Time: 45 min   Total Mark: 10

You need to simulate a **Library Book Tracking System** using basic Object-Oriented Programming (OOP) concepts in C++. The system should allow the library to store a collection of books, support adding ratings for each book, and compute the average rating. Each book will have a **single copy** in a specific library. *For storing strings, you can use the C++ <string> library if convenient.*

Tasks:

1. Create a class named Book with private member variables:

   - `string title` – to store the book's title

   - `string author` – to store the book's author

   - `int ratingCount` – current number of ratings added

   - `double avgRating` – average rating of the book

2. Include public member functions to:

   - Add a rating to the book: `void addRating(int rating)`

   - Calculate the average rating: `double getAverageRating()`

   - Display the book details along with the average rating: `void display()`

3. Implement the following for the Book class:

   - A default constructor

   - A parameterized constructor: `Book(string title, string author)`

4. Create a class named Library that manages the collection of books.

5. Include private member variables:

   - `int maxBooks` – maximum number of books that can be stored

- ○ `Book* books` – dynamically allocated array to store `Book` objects

- ○ `int totalBooks` – current number of books in the library

6. Include public member functions to:

   - ○ Add a new book to the library: `void addBook(Book b)`

   - ○ Remove a book from the library: `void removeBook(Book b)`

   - ○ Add a rating to a specific book: `void rateBook(string title, string author, int rating)`

   - ○ Show all books and their average ratings: `void showBooks()`

   - ○ Return the book with the highest average rating: `Book bestRatedBook()`
     Note: If multiple books have the same highest rating, return any one of them.

7. Implement the following for the `Library` class:

   - ○ A default constructor

   - ○ Parameterized constructors:

      - ■ `Library(int maxBooks)`

      - ■ `Library(int maxBooks, Book* books, int totalBooks)`

   - ○ A copy constructor

   - ○ A destructor

8. Please carefully see the sample main function to understand the output format. You can copy the main function directly to your code.

Sample `main()` Function:

```cpp
int main() {
    Library lib1(5);

    Book b1("The Great Gatsby", "F. Scott Fitzgerald");
    Book b2("To Kill a Mockingbird", "Harper Lee");
    Book b3("1984", "George Orwell");
    Book b4("War and Peace", "Leo Tolstoy");
    Book b5("The Kite Runner", "Khaled Hosseini");
    Book b6("A Tale of Two Cities", "Charles Dickens");

    lib1.addBook(b1);
    lib1.addBook(b2);
    lib1.addBook(b3);
    lib1.addBook(b4);
    lib1.addBook(b5);
    lib1.addBook(b6);

    lib1.rateBook("The Great Gatsby", "F. Scott Fitzgerald", 5);
    lib1.rateBook("The Great Gatsby", "F. Scott Fitzgerald", 4);
    lib1.rateBook("To Kill a Mockingbird", "Harper Lee", 5);
    lib1.rateBook("1984", "George Orwell", 4);
    lib1.rateBook("1984", "George Orwell", 5);
    lib1.rateBook("1984", "George Orwell", 5);
    lib1.rateBook("War and Peace", "Leo Tolstoy", 3);
    lib1.rateBook("War and Peace", "Leo Tolstoy", 4);
    lib1.rateBook("The Kite Runner", "Khaled Hosseini", 5);
    lib1.rateBook("The Kite Runner", "Khaled Hosseini", 4);
    lib1.rateBook("The Kite Runner", "Khaled Hosseini", 5);

    cout << "\nLibrary 1 Books and Ratings:\n";
    lib1.showBooks();

    cout << "\nBest Rated Book in Library 1:\n";
    lib1.bestRatedBook().display();
    cout << endl;

    Library lib2(lib1);
    lib2.removeBook(b2);
    lib2.addBook(b6);

    cout << "\nLibrary 2 Books and Ratings:\n";
    lib2.showBooks();
```

```
        cout << "\nBest Rated Book in Library 1:\n";
        lib1.bestRatedBook().display();
        cout << "\nBest Rated Book in Library 2:\n";
        lib2.bestRatedBook().display();

        return 0;
    }
```

Expected Output:

```
Book added: The Great Gatsby by F. Scott Fitzgerald
Book added: To Kill a Mockingbird by Harper Lee
Book added: 1984 by George Orwell
Book added: War and Peace by Leo Tolstoy
Book added: The Kite Runner by Khaled Hosseini
Library is full. Cannot add more books.

Library 1 Books and Ratings:
Book: The Great Gatsby by F. Scott Fitzgerald, Average Rating:
4.5
Book: To Kill a Mockingbird by Harper Lee, Average Rating: 5
Book: 1984 by George Orwell, Average Rating: 4.66667
Book: War and Peace by Leo Tolstoy, Average Rating: 3.5
Book: The Kite Runner by Khaled Hosseini, Average Rating: 4.66667

Best Rated Book in Library 1:
Book: To Kill a Mockingbird by Harper Lee, Average Rating: 5

Book removed: To Kill a Mockingbird by Harper Lee
Book added: A Tale of Two Cities by Charles Dickens

Library 2 Books and Ratings:
Book: The Great Gatsby by F. Scott Fitzgerald, Average Rating:
4.5
Book: 1984 by George Orwell, Average Rating: 4.66667
Book: War and Peace by Leo Tolstoy, Average Rating: 3.5
Book: The Kite Runner by Khaled Hosseini, Average Rating: 4.66667
Book: A Tale of Two Cities by Charles Dickens, Average Rating: 0

Best Rated Book in Library 1:
Book: To Kill a Mockingbird by Harper Lee, Average Rating: 5

Best Rated Book in Library 2:
Book: 1984 by George Orwell, Average Rating: 4.66667
```