

BRAC UNIVERSITY
Department of Computer Science and Engineering

Examination: Quiz 2
Semester: Fall 2024

Duration: 30 min
Full Marks: 15

CSE 470: Software Engineering

Name:	ID:	Section:
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The bustling Modern City Library implemented a robust Library Management System to handle its growing collection of 20,000 books and its 5,000 active members. The system revolves around several key entities: **Library**, **Book**, **Member**, **Transaction**, and **Librarian**, each playing a pivotal role in ensuring smooth operations.

At the heart of the system is the **Library**, which acts as a central hub. Its attributes include libraryName, address, books, members, and transactions. The library provides functions such as searching books and showing a list of books available for borrowing.

The **Book** class represents each book in the library's collection. It has attributes like title, author, ISBN, and availability. A book can be marked as borrowed or returned to help in tracking whether a book is in circulation. The **Book** class is related compositionally to the **Library** in a way that the books cannot exist outside the library's domain.

Members of the library are represented by the **Member** class, which aggregates into **Library**. Each member has attributes like memberID, name, contactInfo, and membershipStatus. Members can borrow books and return them. The **Member** class depends on **Transaction** to record the borrowing and returning activities.

The **Transaction** class links books and members through attributes such as transactionID, borrowDate, dueDate, returnDate, and fineAmount. It determines fines for overdue returns. Transactions aggregate into **Library** but depend on **Book** and **Member** for their operation, highlighting the relationships between borrowing and returning activities.

The **Librarian** class oversees library operations, generalized into **Junior Librarian** and **Senior Librarian**. Common attributes include employeeID and role. Junior Librarian focuses on basic tasks like handling borrow requests, while Senior Librarian performs advanced functions like approving acquisitions and supervising junior librarians.

This tightly integrated system ensures that books, members, and transactions are managed seamlessly while enabling efficient communication between the different entities. This dependency between classes ensures data consistency and operational efficiency, making the Modern City Library a model of digital transformation in public services.

1. Design a UML class diagram from the above scenario. [10]
2. Write down three functional and two non-functional requirements from the given scenario. [5]

Solution:

