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**Question Paper Code: 49724**

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Elective

Mechanical Engineering

14UME924-ROBOTICS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Radial movement (in & out) to the manipulator arm is provided by  
(a) Elbow extension    (b) Wrist bend    (c) Wrist swivel    (d) Wrist yaw
2. The device with hardware & software support for giving commands to the drives called  
(a) Controller    (b) Sensor    (c) Base    (d) Actuator
3. The \_\_\_\_\_ must not create any sort of distort and scratch in the fragile work parts  
(a) Path control    (b) Hydraulic drives    (c) Tools    (d) Gripper
4. The body , arm and wrist assembly is sometimes called  
(a) End effector    (b) Manipulator    (c) Anatomy    (d) Sensors
5. Internal state sensors are used for measuring \_\_\_\_\_ of the end effector.  
(a) Position    (b) Position & Velocity  
(c) Velocity & Acceleration    (d) Position, Velocity & Acceleration
6. The work envelop is described by the surface of the  
(a) Work volume    (b) Work Done    (c) Work space    (d) Sensor
7. The amount of time required for the work cycle is  
(a) Robot cycle time analysis    (b) Robot time    (c) Cell timing    (d) Machine cycle time
8. The robot which is located at the approximate center of the cell is called  
(a) Machine cell    (b) Robot centered work cell  
(c) Cell layout    (d) Data Interpretation

9. The system used to move parts in the cell
- (a) Intermittent transfer
  - (b) synchronous transfer
  - (c) Continuous transfer
  - (d) In-Line transfer
10. 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 above

PART - B (5 x 2 = 10 Marks)

11. What is meant by pitch, yaw and roll?
12. List out some examples of Robot End Effector.
13. Name some feedback devices used in robotics.
14. Define work cell.
15. What are the commercially available industrial robot?

PART - C (5 x 16 = 80 Marks)

16. (a) Explain with a neat Sketch about the four basic robot configurations classified according to the coordinate system. (16)
- Or
- (b) Explain the main Robot anatomy with neat sketch. (16)
17. (a) (i) Discuss the various types of Gripper mechanisms. (8)
- (ii) Write note on Gripper selection and design. (8)
- Or
- (b) Explain Pneumatic actuators system with neat sketch. (16)
18. (a) Explain the various techniques in Image Processing and Analysis. (16)
- Or
- (b) Briefly explain the characteristics of Sensors (16)

19. (a) Construct the forward and reverse transformation of 2-Degree of freedom and 3-degree of freedom arm. (16)

Or

(b) Derive the expression for direct and inverse kinematics of 4 degrees of freedom robot manipulator (16)

20. (a) Briefly explain the economic analysis of Robots in detail. (16)

Or

(b) Briefly explain the economic analysis of Robots in detail. (16)

