

Enroll No

Q.P.Code
E 1364

Course Code: RAMD201

Course Name: MDM-I Fundamentals of Robotics & Automation

Day & Date: Monday 17/11/2025

Time : 2:30 To 5:30

Max Marks: 100

- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures in rounded () brackets within the question, indicate the scheme of marking for respective part of the question, whereas, figures in the first right column indicate total marks for that whole question.
 - 3) CO is the index number of the Course Outcome statement.
 - 4) The Bloom's taxonomy level (BL) for 1,2,3,4,5 and 6 is remember, understand, apply, analyse, evaluate and create respectively.
 - 5) Assume suitable data if necessary.
 - 6) Use of non-programmable calculators is allowed

Q.1 Answer the Following

	Mark	COs	BT Level
(a) Write laws of Robot and explain with same with example	5	CO_1	2
(b) What is Cobot? (2) What are benefits of using Cobot at manufacturing space? (3)	5	CO_1	2
(c) From the below list, which machines/items can be considered as a robot. Justify your answer. Flashlight, Bicycle, Self-driving Car	5	CO_1	3

OR

(c) Evaluate the integration of robotics and automation in a modern manufacturing setup (2). How do they complement each other to create a fully automated production system? (3)		CO_1	3
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Q.2 Answer the Following

(a) What are the considerations for selection of Grippers for specific applications.	5	CO_2	2
(b) Differentiate between hydraulic and Pneumatic actuators. (1 each)	5	CO_2	2
(c) Identify the movement of gripper (1 each) and type of grip (1.5 each) for following task a. Hand shaking b. Holding spoon	5	CO_2	3

OR

(c) Choose suitable type of drive system for following application and justify your choice a. Robots used for welding lightweight components b. Humanoid Robot		CO_2	3
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Q.3 Answer the Following

- (a) What is forward kinematics and inverse kinematics? (3) Write significance of the same (2). 5 CO_3 2
- (b) Explain (3) the DH rules for determination of co-ordinate with neat sketch (2). 5 CO_3 2
- (c) Calculate Degree of Freedom for following special mechanism 5 CO_3 3

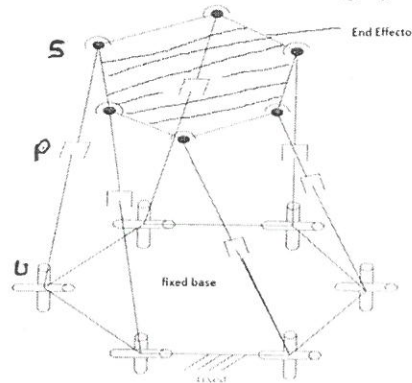


Fig. 3.c

OR

- (c) The concept of roll, pitch and yaw angles has been used to represent the rotation of a frame {B} with respect to the reference frame {U}, that is ${}^U_B R$. Let us suppose that the above rotation can also be expressed by a 3×3 rotation matrix as given below. CO_3 3

$${}^U_B R = \begin{bmatrix} -0.250 & 0.433 & -0.866 \\ 0.433 & -0.750 & -0.500 \\ -0.866 & -0.500 & 0.000 \end{bmatrix}$$

Determine the angles of rolling, pitching and yawing.

Q.4 Answer the Following

- (a) List and explain features of RAPID language. 5 CO_4 2
- (b) Explain any two software used for robot programming. 5 CO_4 2
- (c) Which are characteristics required for any language to become robot programming language. 5 CO_4 3

OR

- (c) Compare lead through programming and walk through programming. CO_4 3

Q.5 Answer the Following

- (a) Differentiate between Fixed and programmable automation. (1 each) 5 CO_5 2
- (b) Explain Integrated Automation (2) and Computer aided automation (3). 5 CO_5 2



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| (c) Justify statement, "No one should not fear job layout of automation" | 5 | CO_5 | 3 |
| (d) A factory producing smartphones wants to reduce downtime and improve communication between CNC machines, conveyors, and inspection stations. Which type of automation would you recommend and why? | 5 | CO_5 | 4 |

OR

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| (d) Analyze the role of sensors and data acquisition systems in enabling integrated automation in a smart factory. | CO_5 | 4 |
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Q.6 Answer the Following

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|---|---|------|---|
| (a) Write (2) working Principle of PLC and explain (3) it with any one industrial application | 5 | CO_6 | 2 |
| (b) What is ladder diagram? (2) Draw and explain symbols used in ladder logic (3). | 5 | CO_6 | 2 |
| (c) List (2) methods of PLC programming and explain (3) structured text method in detail. | 5 | CO_6 | 2 |
| (d) Draw ladder diagram for the equations given below
$Y=(X1X2) + X3$ | 5 | CO_6 | 3 |

OR

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|--|------|---|
| (d) Write PLC program for given ladder diagram | CO_6 | 3 |
|--|------|---|

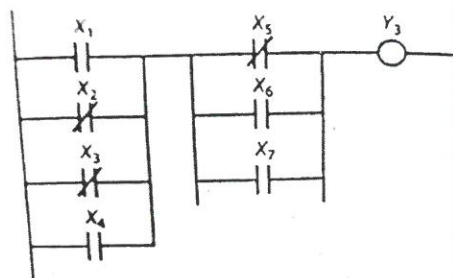


Fig. 6 d

