BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(RA)-2022
Course Name – Industrial Robotics and Automation
Course Code - PCC-ECR602
(Semester VI)

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) Identify the primary function of an industrial robot in material handling.

a) Welding b) Painting

c) Assembly d) Transportation

(ii) Indicate type of industrial robot that commonly used for material handling in confined spaces.

a) SCARA b) Cartesian

c) Articulated d) Delta

(iii) Load handling capacity is defined as the maximum weight that a robot can

a) Paint b) Carry

c) Assemble d) Weld

(iv) Select that object recognition and categorization in robotic vision systems often rely on:

a) Deep learning algorithms b) Traditional computer vision techniques

c) Hardware components only d) Laser scanning

(v) Indicate the technique that is commonly used for depth measurement in robotic vision systems.

a) Stereo vision
b) Image compression
c) Histogram equalization
d) Morphological operations

(vi) Choose software considerations that is crucial for real-time processing in robotic vision systems.

a) High memory footprint
b) Low computational complexity
c) High latency
d) Limited scalability

(vii) Identify the advantages of using ASRS technology.

a) Low inventory turnover
b) High-volume, high-speed operations
c) Limited warehouse space
d) Manual material handling preferences

(viii) Choose the purpose of bar code technology in material handling is to:

a) Automate equipment maintenance
b) Track inventory movement
c) Manage personnel schedules
d) Monitor energy consumption

(ix) Choose the key advantage of using monorails in material handling systems.

a) Limited load capacity
b) Flexibility in route planning
c) High-speed transport
d) Complex maintenance requirements

(x) Choose the type of gripper that requires an external power source to operate?

a) Passive gripper
b) Active gripper
c) Pneumatic gripper
d) Hydraulic gripper

(xi) Select a key advantage of passive grippers.

a) High precision
b) Minimal maintenance
c) Greater force output
d) Variable gripping modes

(xii) Select a key advantage of using a modular gripper design.

a) Lower cost
b) Higher grip strength
c) Ease of customization
d) Reduced maintenance

(xiii) Indicate the type of gripper that is suitable for handling irregularly shaped objects.

a) Parallel gripper
b) Angular gripper
c) Universal gripper
d) Compliant gripper

(xiv) Identify the type of testing that evaluates a robot's ability to respond to commands.

a) Command-response testing
b) Color testing
c) Sound testing
d) Taste testing

(xv) Choose an economic benefit of using robots in agriculture.

a) Increased efficiency
b) Decreased productivity
c) Higher labor costs
d) Lower crop yield

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain how endurance tests contribute to evaluating robot performance. (3)

3. Explain the principles underlying efficient material handling system design. (3)

4. Differentiate between machine loading and unloading in terms of material transfer. (3)

5. Write the benefits of integrating depth sensors with robotic vision systems for tasks like autonomous navigation. (3)

6. Differentiate grippers for collaborative robotics applications from traditional industrial grippers. (3)

OR

Explain friction on gripper force managed in gripper design. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Explain does automation plant design software facilitate the planning and optimization of material handling systems in manufacturing facilities. (5)

8. Describe basic components of a Robot. (5)

9. Analyze the role image data compression plays in robotic vision systems. (5)

10. Analyse the impact of object geometry on gripper force. (5)

11. Illustrate the adaptation of robotic vision systems to adapt with the changes in environmental conditions, such as lighting variations, weather conditions, and terrain changes. (5)

12. Illustrate the impact do robots have on workplace safety, ergonomics, and employee well-being. (5)

OR

Explain that robots impact supply chain management, logistics, and distribution operations. (5)

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