BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – B.Tech.(RA)-2021/B.Tech.(RA)-2022
Course Name – Robotic Fundamentals
Course Code - PCC-ECR404
(Semester IV)

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 any one of the following engineering deals with machinery and structure of robots?

a) Electrical b) Mechanical
c) Computer d) All of the options

(ii) Define which one of the following generation robots are autonomous?

a) First b) Second
c) Third d) Fourth

(iii) State which one from the following "laws" is Asimov's first and most important law of robotics:

a) Robots must make business a greater profit b) Robots must follow the directions given by humans
c) Robots must never take actions harmful to humans d) None of the option

(iv) Identify the main objective(s) of Industrial robot is to

a) To minimize the labor requirement b) To increase productivity
c) To enhance the life of production machines d) All of the options

(v) Define numbers of sections does robot manipulator consists of?

a) One b) Two
c) Three d) Four

(vi) Examin robot motion

a) Is not dependent on robot structure b) Imitates human motion
c) Is same for all robots d) None of the option

(vii) In a robot the 'Translotry Joints' label as

a) Revolute b) Prismatic
c) Cylindrical d) Spherical

(viii) Predict a manipulator with more DOF than is necessary, called

a) Efficient manipulator
b) Dynamically redundant manipulator
c) Unnecessary manipulator
d) Kinematically redundant manipulator

(ix) Examine the advantages and disadvantages of using infrared sensors versus ultrasonic sensors in robotic navigation.

a) Infrared sensors are more accurate but have a limited range compared to ultrasonic sensors.
b) Ultrasonic sensors are faster at detecting obstacles but less reliable in outdoor environments.
c) Infrared sensors are less affected by ambient noise but more prone to interference from sunlight.
d) Ultrasonic sensors are more expensive but offer superior performance in complex environments.

(x) Object modules generated by assembler that contains unresolved external references are resolved for two or more object module by a/an

a) Operating system
b) Compiler
c) Loader
d) Linker

(xi) Indicate the following measures are carried out by internal state sensors of the end effector.

a) Position
b) Position and Velocity
c) Velocity and Acceleration
d) Position, Velocity and Acceleration

(xii) State which software is used to upload the Arduino Sketches to the board?

a) avrgcc
b) g++
c) cpython for windows
d) avrdude

(xiii) Define numbers of Analog pins exist in Arduino.

a) 9
b) 5
c) 6
d) 10

(xiv) Select, which of the following is a pre-built board that connects all Arduino boards?

a) Arduino shields
b) Arduino jacks
c) Barrels
d) Sensors

(xv) Define numbers of buttons exist for reset and erase in Arduino Due?

a) 2
b) 4
c) 6
d) 8

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Write the limitations of on-line robot programming. (3)

3. Indicate a few of the basic Adruino functions. (3)

4. Explain why we should use Arduino. (3)

5. State about the inverse kinematics. (3)

6. Illustrate the functions of the work cell controller. (3)

OR

Analyze the function of robots in a Computer Integrated Manufacturing environment. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Explain briefly the various drive methods used for the robot gripper systems. (5)

8. What are the features and applications of hydraulic actuators. (5)

9. Define components of a robotic system. (5)

10. Represent roll, pitch, and yaw angles. (5)

11. Differentiate between internal and external purpose sensors. (5)

12. Write a program for PNP (pick and place) activity. (5)

OR

Write a comparison table for various robot drive systems. (5)

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