



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
UNIVERSITY OF BARISHAL

FINAL EXAMINATION

Course Title: Software Engineering and Information System Design

Course Code: CSE-3103

3<sup>rd</sup> Year 1<sup>st</sup> Semester

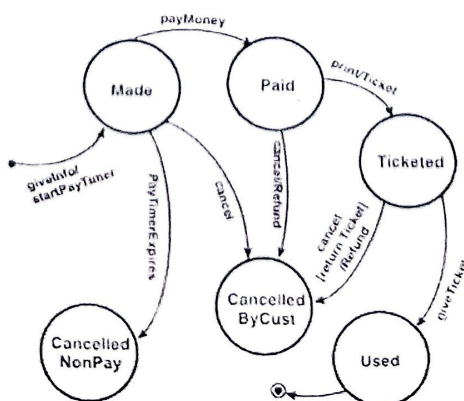
Session: 2023-24 (Admission: 2021-22)

Time: 3 Hours

Marks: 60

(Answer any FIVE questions)

1. a) Define Software Engineering. Explain why it is essential to follow Software Engineering principles and practices in order to develop software on time, within budget, and with the desired quality. [4]
- b) Why are software project planning and tracking essential in software engineering? As a software project manager, explain how you would plan a software project and keep track of its progress during development. [4]
- c) Describe a process framework in your own words. When we say that framework activities are applicable to all projects, does this mean that the same work tasks are applied for all projects, regardless of size and complexity? Explain. [4]
2. a) Explain the phases of the Waterfall Model with a neat diagram. Provide three examples of software projects that would be amenable to the waterfall model. [4]
- b) Define agile. Describe the core principles of Agile Software Development. [4]
- c) What is Scrum? Explain the key roles, events, and artifacts of Scrum in detail. [4]
3. a) What do you mean by Risk analysis and management? What steps are involved in it. Explain in detail. [4]
- b) A software development project is experiencing frequent delays, unclear task responsibilities, low team productivity, and cost overruns. As the project manager, analyze the possible reasons behind these issues. Based on software project management principles, propose a detailed strategy to bring the project back on schedule, control the cost, and improve team coordination. Additionally, explain how you will motivate your software team to enhance overall performance. Justify each step of your proposed solution. [4]
- c) Why is Requirements Engineering important for developing quality software? Explain with reasons. Differentiate between functional and non-functional requirements with suitable examples. [4]
4. a) Discuss Black Box Testing and White Box Testing with suitable examples. How to compute the cyclomatic complexity? [4]
- b) The V-model of software development emphasizes the verification and validation of software throughout the development process. With the aid of an appropriate illustration show and describe how this process is carried out at the various test levels. [4]
- c) When a system must remember something about what has happened before or when valid and invalid orders of operations exist, state-transition diagrams are excellent tools to record this information. Consider the following state transition diagram for a *Ticket Reservation system*. Prepare a detailed report containing the test cases for this system. Include all possible test cases required to ensure that every state transition in the system is exercised at least once during testing. [4]



Signature

Project Mitigation RMA

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Consider the following scenario and answer questions no 5 to 8.

The University Management System (UMS) is being developed to streamline key academic administrative processes, specifically student admission, exam form fill-up, and result processing. The system will support new applicants by allowing them to submit online admission applications, upload necessary documents, pay admission fees, and track their admission status. Once admitted, students receive a unique ID and gain access to academic services. The exam form fill-up module enables registered students to log into the system, view eligible courses for the semester, select the courses they wish to appear for in examinations, make payments, and submit the form digitally. The system validates prerequisites, checks fee clearance, and generates an admit card automatically. For result processing, each course has two examiners who independently enter marks in two parts: Internal Assessment (40%) and Final Exam (60%). The system verifies consistency, calculates final grades, and flags discrepancies for review before publishing results. Administrators can monitor all processes, manage records, approve applications, and generate reports, ensuring accurate and timely academic management.

Joint

Student, ex administration  
Admin  
Faculty, student

5. a) Identify all the key stakeholders for the University Management System. Categorize them into primary and secondary stakeholders and explain the roles and responsibilities of each stakeholder in relation to the system. [4]
- b) Explain the process of Quality Function Deployment (QFD). Identify requirements for the this system based on QFD. [4]
- c) Discuss the different viewpoints of the University Management System. Explain how considering multiple viewpoints helps in capturing complete requirements and reduces conflicts during system development. Provide examples from the scenario. [1]
6. a) Identify all possible use cases for the University Management System based on the given scenario. Draw Use Case Diagrams illustrating the interactions between actors and the system. [6]
- b) Draw both Activity Diagram and Swimlane Diagrams for the UMS, showing the workflow of key processes. [6]
7. a) Derive the potential classes from the system's user stories and prepare class cards. Using these classes, draw a Class Diagram representing the structure of the system. [6]
- b) Draw the Data Flow Diagram for the UMS, showing the main processes, data stores, and external entities. Include all necessary levels to depict the flow of information clearly. [6]
8. a) Draw a Sequence Diagram for one major process of the system, showing the interaction between actors and system components over time. [4]
- b) Draw a comprehensive State Transition Diagram for the University Management System (UMS), showing the lifecycle of a student's course or exam registration process. [4]
- c) Write down all possible test cases for the University Management System (UMS) in detail. Include test cases for major functionalities [4]

**Good Luck!!!**