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Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Final Examination, Summer 2026

Course Code: CSE 315, Course Title: Software Engineering

Level: 3 Term: 1 Batch: 66

Time: 02:00 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.]

1	A university online course registration system validates a student's registration request based on the following rules: • A student can register only if the completed credit hours are between 40 and 140 credits. • A student can register for maximum 6 courses and minimum 2 courses in a semester. • If any input violates these conditions, the system rejects the registration request. Based on the scenario answer the following:		CO2
	a) Analyze the given registration requirements and design an appropriate set of Boundary Value Analysis (BVA) test cases. Identify the boundary values for each input and determine whether each test case should be accepted or rejected.	[5]	

Consider the following program:

```
void loanApproval(int income, int credit_score, int existing_loan)
{
  if (income >= 50000)
  {
    if (credit_score >= 700)
    {
      if (existing_loan == 0)
        status = "Loan Approved";
      else
        status = "Manual Review";
    }
    else
    {
      status = "Manual Review";
    }
  }
  else
  {
    if (credit_score >= 750 && existing_loan == 0)
      status = "Manual Review";
    else
      status = "Loan Rejected";
  }
}
```

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	b)	Analyze the control flow of the given program and design a White Box test suite that achieves complete path coverage. Determine suitable input values and explain which execution path is covered by each test case.	[5]	
2	NVIDIA develops and supplies high-performance GPUs for AI research and enterprise computing. Customers such as universities, research laboratories, and technology companies can place GPU orders through NVIDIA's ordering system.The order consists of an order id and customer id and approval status, shipment status. After an order is received, a Sales Manager reviews the request and verifies product availability. If the requested GPUs are available, the order is approved and sent to the deployment team. The deployment team prepares the GPUs for shipment and configures the required software drivers before delivery. Then the deployment team marks the order as ready for shipment. To inform customers about important updates, the system uses a Notification interface. Instead of the Order class sending notifications directly, it interacts with the Notification interface. Different notification methods such as EmailNotification and SMSNotification implement this interface, allowing NVIDIA to notify customers through different communication channels without changing the order management system. Based on the scenario answer the following:			CO3
	a)	Apply UML class diagram principles to construct a class diagram for the given scenario. • Identify appropriate classes, relationships, and multiplicities • Define suitable attributes for each class. • Include relevant methods where necessary.	[10]	
	b)	Apply BPMN modeling concepts to develop a BPMN diagram for the given scenario. Demonstrate how the whole process interacts with every participant in a systematic manner.	[5]	
3	A university has been using a Library Management System for the last 10 years. The system requires major upgrades, including RFID-based book tracking, cloud migration, and integration with a national digital library. The existing software is poorly documented, and significant modifications are required before implementing these new features. The software company is considering two development approaches for this project: **Project A:** Upgrade the existing system by modifying 20 KLOC of code. The project will be handled by an experienced team, and the requirements are well understood. **Project B:** Redevelop the system as a 90 KLOC cloud-based solution integrated with embedded RFID used in self-service kiosks. The project involves strict hardware constraints, high reliability, and complex integration. Based on the scenario answer the following:			CO3
	a)	Determine the most appropriate software maintenance process model for the upgrade of the existing system. Justify your answers.	[4]	
	b)	Select the appropriate COCOMO development mode for Project A and Project B based on the given project characteristics. Explain the factors influencing your selection. Then calculate the estimated development effort for both projects using the Basic COCOMO model.	[6]	
4	Rahim developed EyeVision, a web-based application that detects eye diseases by analyzing images uploaded by users using a deep learning model. The system also provides diagnostic reports, appointment booking with eye specialists, and a history of previous scans. During testing, the model achieved 98% accuracy but only 82% precision, raising concerns about false positive diagnoses. Karim suggested that the team should prioritize improving the reliability of the disease detection feature instead of adding new features. He also recommended that an independent QA team evaluate the system before its public release. Based on the scenario, answer the following:			CO1
	a)	Describe why the QA team should independently evaluate the EyeVision system before its public release.	[2]	
	b)	Briefly describe some ethical concerns that may arise from collecting users' eye images in the EyeVision application.	[3]	