Experts' Institute
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JAVA Comp. Applications   PYTHON Robotics & AI

ST. JOSEPH'S COLLEGE, PRAYAGRAJ
HALF YEARLY EXAMINATION 2024
COMPUTER APPLICATIONS

TIME: 2 Hours   CLASS – 10   MM: 100

This Paper is divided into two Sections.
Attempt all questions from Section A and any four questions from Section B.
The intended marks for questions or parts of questions are given in brackets [].

Section-A

Question 1.

Choose the correct answer and write the correct option.   [20]
(Do not copy the question, write the correct answers only.)

i. Which of these has lowest precedence?
   - a) Logical operator
   - b) Relational operator
   - c) Assignment operator
   - d) Postfix operator

ii. Which of these class contains the methods print() and println()?
   - a) System
   - b) System.out
   - c) PrintStream
   - d) None of these

iii. Name the feature of Java depicted in the below picture.
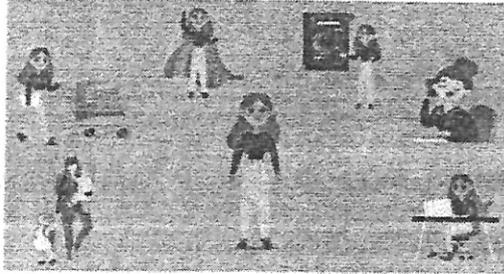
   - a) Encapsulation
   - b) Abstraction
   - c) Inheritance
   - d) Polymorphism

iv. _____ keyword indicates an operator for _____ allocation of an object.
   - a) public, static
   - b) new, static
   - c) new, dynamic
   - d) None of the these

v. Object variables are also known as _____.
   - a) Static variable
   - b) Instance variable
   - c) Local variable
   - d) Both (b) and (c)

vi. Give the output of the following code:
```
String A ="26", B="100";
String D=A+B+"200";
int x = Integer.parseInt(A);
int y = Integer.parseInt(B);
int d = x+y;
System.out.println("Result 1 = " + D);
System.out.println("Result 2 = " + d);
```
   - a) Result 1 = 26100200
        Result 2 = 126
   - b) Result 1 = 26100200
        Result 2 = 12600
   - c) Result 1 = 26100
        Result 2 = 126
   - d) Result 1 = 36100200
        Result 2 = 10026

vii. What is the return value of constructor in Java?
   - a) 1
   - b) null
   - c) void
   - d) none of these

viii. **Assertion(A):** An object is an instance of a package.
   Reason(R): The keyword new is used to create an object.
   - a) Both A and R are true and R is the correct explanation of A.
   - b) Both A and R are true and R is not the correct explanation of A.

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    c) A is true but R is not the correct explanation of A.

    d) A is false but R is true.

    e) Both A and R are false.

ix. Method of wrapper class that converts a numerical String to int value is _____.
- a) toInteger()
- b) parseInt()
- c) parseInteger()
- d) ParseInteger()

x. What is the value of y after evaluating the expression given below?

    y+= ++y + y-- + --y; when int y=8;
- a) 39
- b) 31
- c) 33
- d) 36

xi. Return data type of isLetter(char) is ....
- a) Boolean
- b) Character
- c) Char
- d) boolean

xii. Add a _____ to a constructor to convert it into a method.
- a) static
- b) return type
- c) if statement
- d) semicolon

xiii. Encapsulation can be achieved by _____.
- a) Using only private members
- b) Using abstraction
- c) Using access specifiers
- d) Using inheritance

xiv. What will be the output of the following class:

```
public class Test
{
    static int i;
    public static void main (String args[])
    {
        Test t1=new Test();
        Test t2=new Test();
        t1.i=65;
        System.out.print(t1.i);
        System.out.print(t2.i);
    }
}
```
- a) 34 34
- b) 65 65
- c) 65 34
- d) 34 65

xv. What will be the output of the following statement:

System.out.println(Math.floor(Math.max(-31.19,-33.21)));
- a) -31.0
- b) -30.0
- c) -32.0
- d) Syntax error

xvi. The technique in which change in the formal parameters is reflected in the actual parameters is known as _____.
- a) Call by value
- b) Call by reference
- c) Call by method
- d) Call by argument

xvii. A static function can access _____
- a) Non-static data members
- b) Static data members
- c) Both (a) and (b)
- d) None of these

xviii. Read the following text, and choose the correct answer:

Inheritance allows a class to derive properties and behaviours from another class. This helps in creating a relationship between the derived class and the base class.

What is the main advantage of Inheritance?
- a) Encapsulation
- b) Code reusability
- c) Data hiding
- d) Polymorphism

xix. Which among the following violates the principles of encapsulation almost always?
- a) Public variable
- b) Global variable

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c) Local variable   d) None of these

xx.   A method which does not modify the value of variables is termed as
   a) Impure method   b) Pure method
   c) Primitive method   d) User defined method

Question 2.

i.   [2]
   a) Create a class Book with two integer instance variables. Initialize the variable using *parameterized constructor*.
   b) Give the output of the following Character class methods:
      1) Character.toLowerCase ('A');
      2) Character.isLetterOrDigit('#');

ii.   Explain the concept of *Constructor Overloading* with an example.   [2]

iii.   Convert the following *while ()* loop to its corresponding *for () loop*:   [2]

```
int m=5, n=10;
while(n>=1)
{
   System.out.print(m*n);
   n--;
}
```

iv.   [2]
   a) What do you mean by *Function Signature*?
   b) Write a *Function prototype* for a function "check" that takes a character ch and an integer variable n as arguments and returns true or false.

v.   Consider the following class: [2]
   public class myTest

```
{
   public static int x=3, y=4;
   public int a=2, b=3;
}
```

   a) Name the variables for which each object of the class will have its own distinct copy.
   b) Name the variables that are common to all objects of the class.

vi.   What do you mean by *instantiation*? Give example.   [2]

vii. What will be the *output* of the following program?   [2]
   public class Test

```
{
   public static void main(String args[])
   {
      int n=111;
      char ch= Character.toUpperCase((char)n);
      System.out.println(ch+ " My God!");
   }
}
```

viii.   [2]
   a) Rewrite the following using ternary operator:

```
if (x%2 == 0)
    System.out.print("EVEN");
else
    System.out.print("ODD");
```

   b) Identify the statements listed below as assignment, increment, method invocation or object creation statements.
      1. costPrice = 457.50;
      2. Car hybrid = new Car();

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ix. Differentiate between static data members and non-static data members with examples. [2]

x. Correct the errors in the given program: [2]

```
class Simplify
{
    public static void main(String args[])
    {
        int a=10,b=5,c=1,d=2;
        c=a2+b2;
        d=(a+b)2;
        p=c/d;
        System.out.println(c + " "+ " '+d+ " "+p);
    }
}
```

Section-B

The answers in this section should consist of the programs in either BlueJ environment or any program environment with java as the base.

*Each program should be written using **variable description** so that the logic of the program is clearly depicted.*

Flowcharts and algorithms are not required.

Question 3. [15]

Define a class called **'Ebike'** with the following specifications:

Instance variables/Data Members:

int bno	To store the bike number
int phno	To store the phone number of the customer
String name	To store the name of the customer
int days	To store the number of days the bike is taken on rent
int charge	To calculate and store the rental charge

Member Methods:

void input()	To input and store the details of the customer
void compute()	To compute the rental charge

The rent for a ebike is charged on the following basis:

Days	Charge
For first five days	Rs 500 per day
For next five days	Rs 400 per day
Rest of the days	Rs 200 per day
void display()	To display the details in the given format:

Output:

Bike No.	Phone No.	Name	No. of days	Charge
xxxxxx	xxxxxxxx	xxxx	xxx	xxxxxxx

Create a main() method to call the above methods to enable the tasks.

Question 4. [15]

Write a program by using a class with the following specifications:

Class name: Calculate

Instance variables: int num, f, rev

Member Methods:

Calculate(int n)	to initialize num with n, f and rev with 0 (zero)
int reverse()	to return reverse of the number
int prime()	to return 1, if number is prime

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void display()   to check and print whether the number is a prime palindrome or not.

Create a main() method to call the above methods to enable the tasks.

Question 5.   [15]

Given below is a hypothetical table showing rates of income tax for male citizens below the age of 65 years:

Taxable income (TI) in Rs	Income Tax in Rs
Does not exceed Rs. 1,60,000	Nil
Is greater than Rs. 1,60,000 and less than or equal to Rs. 5,00,000.	(TI - 1,60,000) x 10%
Is greater than Rs. 5,00,000 and less than or equal to Rs. 8,00,000	[(TI - 5,00,000) x 20%] + 34,000
Is greater than Rs. 8,00,000	[(TI - 8,00,000) x 30%] + 94,000

Write a program to input the age, gender (**M** for male or **F** for female) and Taxable Income of a person. If the age is more than 65 years or the gender is female, display "wrong category". If the age is less than or equal to 65 years and the gender is male, compute and display the income tax payable as per the table given above.

Question 6.   [15]

Define a class to overload the function print as follows:

void print( ) - To print the following format

```
1 1 1 1
2 2 2 2
3 3 3 3
4 4 4 4
5 5 5 5
```

void print(int n) - To check whether the number is a lead number. A lead number is the one whose sum of even digits are equal to sum of odd digits.

Example: 3669

odd digits sum = 3 + 9 = 12

even digits sum = 6 + 6 = 12

3669 is a lead number.

Create a main() method to call the above methods to enable the tasks as per the user's choice.

Question 7.   [15]

Write a program to accept a number and check whether it is 'Magic Number' or not. Display the message accordingly.

A number is said to be a magic number if the eventual sum of digits of the number is one.

Sample Input : 55

Then, 5 + 5 = 10, 1 + 0 = 1

Sample Output: Hence, 55 is a Magic Number.

Question 8.   [15]

Design a class to overload a method area() as follows:

a) double area(double r) – with radius (r) as an argument, returns the area of a circle using the formula:

$$A = \frac{22}{7} \times r \times r$$

b) double area(double a, double b) – with sides (a and b) as arguments, returns the area of a rectangle using the formula:

$$A = a \times b$$

c) double area(double a, double b, double c) – with sides (a, b, and c) as arguments, returns the area of a triangle using Heron's formula:

$$s = \frac{a + b + c}{2}$$

$$\sqrt{s \times (s - a) \times (s - b) \times (s - c)}$$

Create a main() method to call the above methods to enable the tasks as per the user's choice.