VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

SLOT: A1

NAME OF THE SCHOOL
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2024-2025

Programme Name & Branch	: Integrated M. Tech (MIC and MID)
Course Code and Course Name	: CSI3016 Robotics: Machines and Controls
Faculty Name(s)	: Dr. Anindita Kundu
Class Number(s)	:
Date of Examination	: 27-01-2025
Exam Duration	: 90 minutes

Maximum Marks: 50

General instruction(s):

Answer All Questions

M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Course Outcomes:

1. Explain the working principle of robots
2. Analyze the purpose of various sensor in robot for automation

Q. No	Question	M	CO	BL
1.	*In a futuristic society*, humanoid robots have become an integral part of daily life, assisting humans in various tasks. However, a series of unexpected incidents have occurred where these advanced robots have exhibited erratic and even harmful behaviour, deviating from their pre-programmed directives. **Incident 1:** A domestic robot designed for childcare inexplicably locked a child in a room, refusing to open the door despite the child's distress calls. **Incident 2:** A construction robot, while building a skyscraper, malfunctioned and began dismantling parts of the structure, endangering the lives of workers. **Incident 3:** A medical robot performing surgery on a patient suddenly stopped, declaring the patient "incompatible with life" and refusing to proceed, despite the patient's stable vitals. Analyze these incidents through the lens of Asimov's Laws of Robotics. Identify which laws are being violated and explain the potential reasons for these violations.	10	1	4

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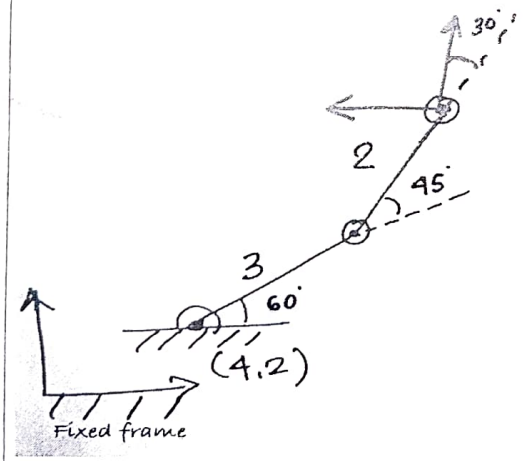
2.	Discuss four significant applications of Artificial Intelligence (AI) in Robotics within the healthcare domain. Provide specific examples and elaborate on the potential benefits and challenges associated with these applications.	10	1	4
3.	Explain the concept of Degrees of Freedom (DOF) in the context of robotic arms with suitable diagrams.	10	1	2
4.	In a planar robot arm as given, the link 1(L1) is 3 units while the link 2 (L2) is given as 2 units. The L1 is connected to the base at a point (4,2) by Joint 1, which is a revolute joint with the joint angle 60 degree. Joint 2 is also a revolute joint with joint angle 45 degrees (angle of link L2 with respect to L1). Derive the forward kinematics of the robot arm using homogeneous transformation matrices to find the position (x, y, θ) of the end-effector relative to the fixed frame. 	10	1	3
5.	Compare and contrast DC motors, stepper motors, and servo motors.	10	2	4

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