**Remedial Assignment**

**Students can submit the assignment as per the following.**

**(i)if >=5 marks in any DA then submit only Part2**

**(ii) If <5 only in one DA then submit Part1 or Part2**

**(iii) if <5 in both two DAs then submit Part1 and Part2**

**(iv) if >=7 in any DA can submit Part3**

**Part 1**

1.Write a program called **CheckerPattern** that prompts user for the size (a non-negative integer in int); and prints the following checkerboard pattern.

Enter the size: **7**

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2. A sales tax of 7% is levied on all goods and services consumed. It is also mandatory that all the price tags should include the sales tax. For example, if an item has a price tag of $107, the actual price is $100 and $7 goes to the sales tax.

Write a program using a loop to continuously input the tax-inclusive price (in double); compute the actual price and the sales tax (in double); and print the results rounded to 2 decimal places. The program shall terminate in response to input of -1; and print the total price, total actual price, and total sales tax. For examples,

Enter the tax-inclusive price in dollars (or -1 to end): 107

Actual Price is: $100.00, Sales Tax is: $7.00

Enter the tax-inclusive price in dollars (or -1 to end): 214

Actual Price is: $200.00, Sales Tax is: $14.00

Enter the tax-inclusive price in dollars (or -1 to end): 321

Actual Price is: $300.00, Sales Tax is: $21.00

Enter the tax-inclusive price in dollars (or -1 to end): -1

Total Price is: $642.00

Total Actual Price is: $600.00

Total Sales Tax is: $42.00

3. **5.5  IncomeTaxCalculator (Decision)**

The progressive income tax rate is mandated as follows:

|  |  |
| --- | --- |
| **Taxable Income** | **Rate (%)** |
| First $20,000 | 0 |
| Next $20,000 | 10 |
| Next $20,000 | 20 |
| The remaining | 30 |

For example, suppose that the taxable income is $85000, the income tax payable is $20000\*0% + $20000\*10% + $20000\*20% + $25000\*30%.

Write a program called **IncomeTaxCalculator** that reads the taxable income (in int). The program shall calculate the income tax payable (in double); and print the result rounded to 2 decimal places.

4. Java program to print common characters between two strings in alphabetical order.

5. How to sort array elements by frequency in Java?

6. Write a program to merge two file contents into another file.

7. Define two different classes namely, Student and Employee. These classes are derived from a base class Person. Define other two classes Staff and Faculty. Staff and Faculty classes are derived from Employee class. The Person class has name and age data and display method to display the name and age of a person. The Student class has data like rollNo and branch and display method to display name, age, rollNo and branch of the student. Stuff has ecNo and doj(date of joining) data and display method to display name, age, ecNo, doj of the stuff. Faculty has designation data (Assistant Professor, Associate Professor and Professor) and display method to display the name, age, ecNo, doj and designation of the Faculty. Staff has designation data (Technical and Clerical) and display method to display the name, age, ecNo, doj and designation of the Staff. Each class have their own constructor to initialize the value of each data field. Finally create MainDemoClass and create an object of each class. Print the values of all objects in the MainDemoClass.

8. .A school has following rules for grading system:  
a. Below 25 - F  
b. 25 to 45 - E  
c. 45 to 50 - D  
d. 50 to 60 - C  
e. 60 to 80 - B  
f. Above 80 - A  
Ask user to enter marks and print the corresponding grade.

A student will not be allowed to sit in exam if his/her attendence is less than 75%.  
Take following input from user  
Number of classes held  
Number of classes attended.  
And print  
percentage of class attended  
Is student is allowed to sit in exam or not.

9. An abstract class has a construtor which prints "This is constructor of abstract class", an abstract method named 'a\_method' and a non-abstract method which prints "This is a normal method of abstract class". A class 'SubClass' inherits the abstract class and has a method named 'a\_method' which prints "This is abstract method". Now create an object of 'SubClass' and call the abstract method and the non-abstract method. (Analyse the result)

10. Lets create a bank account. Create a class named 'BankAccount' with the following data members

1 - Name of depositor

2 - Address of depositor

3 - Type of account

4 - Balance in account

5 - Number of transactions

Class 'BankAccount' has a method for each of the following 1 - Generate a unique account number for each depositor

For first depositor, account number will be BA1000, for second depositor it will be BA1001 and so on

2 - Display information and balance of depositor

3 - Deposit more amount in balance of any depositor

4 - Withdraw some amount from balance deposited

5 - Change address of depositor

After creating the class, do the following operations

1 - Enter the information (name, address, type of account, balance) of the depositors. Number of depositors are to be entered by user.

2 - Print the information of any depositor.

3 - Add some amount to the account of any depositor and then display final informaion of that depositor

4 - Remove some amount from the account of any depositor and then display final informaion of that depositor

5 - Change the address of any depositor and then display the final information of that depositor

6 - Randomly repeat these processes for some other bank accounts and after that print the total number of transactions

11. A boy has his money deposited $1000, $1500 and $2000 in banks-Bank A, Bank B and Bank C respectively. We have to print the money deposited by him in a particular bank.  
Create a class 'Bank' with a method 'getBalance' which returns 0. Make its three subclasses named 'BankA', 'BankB' and 'BankC' with a method with the same name 'getBalance' which returns the amount deposited in that particular bank. Call the method 'getBalance' by the object of each of the three banks.

**Part 2**

1.Write 4 programs called **BoxPatternX** (X = A, B, C, D) that prompts user for the size (a non-negative integer in int); and prints the pattern as shown:

Enter the size: **8**

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(a) (b) (c) (d) (e)

##### Hints

1. On the main diagonal, row = col. On the opposite diagonal, row + col = size + 1, where row and col begin from 1.
2. For pattern (a), if (row == 1 || row == size || col == 1 || col == size) print #; else print blank. Need to print the intermediate blanks.
3. For pattern (b), if (row == 1 || row == size || row == col) print #; else print blank.

2. **PensionContributionCalculator (Decision)**

Both the employer and the employee are mandated to contribute a certain percentage of the employee's salary towards the employee's pension fund. The rate is tabulated as follows:

|  |  |  |
| --- | --- | --- |
| **Employee's Age** | **Employee Rate (%)** | **Employer Rate (%)** |
| 55 and below | 20 | 17 |
| above 55 to 60 | 13 | 13 |
| above 60 to 65 | 7.5 | 9 |
| above 65 | 5 | 7.5 |

However, the contribution is subjected to a salary ceiling of $6,000. In other words, if an employee earns $6，800, only $6，000 attracts employee's and employer's contributions, the remaining $800 does not.

3. Write a program called **PensionContributionCalculator** that reads the monthly salary and age (in int) of an employee. Your program shall calculate the employee's, employer's and total contributions (in double); and print the results rounded to 2 decimal places. For examples,

Enter the monthly salary: $**3000**

Enter the age: **30**

The employee's contribution is: $600.00

The employer's contribution is: $510.00

The total contribution is: $1110.00

4.Write a Java program to find most repetitive character or maximum occurring character in the given string. For example, if “Java Concept Of The Day” is the input string then ‘a’ is the maximum occurring character which occurred 3 times in the string.

5.Write a Java Program to reverse a string without using String inbuilt function reverse().

6. Write a program to read the content of a file and count the number of words in the file.

7. We have to calculate the area of a rectangle, a square and a circle. Create an abstract class 'Shape' with three abstract methods namely 'RectangleArea' taking two parameters, 'SquareArea' and 'CircleArea' taking one parameter each. The parameters of 'RectangleArea' are its length and breadth, that of 'SquareArea' is its side and that of 'CircleArea' is its radius. Now create another class 'Area' containing all the three methods 'RectangleArea', 'SquareArea' and 'CircleArea' for printing the area of rectangle, square and circle respectively. Create an object of class 'Area' and call all the three methods.

8. We have to calculate the percentage of marks obtained in three subjects (each out of 100) by student A and in four subjects (each out of 100) by student B. Create an abstract class 'Marks' with an abstract method 'getPercentage'. It is inherited by two other classes 'A' and 'B' each having a method with the same name which returns the percentage of the students. The constructor of student A takes the marks in three subjects as its parameters and the marks in four subjects as its parameters for student B. Create an object for eac of the two classes and print the percentage of marks for both the students.

9. Create a class 'Student' with three data members which are name, age and address. The constructor of the class assigns default values name as "unknown", age as '0' and address as "not available". It has two members with the same name 'setInfo'. First method has two parameters for name and age and assigns the same whereas the second method takes has three parameters which are assigned to name, age and address respectively. Print the name, age and address of 10 students.

10. All the banks operating in India are controlled by RBI. RBI has set a well defined guideline (e.g. minimum interest rate, minimum balance allowed, maximum withdrawal limit etc) which all banks must follow. For example, suppose RBI has set minimum interest rate applicable to a saving bank account to be 4% annually; however, banks are free to use 4% interest rate or to set any rates above it.

Write a JAVA program to implement bank functionality in the above scenario and demonstrate the dynamic polymorphism concept. Note: Create few classes namely Customer, Account, RBI (Base Class) and few derived classes (SBI, ICICI, PNB etc). Assume and implement required member variables and functions in each class

**Part 3**

**Innovative projects**

Students can implement any one of the following.

**1.Number Guessing Game**

This number guessing game is an easy project built on Java where the player has to guess a number given in between a range. If the guessed number is right, the player wins else, loses. It also has the concept of limited attempts where the player has to guess the number within the limited attempts given.

Abstract: The UI has an input value option where the player has to enter the guessed value, it also displays the time remaining to guess. After completing the limits given, if the guessed number is right, the player wins else loses. The range between the number can be from 1 to 100 or 1 to 1000. Also, if the number you’ve guessed is high or low to the actual value, the application sends you an alert “Too High” or “Too Low”. After the limited attempt is completed, the actual value is revealed.

**2. ATM Simulation System**

ATM simulation system is a simple Java project for beginners. It is a kind of personal banking system where users can perform various transactions like withdrawals, deposits, and checking the balance of the account in just one click.

Abstract: The introduction of the application came up with two features which have an admin mode and the user mode. The admin mode is responsible for controlling the entire system like adding and deleting accounts and updating the records of the user. The user-mode takes care of the deposit, withdrawal, and checking of the account balance. The whole process of this system is automated, from PIN (Personal Identification Number) validation to the transaction. The card details will be secured enough by encrypting the details in the database and will only be accessible to the authorized user. The UI of the application contains a profile of the user, accounts added to it, and an option to withdraw, deposit and update details of the account.

### **3.Scientific Calculator in Java**

### **4.CGPA Calculator in Java**