**21SC1203 - CTOD**

**Insem Lab & Skill Programs**

1. Chris and Dolly were discussing about their monthly bills to be paid in the due time and identified that they are pending in paying the electrical bill and Dolly asks for the electrical bill details. Here are the details given by Chris for the payment of bill. Generate electricity bill based on numbers of units consumed

• if units are = 51 and <= 100 then rate per unit is Rs. 3.

• units are>= 101 and <= 300 then rate per unit is Rs. 5 and add extra Rs.100 to the total bill.

• units are >=301 and <= 450 then rate per unit is Rs. 6 and add extra Rs. 200 to the total bill

• units are >450 then per unit is Rs. 8 and add extra Rs.250 to the total bill.

Now your task is to identify the units utilized and the amount to be paid.

1. Given a number N, check if a number is perfect or not. A number is said to be perfect if sum of all its factors excluding the number itself is equal to the number. Now your task to check whether the given number is Perfect number or not. Implement class level modularization and also draw class diagram.
2. Given a base-10 integer, n, convert it to binary (base-2). Then find and print the base-10 integer denoting the maximum number of consecutive 1's in n's binary representation. When working with different bases, it is common to show the base as a subscript. Example: The binary representation of 125 is 1111101. In base 10, there are 5 and 1 consecutive ones in two groups. Print the maximum, 5.
3. Let a number x containing n digits. If sum of each digit raised to power n is equal to the number itself, then the number is said to be Armstrong number i.e. Now your task to check whether the given number is Armstrong number or not. Implement at class level and draw class diagram.
4. Create Utility class with the following static methods to work on 2D Arrays: a) findSum () - to Sum of all elements b) print () - Print the data in matrix form c) printPrincipal () to Print the elements of principal diagonal d) printPrincipalSum () to Print the sum of elements in Principal diagonal. Implement at class level and draw class diagram
5. Create a class GeometricShape with three overloaded methods findArea () to find area of square, rectangle, and circle. and modularize at method, class, and package level. (Hint: To find area of a square pass an integer value and to find a circle pass a double value). Implement at class level and draw class diagram
6. Create a class named 'Rectangle' with two data members- length and breadth and a method to calculate the area which is 'length\*breadth'. The class has three constructors which are: a. having no parameter - values of both length and breadth are assigned zero. b. having two numbers as parameters - the two numbers are assigned as length and breadth, respectively. c. having one number as parameter - both length and breadth are assigned that number. Now, create objects of the 'Rectangle' class having none, one and two parameters and print their areas. Implement at class level and draw class diagram
7. Create a Class Student with instance variables id, name, marks of 3 subjects and two instance methods findTotal () and findAverage () along with setters and getters. Implement the code at class level and display the details along with total and percentage obtained. Implement at class level and draw class diagram
8. Create a Class Engine with attributes engineID (int), engineType (String), horsepower(int), engineWeight (float). Add constructors to assign the values, getters and toString () methods for Engine class. Create 2 objects in main () and access the methods using these objects. Display the details. Implement at class level and draw class diagram
9. Create a Cuboid class with 3 instance variables length, breadth and height of type double, and a method volume (). Add steers getters and toString() and create 2 objects with different values and print the volume in main(). Implement at class level and draw class diagram
10. Create a class named Date that includes three instance variables- month, year and day of type integer. Provide setter and getter methods for these instance variables. Provide a method displayDate () that displays the month, day and year followed by slashes. (Eg: 10/12/2021). . Implement at class level and draw class diagram
11. Create a class named 'Member' having the following members:

Data members

• Name

• Age

• Phone number

• Address

• Salary

It also has a method named 'printSalary' which prints the salary of the members. Two classes 'Employee' and 'Manager' inherits the 'Member' class. The 'Employee' classes have 'specialization' as data members and 'Manager' has 'department' as data members. Now, assign name, age, phone number, address and salary to an employee and a manager by making an object of both classes and print the same. Implement at class level and draw class diagram

1. We must 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 each of the two classes and print the percentage of marks for both the students. Implement at class level and draw class diagram.
2. Create an abstract class 'Animals' with an abstract method speak (). Now create a subclass of Animals named 'Cats' which overrides speak () and print "Cat meows" and another subclass of class Animals named 'Dogs' which overrides speak () and print "Dogs bark", both inheriting the class 'Animals'. Now create an object for each of the subclasses and call their respective methods. Implement at class level and draw class diagram
3. Develop a java program to store the details of students in an LinkedList.
4. You are the class representative and are required to store the Student Details and ID numbers of all your classmates. Develop a program which takes in the details of the students as dynamic user input and store them in Vector. It should print the details and it should also be able to help you search for a student detail using the ID number
5. Develop a program to read the country names and store in a Vector and then perform the following menu driven operations. a) Search for a country name b) Sort based on country name
6. The Owner of a Supermarket asks the Employee to maintain a detailed record consisting Name, Id and Cost of the item available in their supermarket. He also asks him to get the information of those items in ascending order of the costs. He asks your help for writing a program which takes in the details through the Scanner class and add them to the array list. Your program should also display the details of the items compared in ascending order of the item cost. (Use LinkedList )
7. Naresh wants you to develop a program which takes in words from a list of movies names as dynamic user input and stores them in a Vector. It should then print the shortest word.
8. Election committee wants to check whether the voter is eligible to vote or not. The person can vote if his age is greater than 18. Help the Election committee by developing a code which arises exception if the voter age is less than 18 then print the exception and “VOTER IS NOT ELIGIBLE TO VOTE”, otherwise print “VOTER IS ELIGIBLE TO VOTE”. (Hint: Develop user-defined Exception)
9. Create a Class student with ID, name and branch as the instance variables. Create setters for these variables, such that when Invalid ID (-ve number) is given it must throw InvalidIDException, and InvalidNameException when name has special characters or digits.
10. You are required to compute the power of a number by implementing a calculator. Create a class MyCalculator which consists of a single method long power (int, int). This method takes two integers, n and p, as parameters and finds np. If either n or p is negative, then the method must throw an exception which says, "n or p should not be negative". Also, if both and are zero, then the method must throw an exception which says "n and p should not be zero."For example, -4 and -5 would result in java.lang.Exception: n or p should not be negative.Complete the function power in class MyCalculator and return the appropriate result after the power operation or an appropriate exception as detailed above.
11. Develop a java program using swing package. The program must display a student registration page, which reads ID, Name, Gender (Use Radio Buttons) and department (Use Drop down selection) and two buttons Submit and Reset. When the user clicks Submit, then validate the data, use JOptionPane to alert if any data is missing or entered wrong, otherwise display the data submitted back on JOptionPane. The reset button clears all the data.
12. Develop a simple calculator to perform basic arithmetic operations on 2 integers using GUI. Use appropriate button, textboxes etc.
13. Develop a student registration form that takes Student ID, name, DOB, Email, and mobile number using swing components. Display the details in another frame when clicked on Submit button. Data should be cleared by clicking on the Reset button.
14. Create a login screen and validate the user. When the username and password are matching , display “VALID USER” otherwise display “INVALID USER” by clicking on the submit button. Clear the contents by clicking on the clear button. Eg: Username -> should be your name and Password should be your roll number. Check for this validation and display appropriate messages.