BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – Dip.RA-2022
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) In assembly operations, identify the purpose for which robots are utilized
a) Decreasing assembly speed b) Introducing errors in assembly processes
c) Improving efficiency and reducing cycle time d) Increasing manual labor dependency

(iii) In spot welding, identify the purpose for which robots are employed
a) Reducing safety precautions b) Slowing down the production rate
c) Improving spot welding accuracy and consistency d) Decreasing power consumption

(iv) 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

(v) Identify from the following that visual inspection in robotic systems is primarily used for:
a) Identifying defects b) Depth measurement
c) Image compression d) Object representation

(vi) 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

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

(viii) Identify that Automated Storage and Retrieval Systems (ASRS) are designed for:
a) High-volume storage and retrieval b) Manual inventory counting
c) Limited inventory capacity d) Slow-paced operations

(ix) Identify the aim of Material handling systems
a) Equipment utilization b) Labor productivity
c) Inventory accuracy d) Cycle times

(x) 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

(xi) Select the image format that is known for its high-quality lossy compression and is suitable for photographic images.
a) BMP b) PNG
c) JPEG d) GIF

(xii) Select technique that is commonly used for lossless compression of image data in robotic vision systems.
a) PNG b) JPEG
c) GIF d) BMP

(xiii) Choose the role of machine learning algorithms in depth measurement in robotic vision systems.
a) Calculating distances b) Capturing images
c) Analyzing sound d) Measuring temperature

(xiv) 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

(xv) Choose the primary challenge faced in visual inspection tasks using robotic vision systems.
a) Ensuring accuracy b) Reducing computational cost
c) Increasing file size d) Integrating with hardware

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Define Robot Anatomy. (3)

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

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

5. Describe complexity of tasks that influences the choice of a robot. (3)

6. Analyse the design of grippers with multiple degrees of freedom to enhance manipulation capabilities. (3)

OR

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

Group-C

(Long Answer Type Questions) 5 x 6=30

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

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

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

10. Predict how robots impact job roles, skills requirements, and workforce dynamics 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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