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Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Spring 2026

Course Code: SE323; Course Title: Software Architecture & Design

Sections & Teachers: FRR(A-D), SIM(E-H), AE(I-K), ST(L), RBG(M), FF(N)

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.]

A city authority is developing a Smart Emergency Warning System (SEWS) to detect and respond to emergencies such as fires, floods, earthquakes, and industrial accidents. The system collects real-time data from multiple independent sources, including environmental sensors, CCTV systems, weather services, and a citizen mobile application. These sources continuously publish events such as abnormal temperature, smoke detection, unusual crowd movement, and emergency calls. To ensure **loose coupling**, data producers do not communicate directly with data consumers. Instead, events are routed through a **central coordination mechanism** that registers available analytical services (e.g., fire analysis, flood prediction, traffic impact analysis), dispatches events to appropriate services, and collects processed results.

Based on the analysis results, SEWS sends alerts to **citizens, emergency control rooms, hospitals, and traffic management systems**, where each stakeholder receives only relevant notifications. The system is organized using a **multi-layered architecture**. During large-scale disasters, SEWS experiences a very high load. To improve performance, some components directly access lower layers, raising concerns about **architectural degradation** and reduced maintainability. System designers must ensure scalability while preserving architectural integrity.

1.	a) **Differentiate** between architectural sinkhole and layer bridging. Classify appropriate strategies to minimize sinkholes in a layered architecture.	[Marks-4]	CLO-1 Level-2
	b) **Visualize and explain** the Broker Architecture of SEWS, illustrating all major connected services and their communication flow.	[Marks-7]	CLO-1 Level-2
2.	a) **Identify** the component-and-connector view of SEWS and explain how this structure supports system performance.	[Marks-5]	CLO-2 Level-3
	b) Validate why the Scenario (+1) View is important in the 4+1 View Model, and explain how it is redundant with other views.	[Marks-4]	CLO-2 Level-3