**Please upload to org.howard.edu.lsp.midterm.question1**

**(30 pts. total)**

**Given:**

**Identify CRC cards for the following set of requirements:**

The library maintains a collection of books, each having a title, author, ISBN, and availability status. Members of the library can borrow books if they are available. Each member can borrow only up to 3 books at a time. When a member returns a book, it should become available again. Librarians can add new books to the collection and remove books that are outdated or lost. The system must allow the librarian to view the list of available books and see which books are currently checked out and who has borrowed them.

Using the **Class-Responsibility-Collaborator (CRC) method**, complete the following steps:

#### **Part 1: Identify Classes**

(10 pts.)

* Identify at least **four key classes** necessary to implement this system.
* Write a short explanation of why each class is needed.

#### **Part 2: Define Responsibilities**

(10 pts.)

* For each class, list at least **two primary responsibilities** that the class must have.

#### **Part 3: Identify Collaborators**

(10 pts.)

* For each class, identify **other classes** it interacts with to fulfill its responsibilities and explain why the collaboration is needed.

| **ClassName** | |
| --- | --- |
| Responsibility | Collaborators |

**Classes:**

**Book**: It represents individual books in the library collection where it needs to track essential book information and manage availability during lending and returning.

**Member**: It represents a library user who can borrow/return books needed to enforce borrowing rules and track each member's books.

**Librarian**: It represents the staff responsible for managing the book collection and viewing loan records. It is needed to perform administrative tasks like adding/removing books.

**LibrarySystem**: It is a central controller that coordinates book and member data, processes transactions, and ensures borrowing rules are enforced. It acts as the main logic controller.

| Book | |
| --- | --- |
| - Maintain book details (title, author, ISBN, availability).  - Update availability when borrowed or returned. | Member  Librarian |

| Member | |
| --- | --- |
| - Borrow books if available and within the borrowing limit (max 3).  - Return books back to librarian | Book  Librarian |

| Librarian | |
| --- | --- |
| - Add new books to the collection.  - Remove lost or outdated books.  - View book availability and borrowed records. | LibrarySystem  Book |

| LibrarySystem | |
| --- | --- |
| - Maintain a record of books and members.  - Process borrowing and returning transactions.  - Track book availability and borrowing history. | Librarian  Book |