



Daffodil International University
Faculty of Science & Information Technology
Department of Software Engineering
Midterm Examination, Spring 2026
 Course Code: SE 532; Course Title: Introduction to Robotics
 Sections & Teachers: 43 (All);

Time: 1 Hour 30 Mins

Marks: 25

Answer **ALL** Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	a) A smart <u>kitchen</u> appliance can automatically blend ingredients based on pre-set recipes. It has no sensors to detect the environment and cannot change its behavior once started. Using the definition of a robot discussed in class, explain whether this appliance qualifies as a robot or not. And if this does not qualify as a real robot, suggest some modification that will make it a real robot.	[Marks-3]	CLO-1 Level-2
	b) A robot arm repeatedly places components on a PCB. a. Robot A places components very close to each other but slightly off from the target point. b. Robot B places components scattered around the target but 'averages near the true location.' Identify which robot demonstrates high precision and which demonstrates high accuracy and explain why both accuracy and precision are important in robotic assembly.	[Marks-3]	
	A service robot in a hospital is ordered by a technician to move a heavy trolley quickly through a crowded corridor. The robot's sensors detect a high risk of collision with patients. Which of Asimov's Laws of Robotics <u>applies most strongly in this situation</u>? Should the robot obey the technician's order? Defend your answer using the laws.	[Marks-4]	
2.	An environmental monitoring robot is deployed in an industrial area. The robot must: • Detect rainfall to protect sensitive equipment • Measure the distance to nearby obstacles while moving • Detect the presence of hazardous gas leakage in the environment Answer question a) using this information.		
	a) Express which sensors will be suitable for each requirement described in the given scenario. Classify each selected sensor as active or passive. Prepare the circuit for this robot for sensor data collection and program the necessary Arduino code to develop this system.	[Marks-10]	CLO-2 Level-3
	b) What is Pulse Width Modulation (PWM)? Apply the concept of PWM to briefly explain how PWM is used to control the speed of a DC motor.	[Marks-2]	

(c)	A mobile robot uses a wheel encoder with 20 counts per revolution. The wheel diameter is <u>8 cm</u>. i) Calculate the distance traveled per encoder count. ii) Explain what happens to distance measurement if the wheel diameter increases.	[Marks-3]	
-----	--	-----------	--

~~12.56 cm/counts~~