

**Independent University, Bangladesh**  
**CSE213, Autumn 2021, Section: 1, 2, 3 & 4**

**Disclaimer: Solve these PRACTICE problems to reinforce your concept only**  
**Do not treat them as a question bank**

**Do not expect them to appear in exam**

Happy coding 😊

---

## C++

1. **C++:** Consider the following main(). You need to complete the classes along with necessary fields and methods and run the program.

**Difficulty Level: 50%**

```
class Address {
    // MUST have houseNo, roadNo, street, thana, district, zipCode, etc. as private fields
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

class Employee{
    // MUST have employeeID, name, department and the following as private fields
    Address empAddress;
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

int main() {
    Employee e1, e2(4161, "S K Dey", "CSE");
    //parameterized constructor also ask for address details

    cout << "Give input for employee 1: " << endl;
    cin >> e1;
    //Should ask employeeID, name, department.
    //Then ask address related information.

    cout << "Complete information of the employees are: " << endl;
    cout<< e1 << e2 << endl;

    cout<<"The employee e1 ";
    if(e1 == 1229)    cout << "lives in Bashundhara R/A." << endl;
    else cout << "does NOT lives in Bashundhara R/A." << endl;
    //comparing zipCode field

    return 0;
}
```

2. **C++:** Consider the following main(). You need to complete the classes along with necessary fields and methods and run the program.

**Difficulty Level: 50%**

```
class Date {
    // MUST have day (int), month (string), year (int) as private fields.
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

class Employee{
    // MUST have employeeID, name, department and the following as private fields.
    Date dateOfJoining;
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

int main()
{
    Employee e1, e2(4161, "S K Dey", "CSE");

    cout << "Give input for employee 1: " << endl;
    cin >> e1;
    //Should ask employeeID, name, department.
    //Then ask for date of joining related information.

    cout << "Complete information of the employees are: " << endl;
    cout<< e1 << e2 << endl;

    cout<<"Mr./Ms. " << e1.getName();

    if(e1 == 2017 && e1 == "October")
        cout<<" joined the company in October 2017." << endl;
    else
        cout<<" did NOT join the company in October 2017." << endl;

    return 0;
}
```

---

**P.T.O**

3. **C++:** Consider the following main(). You need to complete the classes along with necessary fields and methods and run the program.

**Difficulty Level: 50%**

```
class Author {
    // MUST have ID (int), name (string) and email (string) as private fields.
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

class Book {
    // MUST have title (string), ISBN_No (string), price (float) and the following as private fields.
    Int noOfAuthor;
    Author *ptr;
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

int main()
{
    Book b1, b2("Data Structures", "978-0-7334-2609-4", 550);
    //parameterized constructor also ask for no of authors and their details

    cout << "Give input for book 1: " << endl;
    cin >> b1;
    //Should ask title, ISBN_No, price.
    //Then ask #ofAuthors & author info (id, name and email) for all
    authors.

    cout << "Complete information of the books are: " << endl;
    cout<< b1 << b2 << endl;

    cout<<"For The book titled: "<< b1.getTitle() <<endl;

    if(b1 <= 1000 || b1 == "Ataul Karim")
        cout<<"Ataul Karim is an author, or the price is <= 1000"<<endl;
    else
        cout<<"Ataul Karim is NOT an author & price is > 1000"<<endl;

    return 0;
}
```

---

P.T.O

4. **C++:** Consider the following main(). You need to complete the classes along with necessary fields and methods and run the program.

**Difficulty Level: 80%**

```
class Author {
    // fields: authorName (string), authorEmail (string),
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

class Book {
    // fields:
    // bookName (string), authorList (Author*), noOfAuthors (int), price (float), isbn (string)
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

class Course {
    // fields: courseId (string), courseTitle (string), noOfCredits (int), textBook (Book)
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

//Complete the following global function
returnType allocateMemory (//decide parameter list) { // complete the function}

int main() {
    Course *courseArr; int n, i;
    Cout<<"How many courses? "; cin>>n;
    allocateMemory(courseArr, n); //it is a global function
    for(i=0;i<n;i++) courseArr[i].populateCourse().displayCourse();

    int totalCredits = 0;
    for(i=0;i<n;i++) totalCredits += courseArr[i];

    cout<<"Total no of credits of these courses is: "
        <<totalCredits<<endl;

    return 0;
}
```

---

**P.T.O**

5. **C++:** Consider the following code. You need to complete the classes along with necessary fields and methods and run the program.

**Difficulty Level: 80%**

```
class HardDisk {
    // fields: rpm (int), capacityInGB (int),
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

class Computer {
    // fields: brand (string), speedInGhz (float), noOfHDD (int), hddArr (HardDisk*), price (float)
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

class ComputerLab {
    // fields: roomNo (string), noOfComputer (int), compArr (Computer*)
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

int main() {
    ComputerLab* labs; int n, i;
    Cout<<"How many computer labs? "; cin>>n;
    labs = new ComputerLab[n]; int totalStorageOfAllLabsInGB = 0;
    for(i=0;i<n;i++) {

        labs[i].setLabInfo().showLabInfo();

        totalStorageOfAllLabsInGB += labs[i];

        if (labs[i] >= 30) cout<<i<<"-th Lab is a big computer Lab."<<endl;
        else cout<<i<<"-th Lab is a small computer Lab."<<endl;
    }
    cout<<"Total Storage of ALL Labs combined is: "
        << totalStorageOfAllLabsInGB <<" GB"<<endl;
    return 0;
}
```

---

**P.T.O**

6. **C++:** Consider the following code. You need to complete the classes along with necessary fields and methods and run the program.

**Difficulty Level: 70%**

```
class Book {
    // private fields: bookName (string), authorNames (string*), noOfAuthors (int), price (float)
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

class Course {
    // private fields: courseId (string), courseTitle (string), noOfCredits (int), textBook
    (Book)
    Public: // add necessary methods including setters and getters,
    // AND/OR declare friends, so that the given main() works
};

//add necessary global function so that the given main() works

int main(){
    Course *enrolledCourses;
    int n, i, ratePerCredit, scholarshipPercent;

    cout<<"How many courses to enroll? "; cin>>n;
    cout<<"Rate per credit for this student? "; cin>> ratePerCredit;
    cout<<"Scholarship (%) for this student? "; cin>> scholarshipPercent;

    enrolledCourses = new Course[n];

    for(i=0;i<n;i++) enrolledCourses[i].setCourseInfo().showCourseInfo();
    cout<<"Total amount to be paid is:"
        <<getBillAmount( enrolledCourses, n,
                        ratePerCredit, scholarshipPercent ) <<endl;
    return 0;
}
```

---

**P.T.O**

7. **C++:** Consider the following code. You need to complete the classes along with necessary fields and methods and run the program.

**Difficulty Level: 90%**

```
class ComplexNo {
    int real, img;
    Public: // add necessary methods including setters and getters,
           // AND/OR declare friends, so that the given main() works
}
//represents complex number in the form of "real +/- img i" e.g: 2+3i

class MatrixOfComplexNo {
    int noOfRows;
    int noOfColsForEachRow[noOfRows];
    ComplexNo *complexRowPtr[];
    //Array of pointers, simulating matrix of ComplexNo objects
    Public: // add necessary methods including setters and getters,
           // AND/OR declare friends, so that the given main() works
}

int main(){
    int n, row, i;
    MatrixOfComplexNo *matrixPtr;

    cout<<"How many matrices of complex nos? "; cin>>n;
    matrixPtr = new MatrixOfComplexNo[n];
    ;
    for(i=0;i<n;i++){
        cin>>matrixPtr[i];
        // ask no of rows for i-th matrix, and then ask no of
        // complexNo for each of the rows of i-th matrix & populate
        // those rows with ComplexNo objects with proper real & img
    }
    cout<<"The matrices of complex numbers is/are: " << endl;
    showComplexMatrices(matrixPtr, n); //global function

    ComplexNo *mergedRow;
    cout<<"Enter indices of 2 rows of first matrix (<<"<<"row") to merge: ";
    cin>>rowIndex1>>rowIndex2;
    mergedRow = matrixPtr[0][rowIndex1].mergeWith(rowIndex2);
    cout<<"The MERGED rows of complex numbers is: ";
    showMergedRow(mergedRow,
                  matrixPtr[0].getRowSize(rowIndex1) +
                  matrixPtr[0].getRowSize(rowIndex1)
                  );
    int lower, upper;
    //get values of lower & upper from user
    // Now display all the Complex numbers from mergedRow,
    // whose real<=lower & img>=upper

    Return 0;
}
```