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**Question Paper Code: 99725**

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

Elective

Mechanical Engineering

19UME925– Industrial Robotics

(Regulations 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The Robot designed with Cartesian coordinate systems has CO1- U  
(a) 3 Linear movement (b) 2 Linear movement  
(c) 1Linear 2 rotational movement (d) 2rotational movement
2. Ability to position back to a point that was previously taught. CO1- U  
(a) Accuracy (b) Repeatability (c) Precision (d) None of the above
3. Motors used for electronic actuator drives CO1- U  
(a) AC servo motors (b) DC servo motors (c) Stepper motor (d) All the above
4. Which Grippers are used to transfer ferrous material CO1- U  
(a) Magnetic (b) Adhesive (c) Mechanical (d) Vacuum
5. The sensor converts light rays into an electrical signal \_\_\_\_\_ CO1- U  
(a) Optical sensor (b) Encoder (c) Potentiometer (d) Capacitive sensor
6. Electrical transformer is used to measure the angle of rotation CO1- U  
(a) LVDT (b) Encoder (c) Resolver (d) Photo electric sensor
7. Robotics is a branch of AI, which is composed of \_\_\_\_\_ CO1- U  
engineering  
(a) Electrical (b) Mechanical (c) Computer (d) All of the above
8. Which of the following motion command is not used in VAL language? CO1- U  
(a) MOVE (b) DEPART (c) D MOVE (d) D PART

9. A portable robot that follows along marked long lines on the floor CO2- U  
(a) AGV (b) Monorail (c) Hoist (d) Crane

10 A mono rail is a track consists of a \_\_\_\_\_ CO2- U  
(a) Single Rail (b) Beams (c) Track (d) All of the above

PART – B (5 x 2= 10 Marks)

11 Describe about robot work envelope. CO1- U

12 List the types of drive systems used in robotics CO1- U

13 What are the common imaging device used for robot vision system CO1- U

14 What is APAS CO1- U

15 List the various investment costs CO2- U

PART – C (5 x 16= 80 Marks)

16 (a) Explain with a neat sketch of Selective Compliance Assembly Robot Arm. CO1-U (16)

Or

(b) Elaborate the selection criteria and factors in the design of a robot. CO1-U (16)

17 (a) Explain with neat sketch of hydraulic actuators in robot with merits and demerits. CO1-U (16)

Or

(b) Discuss with neat sketch of robot end effector swinging gripper, internal and external gripper. CO1-U (16)

18 (a) Describe the neat sketch and working principle of tactile sensor. CO1-U (16)

Or

(b) Describe in detail about the illumination technique of robot vision system. CO1-U (16)

19 (a) Determine the translated vector for the given vector to perform a translation by a distance of CO4-App (16)

Case (i)  $V = 25i + 10j + 20k$   $X = 25$  unit ,  $Y = 10$  unit ,  $Z = 20$ unit

(ii)  $V = 20i + 10j + 10k$   $X = 30$  unit ,  $Y = 25$  unit ,  $Z = 15$  unit

Or

(b) Categorize and explain the higher level robot computer languages used in nowadays robot programming CO4-App (16)

- 20 (a) Explain in detail with neat sketch of Automated Guided Vehicle AGV CO2-U (16)
- Or
- (b) Discuss in detail about EUAC method with robot application. CO2-U (16)

