics and Dynamics. CO4- Ana
15. Explain about path planning? CO5- U

PART – C (5 x 16= 80 Marks)

16. (a) (i) Briefly describe the Robotic Systems with a neat sketch. CO1- U      (10)  
 (ii) Describe Asimov's laws of Robotics. CO1- U      (6)
- Or
- (b) Classify robots according to their co-ordinates with necessary diagrams. CO1- Ana      (16)
17. (a) Compare hydraulic, pneumatic and electrical drives. Sketch and explain pneumatic actuators. CO2-Ana      (16)
- Or
- (b) Explain in details about DC PMMC motor and Brushless DC motor with a neat sketch CO2-U      (16)

18. (a) Explain the different stages of machine vision system and its types of illumination system CO3-U (16)
- Or
- (b) (i) Discuss in detail about Proximity sensors and Touch sensors. CO3-U (8)
- (ii) Illustrate the working of Tachogenerators and position sensor. CO3-U (8)
19. (a) Illustrate in detail the forward and inverse problem of manipulator kinematics in robots CO4- C (16)
- Or
- (b) Discuss in details about Homogeneous Transformations for the manipulator. CO4- U (16)
20. (a) Discuss in details about Block Diagram of Robot control System & motion control. CO5- U (16)
- Or
- (b) Explain in details about Machine loading and unloading process using robots. CO5- U (16)

