



BRAINWARE UNIVERSITY

Term End Examination 2023-2024

Programme – M.Tech.-RA-2023

Course Name – Fundamental of Robotics: Robot Installation and Economics

Course Code - PCC-MIRA101

(Semester I)

Library
Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Select What is a singularity in robotics and mechanisms?
- a) A point where a robot stops working b) A point where a robot becomes infinitely small
- c) A configuration where the robot loses one or more degrees of freedom d) A point where a robot becomes infinitely large
- (ii) Choose what is the term for a singularity that occurs when two adjacent links of a robot arm become collinear
- a) Joint singularity b) Kinematic singularity
- c) Geometric singularity d) Workspace singularity
- (iii) In a robot's kinematic chain, select what does a joint represent
- a) A rigid body b) A point in space
- c) A connection between two links d) A programming code
- (iv) In ANN, neurons are selected by
- a) Memory b) Processing element
- c) Wires d) None of the mentioned
- (v) Show what is the purpose of representing a robot's structure using a kinematic diagram
- a) To create artistic renderings of robots b) To describe the robot's power source
- c) To depict the robot's mechanical structure and joints d) To display the robot's operating software
- (vi) Select what is a link in a robot
- a) A type of programming language b) A physical component that connects joints
- c) A wireless connection to control the robot d) A tool used for tightening bolts
- (vii) Select which of the following is a potential application of quantum computing in the future.
- a) Faster typewriting b) Advanced weather forecasting
- c) Color printing d) Grocery shopping

- (viii) Select what is the primary objective of economic analysis in robotics.
- a) Maximizing technology innovation b) Minimizing robot cost
c) Maximizing robot performance d) Maximizing economic efficiency
- (ix) Choose which of the following is NOT a factor considered in the cost-benefit analysis of implementing robotics in a manufacturing process.
- a) Labor cost savings b) Initial robot purchase cost
c) Environmental impact d) Market competition
- (x) Choose which of the following is NOT a commonly used safety feature in industrial robots.
- a) Emergency stop button b) Safety interlock system
c) Speed boost mode d) Light curtains
- (xi) Select what is the primary goal of integrating robotics into the workforce.
- a) Replacing human workers b) Enhancing human productivity
c) Reducing unemployment d) Decreasing overall production
- (xii) Select which industry has seen widespread use of robotics to perform tasks traditionally done by humans.
- a) Healthcare b) Agriculture
c) Manufacturing d) Retail
- (xiii) Automation through robotics is more likely to affect, select which type of jobs.
- a) Routine, repetitive tasks b) Creative, non-repetitive tasks
c) Executive-level management positions d) Seasonal, agricultural work
- (xiv) Select the primary goal of robotics
- a) To replace human workers entirely b) To create machines that can mimic human behavior
c) To develop autonomous machines that can perform tasks efficiently d) To design robots for entertainment purposes
- (xv) Choose what is the end effector of a robot
- a) The main control unit b) The part of the robot that interacts with objects or the environment
c) The sensor that detects obstacles d) The power source of the robot

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Explain what is tele-robotics. (3)
3. Write the three main categories of safety hazards in robotics. (3)
4. Describe repeatability of robot (3)
5. What role will human-robot collaboration play in the future workplace? (3)
6. Write the three degrees of freedom associated with the arm and body motion (3)

OR

Write the trajectory planning in robotics. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Write the list of industries benefit most from robot applications. (5)
8. Explain Denavit-Hartenberg (DH) Parameters. (5)
9. Write down the advantages of Robots. (5)

10. State the advantages and dis-advantages of hydraulic drive.

(5)

11. Write the advantages and disadvantages of pneumatic actuators.

(5)

12. Write the name of the sensors, which are commonly used in robots for Robotic Process Automation applications.

(5)

OR

Write down the ethical concerns surround the use of AI and robotics in military applications.

(5)

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