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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science and Engineering
Midterm Examination, Spring 2024
Course Code: CSE 333, Course Title: Software Engineering
Level: 3 Term: 3

Time: 1:5 Hrs. **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.]***

As a resident of a smart city, we want to have access to an **Automated Recycling System (ARS)** powered by Artificial Intelligence (AI) so that we can efficiently and effectively recycle waste materials and contribute to environmental sustainability.

Users should be able to register for the automated recycling system using their personal information. Authentication mechanisms such as email verification or OTP should be implemented to ensure secure access. The system should employ AI algorithms to accurately recognize and sort various types of recyclable materials such as plastic, glass, metal, and paper. Advanced image recognition techniques should be used to identify materials based on visual characteristics and markings. Users should be provided with clear instructions on how to use the automated recycling system. Interactive interfaces, such as touchscreens or voice-guided instructions, should assist users throughout the recycling process. Once a recyclable material is deposited into the system, it should be collected and processed automatically. Mechanisms for handling and transporting materials to recycling facilities should be efficient and environmentally friendly. Users should receive feedback and rewards for their recycling efforts, encouraging continued participation. Feedback mechanisms could include notifications on recycling achievements, environmental impact metrics, and rewards points accumulation. System administrators should have access to a centralized dashboard for monitoring the performance and status of the automated recycling system. Real-time alerts should be generated for issues such as equipment malfunctions or capacity constraints. The system should capture data on recycling activity, including the types and quantities of materials recycled. Analytics tools should be utilized to generate reports and insights on recycling trends, usage patterns, and environmental impact. The automated recycling system should be seamlessly integrated with other smart city initiatives and infrastructure, such as IoT networks and waste management systems. Integration points may include data sharing, resource allocation, and collaborative efforts towards sustainability goals.

The system should be designed to accommodate future growth and expansion, including increased user participation and technological advancements. Accessibility features should be incorporated to ensure inclusivity for all users, including those with disabilities or special needs. The automated recycling system should adhere to relevant regulations and standards governing waste management and environmental sustainability. Community outreach programs and educational initiatives should be implemented to promote awareness and encourage participation in recycling efforts.

1.	**Choose** the software development model that will be suited best for the above-mentioned scenario and justify your answer.	[5]	CO1
2.	**Illustrate** the functional and Non-functional requirements for given scenario.	[5]	CO2
3.	**Construct** the Use Case diagram for given scenario.	[5]	CO3
4.	**Illustrate** the Use Case description for **"Material Recognition and Sorting"** and **"User Interaction and Guidance"** process.	[5]	CO2
5.	**Construct** the activity diagram for the **"Material Recognition and Sorting"** and Sequence diagram for **"User Interaction and Guidance".**	[5]	CO3