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Code No. : 15157 (D) N

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. V-Semester Main Examinations, Jan./Feb.-2024

Introduction to Robotics (OE-III)

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B**

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Brief four specifications of a robot.	2	1	1	1
2.	What is the work envelope of a SCARA manipulator?	2	2	1	1
3.	Mention what type of end effector i.e. gripper or tool is used for the following applications. a) Pick and place b) Windows cleaning	2	1	2	1
4.	Classify links used in robots.	2	2	2	1
5.	List robot programming methods.	2	1	3	1
6.	Define direct kinematics.	2	2	3	2
7.	What is machine learning?	2	1	4	2
8.	Write applications of touch sensors.	2	2	4	1
9.	Mention few applications of household robots.	2	1	5	1
10.	Explain the word compliance.	2	2	5	1
Part-B (5 × 8 = 40 Marks)					
11. a)	Explain wrist mechanism with a neat sketch.	6	3	1	3
b)	Mention the laws of robotics.	2	2	1	3
12. a)	List different drive systems and explain.	4	2	2	3
b)	The coordinates of a point 'P' in frame {1} are $[2 \ 5 \ 6]^T$. The position vector 'P' is rotated about y-axis by 60° . Find the coordinates of new point 'Q'.	4	3	2	3

13. a)	Explain the forward kinematics of RR manipulator.	6	4	3	3
b)	Differentiate forward and inverse kinematics of a robot.	2	1	3	1
14. a)	Differentiate touch and tactile sensors.	4	2	4	2
b)	Explain any one position feedback sensor with neat sketches.	4	3	4	2
15. a)	Explain the applications of an industrial robot.	4	3	5	3
b)	Explain the applications of micro robots.	4	3	5	3
16. a)	Explain cylindrical manipulator with a neat sketch.	4	2	1	3
b)	Find homogeneous transformation for the sequence given below. a. Translate by distance d along the Z-axis. b. Rotate counterclockwise by Θ about the Z axis. c. Translate by distance a along the x axis. d. Rotate counterclockwise by α about the x axis.	4	3	2	3
17.	Answer any <i>two</i> of the following:				
a)	Explain robotic programming methods.	4	2	3	2
b)	Explain any one proximity sensor.	4	1	4	2
c)	Write robotic applications in medical field.	4	3	5	3

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level - 1	20%
ii)	Blooms Taxonomy Level - 2	40%
iii)	Blooms Taxonomy Level - 3 & 4	40%
