Assignment on

Course Code- CIS-216

Object Oriented Programming

Special Instruction: Please read and write the following questions with the help of lecture materials, books, and internet.

Level-1 : Let's program

1.

Write a program to get the following output.

Hey there,

I am data!

2.

Write a program to print

*

**

***

****

on screen.

3.

Print the following pattern on the screen

*****

 ***

  *

 ***

*****

4.

Write a program to print the sum of the numbers 2, 4 and 5.

5.

Write a program to print the difference and product of the numbers 45 and 32.

Level-2: Know Data-types

1.

Write a Java program to print an int, a double and a char on screen.

2.

Write a program to print the area of a rectangle of sides 2 and 3 units respectively.

3.

Write a program to print the product of the numbers 8.2 and 6.

4.

Print the ASCII value of the character 'h'.

5.

Write a program to assign a value of 100.235 to a double variable and then convert it to int.

6.

Write a program to add 3 to the ASCII value of the character 'd' and print the equivalent character.

7.

Write a program to add an integer variable having value 5 and a double variable having value 6.2.

8.

Write a program to find the square of the number 3.9.

Level 3: Java Operators

1.

Length and breadth of a rectangle are 5 and 7 respectively. Write a program to calculate the area and perimeter of the rectangle.

2.

Write a program to calculate the perimeter of a triangle having sides of length 2,3 and 5 units.

3.

Write a program to add 8 to the number 2345 and then divide it by 3. Now, the modulus of the quotient is taken with 5 and then multiply the resultant value by 5. Display the final result.

4.

Now, solve the above question using assignment operators (eg. +=, -=, *=).

5.

Write a program to check if the two numbers 23 and 45 are equal.

6.

Write a program to print the power of 7 raised to 5.

7.

Assign values of variables 'a' and 'b' as 55 and 70 respectively and then check if both the conditions 'a < 50' and 'a < b' are true.

8.

Now solve the above question to check if atleast one of the conditions 'a < 50' or 'a < b' is true.

9.

If the marks of Robert in three subjects are 78,45 and 62 respectively (each out of 100), write a program to calculate his total marks and percentage marks.

10.

Suppose the values of variables 'a' and 'b' are 6 and 8 respecrtively, write two programs to swap the values of the two variables.

1 - first program by using a third variable

2 - second program without using any third variable

(Swapping means interchanging the values of the two variables E.g.- If entered value of x is 5 and y is 10 then after swapping the value of x and y should become 10 and 5 respectively.)

11.

Write a program to convert Fahrenheit into Celsius.

12.

The total number of students in a class are 90 out of which 45 are boys. If 50% of the total students secured grade 'A' out of which 20 are boys, then write a program to calculate the total number of girls getting grade 'A'.

13.

Write a program to calculate the sum of the first and the second last digit of a 5 digit.

E.g.- NUMBER : 12345 OUTPUT : 1+4=5

14.

Take a 4 digit number. Write a program to display a number whose digits are 2 greater than the corresponding digits of the number TAKEN.

For example, if the number which was taken is 5696, then the displayed number should be 7818.

15.

Write a program to calculate the sum of the digits of a 3-digit number.

Number : 132 Output : 6

16.

Write a program to reverse a 3-digit number. E.g.-Number : 132 Output : 231

Level 4: Input by user

1.

Write a program to take two integer inputs from user and print sum and product of them.

2.

Take two integer inputs from user. First calculate the sum of two then product of two. Finally, print the sum and product of both obtained results.

3.

Ask user to give two double input for length and breadth of a rectangle and print area type casted to int.

4.

Take name, roll number and field of interest from user and print in the format below :

Hey, my name is xyz and my roll number is xyz. My field of interest are xyz.

5.

Take side of a square from user and print area and perimeter of it.

6.

Write a program to find square of a number.

E.g.-

INPUT : 2 OUTPUT : 4

INPUT : 5 OUTPUT : 25

7.

Take two different string input and print them in same line. E.g.-

INPUT : Codes

Dope

OUTPUT : CodesDope

8.

Take 3 inputs from user and check :

all are equal

any of two are equal

(use && ||)

9.

Write a program to enter the values of two variables 'a' and 'b' from keyboard and then check if both the conditions 'a < 50' and 'a < b' are true.

10.

If the marks of Robert in three subjects are entered through keyboard (each out of 100), write a program to calculate his total marks and percentage marks.

Level 5: Decide if or else

1.

Take values of length and breadth of a rectangle from user and check if it is square or not.

2.

Take two int values from user and print greatest among them.

3.

A shop will give discount of 10% if the cost of purchased quantity is more than 1000.

Ask user for quantity

Suppose, one unit will cost 100.

Judge and print total cost for user.

4.

A company decided to give bonus of 5% to employee if his/her year of service is more than 5 years.

Ask user for their salary and year of service and print the net bonus amount.

5.

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.

6.

Take input of age of 3 people by user and determine oldest and youngest among them.

7.

Write a program to print absolute vlaue of a number entered by user. E.g.-

INPUT: 1 OUTPUT: 1

INPUT: -1 OUTPUT: 1

8.

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.

Modify the above question to allow student to sit if he/she has medical cause. Ask user if he/she has medical cause or not ('Y' or 'N') and print accordingly.

10.

If

x = 2

y = 5

z = 0

then find values of the following expressions:

a. x == 2

b. x != 5

c. x != 5 && y >= 5

d. z != 0 || x == 2

e. !(y < 10)

11.

Write a program to check whether a entered character is lowercase (a to z) or uppercase (A to Z).

Level 6: Loop

1.

Take 10 integers from keyboard using loop and print their average value on the screen.

2.

Print the following patterns using loop :

a.

```
*
**
***
****
```

b.

```
   *
  ***
 *****
  ***
   *
```

c.

```
1010101
 10101
  101
   1
```

3.

Print multiplication table of 24, 50 and 29 using loop.

4.

Print ASCII values and their equivalent characters. ASCII value vary from 0 to 255.

5.

Factorial of any number n is represented by n! and is equal to 1*2*3*....*(n-1)*n. E.g.-

4! = 1*2*3*4 = 24

3! = 3*2*1 = 6

2! = 2*1 = 2

Also,

1! = 1

0! = 0

Write a Java program to calculate factorial of a number.

6.

Write a program to find greatest common divisor (GCD) or highest common factor (HCF) of given two numbers

7.

Take integer inputs from user until he/she presses q (Ask to press q to quit after every integer input). Print average and product of all numbers.

8.

Write an infinite loop.

A inifinte loop never ends. Condition is always true.

Level 7: Have your own methods

1.

Define two methods to print the maximum and the minimum number respectively among three numbers entered by user.

2.

Define a program to find out whether a given number is even or odd.

3.

A person is elligible to vote if his/her age is greater than or equal to 18. Define a method to find out if he/she is elligible to vote.

4.

Write a program to print the sum of two numbers entered by user by defining your own method.

5.

Define a method that returns the product of two numbers entered by user.

6.

Write a program to print the circumference and area of a circle of radius entered by user by defining your own method.

7.

Define a method to find out if number is prime or not.

8.

Write a program which will ask the user to enter his/her marks (out of 100). Define a method that will display grades according to the marks entered as below:

Marks	Grade
91-100	AA
81-90	AB
71-80	BB
61-70	BC
51-60	CD
41-50	DD
<=40	Fail

9.

Write a program to print the factorial of a number by defining a method named 'Factorial'.

Factorial of any number n is represented by n! and is equal to 1*2*3*....*(n-1)*n. E.g.-

4! = 1*2*3*4 = 24

3! = 3*2*1 = 6

2! = 2*1 = 2

Also,

1! = 1

0! = 0

Level 8: Java Array

1.

Take 10 integer inputs from user and store them in an array and print them on screen.

2.

Take 10 integer inputs from user and store them in an array. Again ask user to give a number. Now, tell user whether that number is present in array or not.

3.

Take 20 integer inputs from user and print the following:

number of positive numbers

number of negative numbers

number of odd numbers

number of even numbers

number of 0s.

4.

Take 10 integer inputs from user and store them in an array. Now, copy all the elements in an another array but in reverse order.

5.

Write a program to find the sum and product of all elements of an array.

6.

Initialize and print all elements of a 2D array.

7.

Find largest and smallest elements of an array.

8.

Write a program to check if elements of an array are same or not it read from front or back. E.g.-

9.

Take an array of 10 elements. Split it into middle and store the elements in two dfferent arrays. E.g.-

INITIAL array :

58 24 13 15 63 9 8 81 1 78

After spliting :

58 24 13 15 63

9 8 81 1 78

10.

Consider an integer array, the number of elements in which is determined by the user. The elements are also taken as input from the user. Write a program to find those pair of elements that has the maximum and minimum difference among all element pairs.

11.

If the input array is [10, 12, 20, 30, 25, 40, 32, 31, 35, 50, 60], your program should be able to find that the subarray lies between the indexes 3 and 8.

Level 9: Characters and Strings

1.

Write a program to print a string entered by user.

2.

Write a program to input and display the sentence I love candies.

3.

Write a program to find the length of the string "refrigerator".

4.

Write a program to check if the letter 'e' is present in the word 'Umbrella'.

5.

Write a program to check if the word 'orange' is present in the "This is orange juice".

6.

Write a program to find the first and the last occurence of the letter 'o' and character ',' in "Hello, World".

7.

Write a program that takes your full name as input and displays the abbreviations of the first and middle names except the last name which is displayed as it is. For example, if your name is Robert Brett Roser, then the output should be R.B.Roser.

8.

Write a program to find the number of vowels, consonents, digits and white space characters in a string.

9.

Write a program to delete all consonents from the string "Hello, have a good day".

10.

Input a string of alphabets. Find out the number of occurrence of all alphabets in that string. Find out the alphabet with maximum occurrence.

Level 10: Java Classes and Objects

1.

Write a program to print the area of a rectangle by creating a class named 'Area' having two methods. First method named as 'setDim' takes length and breadth of rectangle as parameters and the second method named as 'getArea' returns the area of the rectangle. Length and breadth of rectangle are entered through keyboard.

2.

Create a class named 'Student' with String variable 'name' and integer variable 'roll_no'. Assign the value of roll_no as '2' and that of name as "John" by creating an object of the class Student.

3.

Assign and print the roll number, phone number and address of two students having names "Sam" and "John" respectively by creating two objects of class 'Student'.

4.

Write a program to print the area and perimeter of a triangle having sides of 3, 4 and 5 units by creating a class named 'Triangle' without any parameter in its constructor.

5.

Write a program to print the area and perimeter of a triangle having sides of 3, 4 and 5 units by creating a class named 'Triangle' with constructor having the three sides as its parameters.

6.

Write a program to print the area of two rectangles having sides (4,5) and (5,8) respectively by creating a class named 'Rectangle' with a method named 'Area' which returns the area and length and breadth passed as parameters to its constructor.

7.

Write a program to print the area of a rectangle by creating a class named 'Area' taking the values of its length and breadth as parameters of its constructor and having a method named 'returnArea' which returns the area of the rectangle. Length and breadth of rectangle are entered through keyboard.

8.

Print the average of three numbers entered by user by creating a class named 'Average' having a method to calculate and print the average.

9.

Print the sum, difference and product of two complex numbers by creating a class named 'Complex' with separate methods for each operation whose real and imaginary parts are entered by user.

10.

Write a program that would print the information (name, year of joining, salary, address) of three employees by creating a class named 'Employee'. The output should be as follows:

Name	Year of joining	Address
Robert	1994	64C- WallsStreat
Sam	2000	68D- WallsStreat
John	1999	26B- WallsStreat

11.

Add two distances in inch-feet by creating a class named 'AddDistance'.

12.

Write a program by creating an 'Employee' class having the following methods and print the final salary.

1 - 'getInfo()' which takes the salary, number of hours of work per day of employee as parameter

2 - 'AddSal()' which adds $10 to salary of the employee if it is less than $500.

3 - 'AddWork()' which adds $5 to salary of employee if the number of hours of work per day is more than 6 hours.

13.

Create a class called 'Matrix' containing constructor that initializes the number of rows and number of columns of a new Matrix object. The Matrix class has the following information:

1 - number of rows of matrix

2 - number of columns of matrix

3 - elements of matrix in the form of 2D array

Level 11: Java Array of Objects

1.

Write a program to print the name, salary and date of joining of 10 employees in a company.

Use array of objects.

2.

Write a program to print the roll number and average marks of 8 students in three subjects (each out of 100). The marks are entered by user.

3.

Write a program to calculate the average height of all the students of a class. The number of students and their heights in a class are entered by user.

4.

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.

5.

Write a program to create a directory that contains the following information.

(a) Name of a person

(b) Address

(c) Telephone Number (if available with STD code)

(d) Mobile Number (if available)

(e) Head of the family

(f) Unique ID No.

The program will support the following menu based activities:

(a) Create a database entry (The Unique ID number must be unique for every entry, the telephone numbers of two or more persons can be same if and only if the head of family is same)

(b) Edit an entry (Must be identified by only the Unique ID number)

(c) Search by keyword (Any keyword may not be complete; even if the keyword matches partially with any field, the corresponding information must be displayed)

Level 12: subclass

1.

Create a class with a method that prints "This is parent class" and its subclass with another method that prints "This is child class". Now, create an object for each of the class and call

1 - method of parent class by object of parent class

2 - method of child class by object of child class

3 - method of parent class by object of child class

2.

In the above example, declare the method of the parent class as private and then repeat the first two operations (You will get error in the third).

3.

Create a class named 'Member' having the following members:

Data members

1 - Name

2 - Age

3 - Phone number

4 - Address

5 - 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' and 'Manager' classes have data members 'specialization' and 'department' respectively. Now, assign name, age, phone number, address and salary to an employee and a manager by making an object of both of these classes and print the same.

4.

Create a class named 'Rectangle' with two data members 'length' and 'breadth' and two methods to print the area and perimeter of the rectangle respectively. Its constructor having parameters for length and breadth is used to initialize length and breadth of the rectangle. Let class 'Square' inherit the 'Rectangle' class with its constructor having a parameter for its side (suppose s) calling the constructor of its parent class as 'super(s,s)'. Print the area and perimeter of a rectangle and a square.

5.

Now repeat the above example to print the area of 10 squares.

Hint-Use array of objects

6.

Create a class named 'Shape' with a method to print "This is This is shape". Then create two other classes named 'Rectangle', 'Circle' inheriting the Shape class, both having a

method to print "This is rectangular shape" and "This is circular shape" respectively. Create a subclass 'Square' of 'Rectangle' having a method to print "Square is a rectangle". Now call the method of 'Shape' and 'Rectangle' class by the object of 'Square' class.

Level 13: Java Constructor Overloading

1.

Write a program to print the names of students by creating a Student class. If no name is passed while creating an object of Student class, then the name should be "Unknown", otherwise the name should be equal to the String value passed while creating object of Student class.

Level 14: More about methods using Java

1.

Create a class named 'PrintNumber' to print various numbers of different datatypes by creating different methods with the same name 'printn' having a parameter for each datatype.

2.

Create a class to print an integer and a character with two methods having the same name but different sequence of the integer and the character parameters.

For example, if the parameters of the first method are of the form (int n, char c), then that of the second method will be of the form (char c, int n).

3.

Create a class to print the area of a square and a rectangle. The class has two methods with the same name but different number of parameters. The method for printing area of rectangle has two parameters which are length and breadth respetively while the other method for printing area of square has one parameter which is side of square.

4.

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.

Hint - Use array of objects

5.

Create a class 'Degree' having a method 'getDegree' that prints "I got a degree". It has two subclasses namely 'Undergraduate' and 'Postgraduate' each having a method with the same name that prints "I am an Undergraduate" and "I am a Postgraduate" respectively. Call the method by creating an object of each of the three classes.

6.

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.

7.

A class has an integer data member 'i' and a method named 'printNum' to print thevalue of 'i'. Its subclass also has an integer data member 'j' and a method named 'printNum' to print the value of 'j'. Make an object of the subclass and use it to assign a value to 'i' and to 'j'. Now call the method 'printNum' by this object.

8.

Suppose a class 'A' has a static method to print "Parent". Its subclass 'B' also has a static method with the same name to print "Child". Now call this method by the objects of the two classes. Also, call this method by an object of the parent class refering to the child class i.e. A obj = new B()

9.

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.

Hint:

```
Class Customer
{
//Personal Details ...
// Few functions ...
}
Class Account
{
// Account Detail ...
// Few functions ...
}
Class RBI
{
Customer c; //hasA relationship
Account a; //hasA relationship
..
Public double GetInterestRate() { }
Public double GetWithdrawalLimit() { }
}
Class SBI: public RBI
{
//Use RBI functionality or define own functionality.
}
Class ICICI: public RBI
```

{

//Use RBI functionality or define own functionality.

}

Level 15: Java Abstract class

1.

Create an abstract class 'Parent' with a method 'message'. It has two subclasses each having a method with the same name 'message' that prints "This is first subclass" and "This is second subclass" respectively. Call the methods 'message' by creating an object for each subclass.

2.

Create an abstract class 'Bank' with an abstract method 'getBalance'. $100, $150 and $200 are deposited in banks A, B and C respectively. 'BankA', 'BankB' and 'BankC' are subclasses of class 'Bank', each having a method named 'getBalance'. Call this method by creating an object of each of the three classes.

3.

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.

4.

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)

5.

Create an abstract class 'Animals' with two abstract methods 'cats' and 'dogs'. Now create a class 'Cats' with a method 'cats' which prints "Cats meow" and a class 'Dogs' with a method 'dogs' which prints "Dogs bark", both inheriting the class 'Animals'. Now create an object for each of the subclasses and call their respective methods.

6.

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.

7.

Repeat the above question for 4 rectangles, 4 squares and 5 circles.

Hint- Use array of objects.
