BRAINWARE UNIVERSITY

Term End Examination 2023
Programme – Dip.ME-2019
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 which of the following terms refers to the use of compressed gasses to drive (power) the robot device?

　a) pneumatic　　　　　　　　　　　b) piezoelectric
　c) hydraulic　　　　　　　　　　　　d) photosensitive

(ii) Identify the original LISP machines produced by both LMI and Symbolics were based on research performed at _____

　a) CMU　　　　　　　　　　　　　　b) MIT
　c) Stanford University　　　　　　　d) RAMD

(iii) Determine which of the following "laws" is Asimov's first and most important law of robotics?

　a) robot actions must never result in damage to the robot
　b) robots must never take actions harmful to humans
　c) robots must follow the directions given by humans
　d) robots must make business a greater profit

(iv) Tell which of the basic parts of a robot unit would include the computer circuitry that could be programmed to determine what the robot would do?

　a) sensor　　　　　　　　　　　　　b) controller
　c) arm　　　　　　　　　　　　　　d) end effector

(v) Determine the linear variable differential transformer transducer is

　a) Capacitive transducer　　　　　　b) Inductive transducer
　c) Resistive transducer　　　　　　　d) Non-inductive transducer

(vi) State Clockwise of Anti clockwise rotation about the vertical axis to the perpendicular arm is provided through

　a) Shoulder swivel　　　　　　　　b) Elbow extension
　c) Arm sweep　　　　　　　　　　d) Wrist bend

(vii) Classify which of the following work is done by General purpose robot?

a) Part picking
b) Welding
c) Spray painting
d) All of the above

(viii) Identify which of the following drive is used for lighter class of Robot.

a) Pneumatic drive
b) Hydraulic drive
c) Electric drive
d) All of the above

(ix) Ask the name for information sent from robot sensors to robot controller

a) temperature
b) pressure
c) feedback
d) signal

(x) PROLOG is an AI programming language which solves problems with a form of symbolic logic known as predicate calculus. It was developed in 1972 at the University of Marseilles by a team of specialists. Name the person who headed this team

a) Alain Colmerauer
b) Niklaus Wirth
c) Seymour Papert
d) John McCarthy

(xi) Identify which of the basic parts of a robot unit would include the computer circuitry that could be programmed to determine what the robot would do?

a) sensor
b) controller
c) arm
d) end effector

(xii) If a robot has k legs, then state the number of possible events is

a) N = (2k-2)
b) N = (2k-1)
c) N = (2^k-1)
d) N = (2k-2)

(xiii) choose the family of context sensitive languages is .... under union and .... under reversal.

a) closed, not closed
b) not closed, not closed
c) not closed, closed
d) closed, closed

(xiv) From the point of view of the programmer, determine the major advantages of using a high-level language rather than internal machine code or assembly language

a) Program portability
b) Efficiency
c) Easy development
d) None of the above

(xv) In LISP, State that the function returns t if

a) (cons <object>)
b) (consp <object>)
c) (eq <object>)
d) (cous = <object>)

Group-B
(Short Answer Type Questions)

3 x 5=15

2. describe the Joint mode of teaching robots. (3)
3. Define Position representation. (3)
4. Illustrate the motion commands available in VAL programming? (3)
5. Define work space? (3)
6. Write a program to make the robot move forward 1 meter and then stop. (3)

OR

Write a program to make the robot turn left 90 degrees and then move forward 0.5 meters. (3)

Group-C
(Long Answer Type Questions)

5 x 6=30

7. Discuss the origin and various generations of robots. (5)
8. Differentiate between open loop and closed loop servo systems. With the aid of diagrams illustrate the working principle of directional control and flow control valve. (5)
9. Explain the different types of electrical drives used in robot actuation (5)

10. Explain any one algorithm for image edge detection and image segmentation with advantages. (5)
11. What is the work envelope of a robot sketch and explain two views to indicate the work envelope of a i) Cylindrical robot. ii) Anthropomorphic robot. (5)
12. Write a VAL robot program to perform pick and place operation on the conveyer system (5)

OR

Write a program to make the robot move forward in a straight line for 3 meters, then turn right 45 degrees, and move forward for another 2 meters. (5)

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