

|  | University of Dhaka |  |
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| **Institute of Information Technology (IIT)** |
| Bachelor of Science in Software Engineering (BSSE) |

| **Course:** | **SE 506 Design Patterns** |
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| **Lab 07:** | **Miscellaneous** |
| **Time:** | **2 hours** |

Design and implement a library management system using the **Factory**, **Proxy**, and **Singleton** patterns. In this system, Users can borrow different types of library items (e.g., Books, Magazines, etc.). The access to restricted items is controlled through a proxy. A singleton configuration manager handles library-wide settings like late fees and opening hours. You can start with the following steps:

* Define a LibraryItem interface with methods like getDetails() and borrowItem().
* Implement concrete classes Book, Magazine, and other types.
* Create a LibraryItemFactory class to generate the appropriate LibraryItem object based on user input.
* Define a LibraryAccess interface with a method accessItem(String itemID, User user).
* Implement a concrete class RealLibraryAccess to provide direct access to library items.
* Create a LibraryAccessProxy class that checks user permissions before allowing access to restricted items.
* Create a LibraryConfigManager class to store system-wide settings like late fees, borrowing limits, and library hours.
* Ensure only one instance of LibraryConfigManager exists and provide methods to retrieve and update settings.