Object Oriented Programming Lab

Lab 10 **Marks 05**

Instructions

- Work in this lab individually.
- You can use your books, notes, handouts etc. but you are not allowed to borrow anything from your peer student.
- Make sure to follow the best coding practices.
- Include comments to explain the logic where necessary.
- *You are strictly **NOT ALLOWED** to include any additional data-members/functions/constructors in your class.*
- Test your program thoroughly with various inputs to ensure proper functionality and error handling.
- Show your work to the instructor before leaving the lab to get some or full credit.

Ship Inheritance Hierarchy

Implement the following class hierarchy. The inheritance access level should be public for all derived classes.

Ship Class Details

Design a **Ship** class that has the following members:

- A member variable for the **name of the ship** (a string)
- A member variable for the **year that the ship was built** (a string)
- An appropriate **constructor**
- Appropriate **accessors and mutators**
- A virtual **print** function that displays the ship's name and the year it was built.

CruiseShip Class Details

Design a **CruiseShip** class that is derived from the **Ship** class. The **CruiseShip** class should have the following members:

- A member variable for the **maximum number of passengers** (an int)
- An appropriate **constructor**
- Appropriate **accessors and mutators**
- A **print** function that **overrides the print function in the base class**. The **CruiseShip** class's print function should display the ship's name, year of build, and the maximum number of passengers.

CargoShip Class Details

Design a **CargoShip** class that is derived from the **Ship** class. The **CargoShip** class should have the following members:

- A member variable for the **cargo capacity in tonnage** (an int)
- An appropriate **constructor**
- Appropriate **accessors and mutators**
- A **print** function that **overrides the print function in the base class**. The **CargoShip** class's print function should display only the ship's name and the ship's cargo capacity.

BattleShip Class Details

Design a **BattleShip** class that is derived from the **Ship** class. The **BattleShip** class should have the following members:

- A member variable for the **total number of missiles** (an int)
- An appropriate **constructor**
- Appropriate **accessors and mutators**
- A **print** function that **overrides the print function in the base class**. The **BattleShip** class's print function should display only the ship's name and the missile capacity.

Main Program Details

Create an **array of 4 Ship pointers** and initialize its elements with the addresses of dynamically allocated objects of the classes **Ship**, **CruiseShip**, **CargoShip**, and **BattleShip**. Then, iterate through the array and call the **print function** of each object to demonstrate the classes. Finally, **release any occupied memory resources**.