



# BRAINWARE UNIVERSITY

Term End Examination 2023-2024

Programme – Dip.ME-2021

Course Name – Industrial Robotics and Automation

Course Code - DME604

( 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 that computer vision plays vital role in the domains of \_\_\_\_\_.
- |           |                     |
|-----------|---------------------|
| a) safety | b) security         |
| c) health | d) All of the above |
- (ii) Name the component of robot which is used to contract almost 40% when air is sucked in them.
- |                          |                 |
|--------------------------|-----------------|
| a) Actuators             | b) Muscle Wires |
| c) Pneumatic Air Muscles | d) Sensors      |
- (iii) State Which of the following terms refers to the rotational motion of a robot arm
- |               |         |
|---------------|---------|
| a) swivel     | b) axle |
| c) retrograde | d) roll |
- (iv) State the number of moveable joints in the base, the arm, and the end effectors of the robot determines \_\_\_\_\_
- |                       |                     |
|-----------------------|---------------------|
| a) degrees of freedom | b) payload capacity |
| c) operational limits | d) flexibility      |
- (v) Define the radial movement (in & out) to the manipulator arm is provided by
- |                    |               |
|--------------------|---------------|
| a) Elbow extension | b) Wrist bend |
| c) Wrist swivel    | d) Wrist yaw  |
- (vi) Identify Industrial Robots are generally designed to carry which of the following coordinate system(s).
- |                                  |                             |
|----------------------------------|-----------------------------|
| a) Cartesian coordinate systems  | b) Polar coordinate systems |
| c) Cylindrical coordinate system | d) All of the above         |
- (vii) Identify which internal state sensors are used for measuring \_\_\_\_\_ of the end effector.
- |                            |                                      |
|----------------------------|--------------------------------------|
| a) Position                | b) Position & Velocity               |
| c) Velocity & Acceleration | d) Position, Velocity & Acceleration |

- (viii) identify which of the following sensors determines the relationship of the robot and its environment and the objects handled by it
- a) Internal State sensors  
b) External State sensors  
c) Both (A) and (B)  
d) None of the above
- (ix) Identify in which of the following operations Continuous Path System is used
- a) Pick and Place  
b) Loading and Unloading  
c) Continuous welding  
d) All of the above
- (x) Select a robot can alter its own trajectory in response to external conditions, observe that it is considered to be
- a) intelligent  
b) mobile  
c) open loop  
d) non-servo
- (xi) Interpret the correct configuration that consists of a telescopic arm which pivots about a horizontal axis and also rotates about a vertical axis.
- a) Cylindrical configuration.  
b) Spherical configuration.  
c) Jointed-arm configuration.  
d) None of these.
- (xii) Select for a large and Ferromagnetic type of object interpret the proper gear that can be employed.
- a) Magnetic.  
b) Mechanical.  
c) Electromagnetic.  
d) All of these.
- (xiii) Hydraulic systems are equipped with one or more accumulators that serve to perform \_\_\_\_\_ . Predict the correct statement.
- a) To provide pressure for emergency operation of the system in the event of system failure.  
b) To act as a buffer and absorb surges and shock pressure that might damage pipes and other components of the system.  
c) To equalize and readjust for any pressure losses in the system due to small leaks and thermal reaction of the fluid.  
d) All of these.
- (xiv) Identify the function of a hydraulic pump.
- a) To provide flow in the hydraulic system.  
b) To create pressure required in a hydraulic system.  
c) To control the pressure required in a hydraulic system.  
d) To compensate for atmospheric pressure at varying altitudes.
- (xv) Choose from the following terms that is classified into the lighter class of robot.
- a) Pneumatic drive.  
b) Hydraulic drive.  
c) Electric drive.  
d) All of these.

### Group-B

(Short Answer Type Questions)

3 x 5=15

2. State the advantages of Fluid Power system in a robotic device. (3)
3. Illustrate the various components of Non-contact proximity sensors. (3)
4. Describe the fundamental laws of Robotics. (3)
5. Distinguish between Robot and NC Technology. (3)
6. Discriminate between mechanization and automation. (3)

OR

Predict the various type of automation system. (3)

### Group-C

(Long Answer Type Questions)

5 x 6=30

7. State the desirable features for sensors and transducers. (5)

8. Explain a comparison between robot-oriented languages and task-level programming languages. (5)
9. Classify the robots according to the coordinates of motion. (5)
10. With suitable sketch illustrate the working on external and internal grippers. (5)
11. Illustrate the importance of 'Robotic Arc Welding Sensors'. (5)
12. Discriminate between 'Workcell' and 'Interlocks'. (5)

**OR**

Discriminate between 'Automated machine' and 'Robot'. (5)

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