UNIVERSITY OF THE PUNJAB

B.S. in Computer Science First Year : Annual–2022

Subject: Programming Fundamentals   Paper: 3-N   Time: 30 Min.   Marks: 20

Roll No. in Fig. ....

Roll No. in Words. ....

....

Signature of Supdt.:

This Paper will be collected back after expiry of time limit mentioned above, then Subjective paper shall be attempted.

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.

Q.1.   Encircle the right answer cutting and overwriting is not allowed.   (10x2=20)

1. Consider the following code. Which of the following statements accesses the bottom right cell of a 2D array declared in the code?

```cpp
#include <iostream>
using namespace std;
int main()
{
    int arr2D[2][3] = {1,12,0,4,11,6};
}
```

A) cout << arr2D[1][2];

B) cout << arr2D[2][3];

C) cout << arr2D[1][3];

D) cout << arr2D[2][1];

2. How many asteriks (*) will be printed when the following code gets executed?

```cpp
#include<iostream>
using namespace std;
int main()
{
        char grade = 'b';
        switch (grade)
        {
                case 'a':
                    cout<<"*";
                    break;
                case 'b':
                    cout << "*";
                case 'c':
                    cout << "*";
                    break;
                default:
                    cout << "*";
                    break;
        }
        return 0;
}
```

A) 2 asteriks

B) 1 asterik

C) 3 asteriks

D) Nothing gets displayed (empty console)

3. How many times for loop in the following code will runs ?

```cpp
#include<iostream>
using namespace std;
int main()
{
        int C[11] = { 15,9,0,0,6,5,4,3,2,1,11 }; int k = 0;
        for (int i = 0; i < 5; i+=2)
        {
```

```
            k = ++C[i++];
            cout << k << endl;
        }
        cout << endl;
        return 0;
}
```

A) 1 times

C) 5 times

B) 3 times

D) 2 times

4. How many times for loop in the following program will execute?

```
#include<iostream>
using namespace std;
int main()
{
    int i = 4;
    for (; i >= 1 ; )
        cout<<"SE-F19";
    return 0;
}
```

A) 2

C) 0

B) 4

D) Infinite number of times

5. Suppose you have an array: int arr2D[4][2] = { 22,3,11,2 }; What will be the output of cout << arr2D[1][0];

A) 2

C) 22

B) 0

D) 11

6. What will be the output of the following program?

```
#include <iostream>
using namespace std;
int main()
{
    int arrA[2][4] = {1,2,3,4,1,2,3,4};
    int i = 0;
    cout << arrA[i++][i];
}
```

A) 2

C) 3

B) 1

D) 4

7. What will be the output of the following program?

```
#include <iostream>
using namespace std;
int main()
{
    int arrA[2][2] = {1,2,3,4};
    int i = 0;
```

```
    arrA[i++][++i]++;
    cout << arrA[1][1];
    cout << " ";
    cout << arrA[0][1];
}
```

A) 4 2

C) 5 2

B) 4 3

D) 5 3

8. What will be the output of the following program?

```
#include <iostream>
using namespace std;
int main()
{
        int a[2] = { 2 , 3}, * p, * q;
        p = a;
        q = ++p;
        *p++;
        (*q)++;
        cout << a[0]<<","<<a[1];
        return 0;
}
```

A) 3,4

C) 3,3

D) 2,3

B) 2,4

9. What will be the value of *p1 at the end of the following program ?

```
#include<iostream>
#include<fstream>
#include<string>
using namespace std;
int main()
{
        int* p1; int x = 3;
        int y = ++x;
        p1 = &x;
        return 0;
}
```

A) 3

C) 2

B) 4

D) 4

10. What will be the value of l in the last iteration of for loop in the following code?

```
#include<iostream>
#include<fstream>
#include<string>
using namespace std;
int main()
{
        int arr[15] = { 2,1,11,2,3,5,6,2,11,0 }; int l = 0;
        for (int j = 0; j < 6; j++)
        {
                l = arr[j]++;
                cout << l<<" "<<j;
        }
        return 0;
}
```

A)   5

B)   11

C)   12

D)   1

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Specify output of the following: (5x3=15)

[Part A]

```cpp
#include <iostream>
using namespace std;
    int arr1[] = {45, 0, 1, 22, 13};
    int arr2[] = {12, 0, 1, 1, 20};
    int i, res = 0;
    int main()
    {
      for (i = 0; i < 5; i++) {
        res += arr1[i];
      }
      for (i = 0; i < 4; i++) {
        res += arr2[i];
      }
      cout << res;
      return 0;
    }
```

[Part B]

```cpp
#include <iostream>
using namespace std;
void showVal(int , int);
int main()
{
        int a=0,b=0;
        showVal(a,b);
        return 1;
}
void showVal(int a, int b)
{
        a=( b=75 ) + 9;
        cout<<a<<" "<<b;
}
```

[Part C]

```cpp
#include <iostream>
using namespace std;
int main ()
{
//Assume any value for the addresses involved in this code and specify your assumption
//clearly as a comment or side note

        int x; int y;
        int *p = &x; int *q = &y;
        *p=5; *q=10;
        cout << x << " " << y << endl;
        cout << p << " " << q << endl;
        cout << *p << " " << *q << endl;
        cout << &x << " " << &y << endl;
        return 1;
}
```

[Part D]

```cpp
#include <iostream>
using namespace std;
void main ()
{

        print (1000);
}
void print (int n)
{

        if (n > 4000)
          return;
        cout<< n;
        print (2*n);
}
```

[Part E]

```cpp
#include <iostream>
using namespace std;
int main()
{
    int arr[5], sum = 0;
    cout << "Please enter 5 numbers: ";
for (int j = 0; j < 5; ++j)
{
    cin >> arr[j];
    sum += arr[j];
}
cout << "Sum of array = " << sum << endl;
return 0;
}
```

[5 marks] Question 3:

Write a prototype of a function named *takeInput* that takes a one-dimensional integer array as a parameter and does not return anything.

[5 marks] Question 4:

Point out the errors in the following:

```cpp
#include <iostream>
using namespace std;
void change_val();
int modify_val();
int y;
int main()
{
        int y=0, z;
        y=10;
        y++;
        change_val (y);
        y++
        modify_val();
        cout << y ;
        return 1;

}
void change_val ( )
{
        return 22;

}
int modify_val ( )
{
        return 1;

}
```

[10 marks] Question 5:

You are required to design a Calculator. Take two numbers a and b as an input from the user. You need to implement the following functions:

1. double Add(double a, double b); *a+b*   (1)
2. double Subtract(double a, double b); *a-b*   (1)
3. double Divide(double a, double b; *a/b*   (1)
4. double Multiply(double a, double b); *a*b*   (1)
5. double takeSin(double a); *sin(a)*   (2)
6. double takecos(double a); *cos(a)*   (2)
7. double taketan(double a); *tan(a)*   (2)

Take input of two numbers in main() and then ask the user which function he wants to call. Then call the respective functions E.g. If the user enters 3 then divide function will be called. Keep running the logic till the user enters a character other than 'y'. You can take input from the user in character for this purpose. You might need to include relevant c++ libraries to deal with mathematical functions.

[10 marks] Question 6:

Write a program that implements a function swapR(int&,int&). This function should take input parameters by reference (i.e. swapped values should be reflected in original variables declared in main() before function call. Don't create local variables in swapR. The function should not print anything. Value of two variables before and after calling swapR should be displayed in main(). Moreover, your logic should not make use of any extra variable while swapping values. Your whole program should have only two variables declared (that will be swapped). Use of any extra variable will result in ZERO marks.

[10 marks] Question 7:

Write a function that prints the following pattern on the screen. Use nested loops to design the pattern.

```
      1
     A B
    2 3 4
   C D E F
  5 6 7 8 9
```

Hint: To print alphabets, you can use ASCII values of upper case alphabets to start with the loop.

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Signature of Supdt.:

Q.1.   Encircle the right answer cutting and overwriting is not allowed. (10x1½=15)

I.   Is const better than #define?

A. Yes   B. No

II.   Can we create array of reference?

A. Yes   B. No

III.   When can we have two classes with same name?

A. We can't have   B. In different work space

C. Can have but in different file   D. We can have in any Scenario

IV.   Can a class contain another class in it?

A. Yes   B. No

V.   What is the size of void in C++?

A. 2 bytes   B. 4 bytes   C. Undefined D. 0

VI.   Can a function call itself?

A. Yes   B. No

VII.   Can a structure contain pointer to itself?

A. Yes   B. No

VIII.   Which operator has highest precedence?

A. ++   B. *   C. =   D. ()

IX.   Can we have constructor as Virtual?

A. Yes   B. No

X.   Can we have pure Virtual Destructor?

A. Yes   B. No

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

NOTE: *Attempt any FOUR questions. All questions carry equal marks.*

Q.2.   Write the output of following code segments: (15)

(a)
```
class Calc
{
  char Grade;
  int Bonus;
public:
  Calc()
  {     Grade = 'E';
        Bonus = 0;
  }
  void Down(int G)
  {
    Grade -= G;
  }
  void Up(int G)
  {
    Grade += G;
    Bonus++;
  }
  void Show()
  {
    cout << Grade << "#" << Bonus << endl;
  }};
int main()
{
  Calc C;
  C.Down(2);
  C.Show();
  C.Up(7);
  C.Show();
  C.Down(2);
  C.Show();
}
```
(b)
```
int main()
{
  char *String = "Welcome";
  int *Point, Value[] = {10,15,70,19};
  Point = Value;
  cout << *Point << String << endl;
  String++;
  Point++;
  cout << *Point << String << endl;
}
```

(c)

```cpp
#include<iostream>
using namespace std;
class Test
{        private :
                    int marks = 85;
         public :
                    Test(int marks)
                    {
                            cout<< this->marks;
                            cout<<endl;
                    }
};
int main()
{
         Test t(95);
         return 0;
}
```

(d)

```cpp
#include <iostream>
using namespace std;
int main()
{   int i, x[5], y, z[5];
    for (i = 0; i < 5; i++) {
       x[i] = i;
       z[i] = i + 3;
       y = z[i];
       x[i] = y++; }
    for (i = 0; i < 5; i++)
       cout << x[i] << " ";
    return 0;
}
```

(e)

```cpp
#include<iostream>
#include<cstring>
using namespace std;
int main()
{
         char *s="GOODLUCK";
         for(int i=strlen(s)-1;i>=0;i--)
         {
                    for(int j=0;j<=i;j++)
                    cout<<s[j];
                    cout<<endl;
         }
         return 0; }
```

Question # 3:

Write a program that displays the following output using any loop.

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

Question # 4:

Define a class Time that includes three pieces of information as data members -- hours (type int), minutes (type int), seconds (type int). Write a program that takes two time as an input , add the two times and then print the new time.

Sample data:

Enter 1st time:
Hours? 15
Miuntes? 35
Seconds? 22
Enter 2nd Time:
Hours? 20
Minutes?20
Seconds?15
New Time after Add:

Question # 5:

Define a function named monthly-profit which will calculate the monthly profit on the given investment amount. Function will take two float arguments, percent profit rate and investment amount and return the monthly profit (float). Write function prototype, function definition and a main program to demonstrate the functionality.

Note: User can enter any values therefore write generalized function for user variables (Not initialized the variable value).

Question.#6:

Define a class Employee to store the records of employees. We want to store only Name, age and address of employee. Write main program to input record of one person and display 'Young' if its age is less than 20 or 'Old' if the age is greater than 50 and 'Middle' if the age of person is between 21 and 49.

Question #7:

Write a program that sort the given data in descending order using bubble sort technique?

5	15	20	4	33	1	8	19