

Enroll No

K.E.Society's
Rajarambapu Institute of Technology, Rajaramnagar
 (An Empowered Autonomous Institute, Affiliated to SUK)
 End Semester Examination (Nov./Dec. 2025)
 S.Y.B.Tech. Robotics & Automation III

Q.P.Code
E 1148

Course Code: RA201

Course Name: Fundamentals of Robotics & Automation

Day & Date: Wednesday 05/12/2025

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, analyze, evaluate and create respectively.
 - 5) Assume suitable data if necessary.
 - 6) Use of non-programmable calculators is allowed

Q. No.	Description of the Question	Marks	COs	BT Level
Q.1	(a) Draw neat sketches (03 marks) and distinguish (05 marks) between Cylindrical type Robot and Spherical Coordinate type robot	08	1	3
Q.1	(b) Select a Robot for handling an automotive component (Engine) as shown in Fig. 1. Draw a neat sketch of the problem (02 marks), discuss various factors (04 marks) considered in selecting the Robot and justify (02 marks) the selection of Robot for this application.	08	1	4

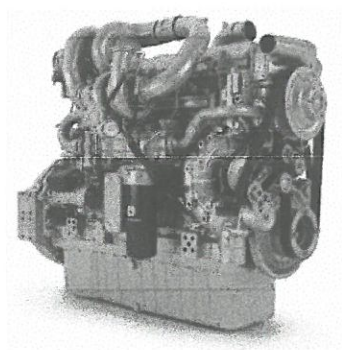


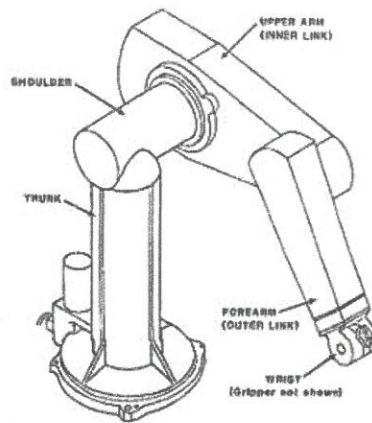
Fig. 1. Automotive Engine

OR

Q.1	(b) A robot arm is required to load and unload components from a lathe. Draw a neat sketch of the problem (02 marks), discuss various factors (04 marks) considered in selecting the Robot and justify (02 marks) the selection of Robot for this application.	08	1	4
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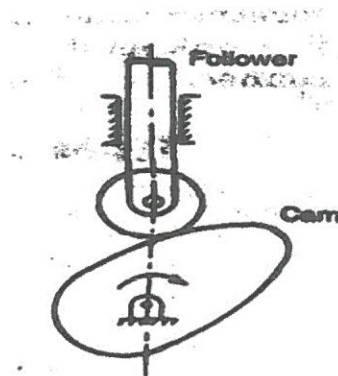
- Q.2 (a) Refer to the figure given below, redraw the same (01 mark) , 08 2 4
name and explain different joints (05 marks) in it and find the
number of degree of freedom (02 marks).



- Q.2 (b) Draw neat sketches and compare prismatic joint (03 marks) and 06 2 3
cylindrical joint (03 marks).

OR

- Q.2 (b) Identify (02 mark) and explain (04 marks) the types of kinematic 06 2 3
pairs in the figure given below.



- Q.3 (a) Distinguish between grippers and tool end effectors (06 marks). 06 3 3
Q.3 (b) Consider an application in which a Robot is used to pick and 08 3 4
place the spherical fruits (Oranges) as shown in Fig. 2. Explain
the factors to be considered for selection of a gripper (05 marks))
for this application. Select a suitable gripper (1.5 marks) and
justify your selection (1.5 marks).

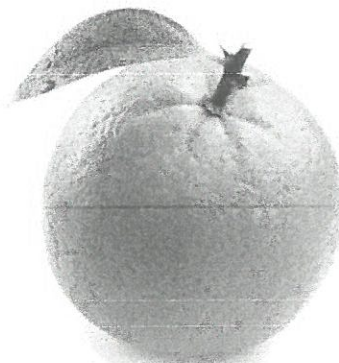


Fig. 2: Spherical fruit (Orange)



OR

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|-----|-----|--|----|---|---|
| Q.3 | (b) | Compare (05 marks) vacuum and magnetic grippers used in packaging lines. Discuss (03 marks) which one is safer for fragile materials and why. | 08 | 3 | 4 |
| Q.4 | (a) | A robot must identify metal and non-metal parts and sort them accordingly in the respective bins. Draw a neat sketch of the problem (02 marks) and write a program (06 marks) with a sequence of commands, for the Robot to perform this task. | 08 | 4 | 5 |
| Q.4 | (b) | Write features (03 marks) of VAL II programming. What are the rules (03 marks) for location name in VAL II programming? Illustrate with an example (02 marks). | 08 | 4 | 2 |

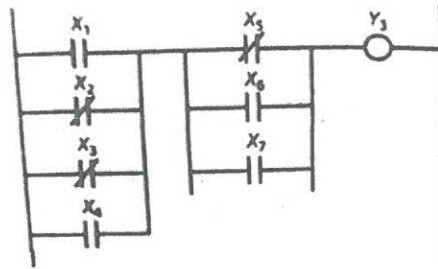
OR

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|-----|-----|---|----|---|---|
| Q.4 | (b) | What is a teach pendant (03 marks)? Draw a neat sketch (03 marks) and explain its role (02 marks) in robot programming.. | 08 | 4 | 2 |
| Q.5 | (a) | What is Job shop production (04 marks) system? Which type of automation (01 marks) is best suitable for it and why (03 marks) ? | 08 | 5 | 4 |
| Q.5 | (b) | 'Programmable automation is preferred over fixed automation'– Justify (08 marks) the statement | 08 | 5 | 4 |
| Q.5 | (c) | Draw a neat sketch (01 mark) and compare (03 marks) field level automation and control level automation. | 04 | 5 | 3 |

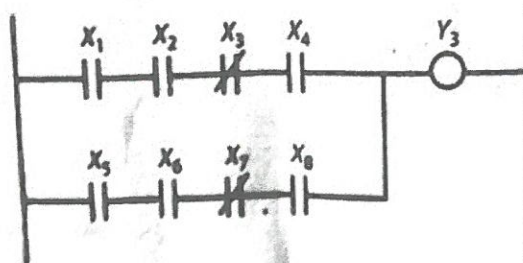
OR

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|-----|-----|---|----|---|---|
| Q.5 | (c) | Explain the following advanced automation functions;
(i) Safety monitoring (02 marks)
(ii) Error detection and recovery (02 marks) | 04 | 5 | 3 |
| Q.6 | (a) | Explain the following using appropriate examples and ladder logic diagrams.
(i) AND logic function (04 marks)
(ii) OR logic function (04 marks) | 08 | 6 | 2 |
| Q.6 | (b) | Write a PLC program (05 marks) for each of the ladder diagrams and explain (03 marks) how each of them works.
(i) | 08 | 6 | 4 |





(ii)



Q.6 (c) Explain main elements (02 marks) of ladder logic using an example (02 marks) of any ladder logic diagram. 04 6 3

OR

Q.6 (c) Draw neat sketches and explain the following elements of PLC. 04 6 3
 (i) Input module (02 marks)
 (ii) Output module (02 marks)

