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Daffodil International University

Department of Software Engineering

Faculty of Science & Information Technology

Midterm Examination, Fall 2024

Course Code: SE 532; Course Title: Introduction to Robotics

Sections & Teachers: 40 (All);

Md Hafizul Imran(HI); Masrufa Tasnim (MT); Md. Sefatullah (MS)

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)*	**Explain** the following terms: i. Resolution, ii. Photoconductive Effect	**[Marks-2]**	**CLO-1** *Level- 2*
	b)	Are "Accuracy" and "Precision" of a sensor indicating the same characteristics? **Explain** your answers using necessary logic and diagrams if needed.	**[Marks-3]**	
	c)	Bangladesh is rapidly adopting automation and robotics in various sectors, including manufacturing, healthcare, and agriculture. As more industries in Bangladesh begin to rely on robots, it is crucial to ensure that these machines operate safely and ethically. Now, Agricultural robots are used to plant and harvest crops in rural areas of Bangladesh. **Describe** how do the Three Laws help balance efficiency with the safety of farmers working alongside these robots?	**[Marks-5]**	
2.		Consider a smart home system designed to enhance safety through the following functionalities: The system is equipped to detect temperature and presence of sunlight and by detecting these it automatically controls the lights, fans and ac inside the house Additionally, the system is capable of detecting fire within the kitchen, issuing an alert in the event of a fire accident.		
	a)	**Express** which sensors will be suitable to design the smart home system described in the given scenario. Provide a detailed description of their operational processes and underlying principles.	**[Marks-6]**	**CLO-2** *Level-3*
	b)	If you want to turn on a RED light or LED when there is fire, how may you design the circuit for this part? Only **prepare** the circuit for the fire detection and red led alert system. **Program** the necessary Arduino code to develop this system.	**[Marks-6]**	
	c)	To make a robot which is mobile or moving, it is necessary to install motors and wheels. To measure the distance covered by the robot over a specific duration, an Encoder Sensor can be used. Given the following parameters: • The encoder provides 32 counts per revolution. • The installed wheel has a radius of 10 cm. • The encoder records 40 counts in 5 minutes, **Calculate** the distance the robot has traveled in 15 minutes if it has a uniform velocity.	**[Marks-3]**	