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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science and Engineering
Final Examination, Spring 2024
Course Code: CSE333, Course Title: Software Engineering
Level: 3, Term: 3

Time: 2:00 Hrs. **Marks: 40**

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.]***

In a world where neurodiversity is celebrated, educators and parents recognized the need for specialized educational tools to support the unique learning needs of autistic children. Driven by the mission to empower these children with effective learning experiences, a team of educators and software developers embarked on creating an Educational Platform for Autistic Children (EPAC). The platform aims to provide a safe, engaging, and inclusive learning environment where children on the autism spectrum can thrive. To achieve this goal, they outlined the following software requirements:

The system should support user registration for autistic children, educators, and parents/guardians, capturing essential information such as name, age, and educational goals. Registered users should be able to log in securely to access their accounts and personalize their profiles. Parents/guardians should have the ability to monitor their children's progress and customize learning settings based on individual needs. The system should offer a variety of interactive educational activities tailored to the learning styles and preferences of autistic children. Activities should cover various subjects such as language arts, mathematics, science, social skills, and sensory integration. Each activity should be customizable to accommodate different skill levels and sensory sensitivities. The system should provide visual supports such as pictograms, visual schedules, and visual cues to help autistic children understand instructions, concepts, and routines. Visual supports should be customizable and adaptable to individual preferences, allowing users to personalize their learning experiences. The system should track and record the progress of autistic children across different educational activities and skill areas. Parents/guardians and educators should have access to detailed progress reports, including achievements, areas of improvement, and suggested interventions. The system should facilitate communication between autistic children, educators, and parents/guardians through secure messaging and video conferencing features. Educators should be able to provide real-time feedback, guidance, and support to children during learning activities.

The system should feature an intuitive and user-friendly interface designed. User interactions should be engaging, predictable, and consistent to reduce cognitive load and sensory. The system should prioritize the security and privacy of user data, implementing encryption, access controls. Parental consent should be obtained for children's participation and data sharing, adhering to applicable privacy regulations. The system should support collaboration and integration with other educational platforms, assistive technologies, and therapy tools used by autistic children, educators, and therapists. APIs should be provided for seamless integration with third-party software and services. The system should undergo regular updates and improvements based on feedback from users, educators, therapists, and researchers in the field of autism education. Continuous monitoring and evaluation should be conducted to assess the effectiveness and impact of the platform on the learning outcomes and well-being of autistic children.

1.	Model the Class Diagram for the above scenario.	[10]	CO3
2.	**Construct** the BPM for "*Track and record of progress*" and GUI for "*Track and progress*" of autistics children.	[10]	CO3

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3.	a)	A software project with a size of 500 KLOC is to be developed. The development team has limited experience in similar projects. The project schedule is moderately tight. **Compute** the effort, development time, average staff size, and productivity of the project. A software project with a size of 600 KLOC has been developed and delivered to the customer after thorough testing. In the first year after delivery, 25,000 lines of code were added, and 1,500 lines of code were deleted. If the development cost of the software was 20, 00,000 BDT, estimate the maintenance cost of the software.	[5]
	b)	Imagine you are part of the quality assurance team for a popular mobile banking application. During a routine testing cycle, a critical defect is discovered in the payment processing module. This defect causes intermittent failures in transaction processing, leading to potential financial losses for users. As a response, the development team has scheduled a "Critical Bug Fix Sprint" to address the issue promptly. **Discover** the following task: • Participants review the defect reports related to the critical payment processing issue. • Each participant assigns a severity level to the defects (e.g., critical, major, minor) based on the impact on functionality and user experience. • Participants discuss the root causes of the defects and propose potential fixes or workarounds. • The team collaboratively prioritizes the defects, considering factors such as severity, frequency of occurrence, and potential business impact. • Participants document the prioritized defects and develop an action plan for resolution, including assigning tasks to developers and scheduling follow-up testing.	[5]

4.	a)	Consider the following code segment for White Box Testing:
		`PROGRAM sum ( maxint, N : INT )`
		`INT result := 0 ; i := 0 ;`
		`IF N < 0`
		`THEN N := - N ;`
		`WHILE ( i < N ) AND ( result <= maxint )`
		`DO i := i + 1 ;`
		`result := result + i ;`
		`OD;`
		`IF result <= maxint`
		`THEN OUTPUT ( result )`
		`ELSE OUTPUT ( "too large" )`
		`END.`
		List the minimal set of test cases to make sure that all paths are tested in this code.
			[5]

	b)	You are assigned to test a weather forecasting application that provides weather information based on user location input. The application displays current weather conditions, forecasts for the upcoming days, and severe weather alerts. Task: **Analyze** the test cases to verify the following functionalities: • Retrieving current weather conditions based on user location. • Displaying weather forecasts for the next 3 days. • Alerting users about severe weather conditions, such as storms or hurricanes. Considerations: Test cases should cover various locations, weather conditions, and edge cases, ensuring accurate and reliable weather information is provided to users.	[5]