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BRAINWARE UNIVERSITY

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

Term End Examination 2025-2026
Programme – Dip.RA-2023
Course Name – Industrial Robotics and Automation
Course Code - ECPC502
(Semester V)

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) Load handling capacity is defined as the maximum weight that a robot can
a) Paint b) Carry
c) Assemble d) Weld

(ii) Identify from the following that is NOT a common image representation format used in robotic vision systems.
a) BMP b) JPEG
c) PNG d) MP4

(iii) Indicate that Rail-guided vehicles are best suited for operations that require:
a) Flexibility in route selection b) High-speed transport
c) Continuous tracking and control d) Small item handling

(iv) Identify Conveyor systems that are ideal for:
a) Irregularly shaped items b) Batch processing
c) Low-volume production d) Continuous flow of materials

(v) Select the reason of using Cranes and hoists.
a) Small parts assembly b) Vertical material movement
c) Horizontal transport d) Inventory tracking

(vi) Select the reason of using Bar code technology.
a) Real-time location tracking b) Inventory identification and tracking
c) Automated material inspection d) Equipment maintenance scheduling

(vii) Identify the advantage of Automation plant design software.
a) Avoiding process optimization b) Streamlining production workflows
c) Increasing manual interventions d) Limiting design flexibility

(viii) Select a common consideration in gripper force analysis.
a) Speed of operation b) Material cost
c) Power consumption d) Weight of the gripper

(ix) Select the type of gripper that is typically used for delicate objects?

a) Pneumatic gripper
b) Hydraulic gripper
c) Magnetic gripper
d) Vacuum gripper

(x) Select parameter that is crucial in the design of a gripper for handling heavy objects.

a) Speed of operation
b) Grip strength
c) Range of motion
d) Material cost

(xi) Identify type of gripper that is commonly used in assembly line automation.

a) Passive gripper
b) Active gripper
c) Vacuum gripper
d) Magnetic gripper

(xii) Indicate a primary benefit of using robots in machine loading.

a) Efficiency
b) Accuracy
c) Manual labor
d) Speed

(xiii) Choose the role of machine learning algorithms in visual inspection tasks.

a) Identifying defects
b) Capturing images
c) Compressing images
d) Generating reports

(xiv) Select technique that is commonly used for lossless compression of image data in robotic vision systems.

a) PNG
b) JPEG
c) GIF
d) BMP

(xv) Indicate a factor that is NOT typically considered when selecting an image representation format for robotic vision systems.

a) Color depth
b) File size
c) Operating system
d) Compression ratio

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Group-B

(Short Answer Type Questions) 3 x 5=15

2. State the Law's of Robotics. (3)

3. Describe how machine learning plays in enhancing object recognition capabilities in robotic vision systems. (3)

4. Discuss how robotic vision systems integrate with robotic manipulators for tasks like pick-and-place operations. (3)

5. Discuss the advantages and disadvantages of passive grippers compared to active grippers. (3)

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

OR

Explain the impact of external forces, such as gravity and inertial forces on gripper force analysis. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Explain the function of robotic vision systems in automation. (5)

8. Discuss the typical applications of grippers. (5)

9. Explain how material handling systems contribute to workplace safety, and what measures can be implemented to enhance safety within these systems. (5)

10. Explain that robots contribute to productivity gains and operational efficiencies in industries. (5)

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

12. Explain specific challenges and requirements that are associated with CNC machine tool loading, and how industrial robots address these challenges. (5)

OR

Explain the concept of a "robot-centered cell" in material handling systems and advantages in industrial automation. (5)

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