

# **Sri Krishna College of Technology**

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Department :IT

Batch :2021-25

Degree :B.TECH - IT

## **2021\_25 II\_Data Structure Through CPP - IRC**

### **IRC\_CPP\_COD\_BASICS AND OPERATORS**

Attempt : 1

Total Mark : 200

Marks Obtained : 200

#### **Section 1 : CODING**

##### **1. Problem Statement:**

Welcome Message

"Pine Tree" is a recently launched startup Event Management company. The company gained a good reputation within a short span because of its highly reliable service delivery.

Nikhil, the founder of this company wished to take the company's services to the next step and decided to design an Event Management System that would let its Customers plan and host events seamlessly via an online platform. As a part of this requirement, Nikhil wanted to write a piece of code for his company's Examly Event Management System that will welcome all the Customers who are using it. Help Nikhil on the task.

***Answer***

```
#include<iostream>
using namespace std;
int main()
{
    cout<<"Welcome to Examly Event Management System";
    return 0;
}
```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement:

Number of events

"Pine Tree" Company has signed up a big-time Event Management deal from the Rotary Youth Club for a Trade Fair organized at Codissia Complex, wherein all startup companies in the Software industry are demonstrating their latest products and services and meet with industry partners and Customers.

Examly Event Management System has to be modified to write a piece of code that will get the input of the number of events to be hosted for the Fair at Codissia from its users and display the same. Help the company accomplish the requirement.

**Answer**

```
#include<iostream>
using namespace std;
int main()
{
    int s;
    cin>>s;
    cout<<"Number of events hosted in Codissia is "<<s;
}
```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement:

#### Event Details

Be it a last-minute get-together, a birthday party, or corporate events, the "Pine Tree" Event Management Company helps you plan and execute it better and faster. Nikhil, the founder of the company wanted the Examly Event Management System to get and display the event details from his Customers for every new order of the Company.

Write a program that will get the input of the event details like the name of the event, type of the event, number of people expected, a string value (Y/N) telling whether the event is going to be a paid entry, and the projected expenses (in lakhs) for the event. The program should then display the input values as formatted output.

#### **Answer**

```
#include<iostream>
using namespace std;
int main()
{
    string a,b;
    char c;
    int d;
    float e;
    getline(cin,a);
    cin>>b>>d>>c>>e;
    cout<<"Event Name :"<<a;
    cout<<"\nEvent Type :"<<b;
    cout<<"\nExpected Count :"<<d;
    cout<<"\nPaid Entry :"<<c;
    cout<<"\nProjected Expense :"<<e<<"L";
}
```

**Status :** Correct

**Marks :** 10/10

### 4. Problem Statement :

## Naming Ceremony

Hermoine and Ron were blessed with a baby. They need to name their child and the priest doesn't know the actual spelling of it. So, help them to get and display the child's name.

### **Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    string name;
    getline(cin,name);
    cout<<name;
}
```

**Status :** Correct

**Marks : 10/10**

## 5. Problem Statement :

### Round Off

Write a program to get a float value from the user and display it in the below-mentioned format. HINT: Use ceil() and floor() functions from header file cmath.

### **Answer**

```
// You are using GCC
#include <iostream>
#include<cmath>
using namespace std;
int main()
{
    float a;
    cin>>a;
    cout<<(int)a<<endl;
    cout<<ceil(a)<<endl;
```

```
    cout<<floor(a)<<endl;
}
```

**Status :** Correct

**Marks :** 10/10

## 6. Problem Statement :

Write a program to generate the equivalent ASCII value for a given character.

### **Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    char a;
    cin>>a;
    cout<<int(a);
}
```

**Status :** Correct

**Marks :** 10/10

## 7. Problem Statement :

In Japan, there was a very huge Tsunami. Millions and millions worth of buildings and property were destroyed. Many people lost their lives while some of them were injured and few were safe. A news reporter arrives at the spot to take the current survey regarding the situation of the people alive, dead and injured. He wanted to publish it in the newspaper and reach out to other countries asking to help the affected people. Can you please help him in this noble cause by writing a program to generate the newspaper report?

### **Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
```

```

int main()
{
    int a,b,c;
    cin>>a>>b>>c;
    cout<<"1)Dead : "<<a<<endl;
    cout<<"\n2)Injured : "<<b<<endl;
    cout<<"\n3)Safe : "<<c<<endl;
    cout<<"\nPlease help the people who are suffering!!!";
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 8. Problem Statement :

Write a program to perform arithmetic operations such as addition, subtraction, multiplication, and division.

### Answer

```

// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int a,b;
    cin>>a>>b;
    cout<<a+b<<"\n"<<a-b<<"\n"<<a*b<<"\n"<<a/b;
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 9. Problem Statement :

### Cricket Stadium

There was a large ground in the center of the city which is rectangular in shape. The Corporation decides to build a Cricket stadium in the area for school and college students, But the area was used as a car parking zone.

In order to protect the land from using as an unauthorized parking zone, the corporation wanted to protect the stadium by building a fence. In order to help the workers to build a fence, they planned to place a thick rope around the ground. They wanted to buy only the exact length of the rope that is needed. They also wanted to cover the entire ground with a carpet during the rainy season. They wanted to buy only the exact quantity of carpet that is needed. They requested your help. Can you please help them by writing a program to find the exact length of the rope and the exact quantity of carpet that is required?

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int area(int x,int y)
{
    int c;
    c=x*y;
    return c;
}
int per(int a,int b)
{
    int d;
    d=2*(a+b);
    return d;
}
int main()
{
    int x,y,f,u;
    cin>>x>>y;
    f=per(x,y);
    u=area(x,y);
    cout<<f<<"\n"<<u;
}
```

**Status :** Correct

**Marks :** 10/10

10. Problem Statement :

Average Calculation

A teacher wants to compute the average of 5 students in her class. Write a program to help her to find the average. The average is the sum of all the numbers, then divided by the total numbers.

**Answer**

```
// You are using GCC
#include<iostream>
#include<bits/stdc++.h>
using namespace std;
int main()
{
    int i;
    float num[5],sum=0,avg;
    for(i=0;i<5;i++)
    {
        cin>>num[i];
        sum+=num[i];
    }
    avg=sum/5;
    cout<<fixed<<setprecision(2)<<avg;
}
```

**Status :** Correct

**Marks :** 10/10

**11. Problem Statement :**

**Sports day Celebration**

Training for sports day has begun and the physical education teacher has decided to conduct some team games. The teacher wants to split the students in higher secondary into equal-sized teams. In some cases, there may be some students who are left out from the teams and he wanted to use the left out, students, to assist him in conducting the team games. For instance, if there are 50 students in a class and if the class has to be divided into 7 equal-sized teams, 7 students will be there in each team and 1 student will be left out. That 1 student will assist the PET. With this idea in mind, the PET wants your help to automate this team splitting task. Can you please help him out?



**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int a,b;
    cin>>a>>b;
    cout<<a/b<<"\n"<<a%b<<endl;
}
```

**Status : Correct****Marks : 10/10****12. Problem Statement:****Pranav and Change**

Pranav, an enthusiastic kid visited the "Fun Fair 2017" along with his family. His father wanted him to purchase entry tickets from the counter for his family members. Being a little kid, he is just learning to understand units of money. Pranav has paid some amount of money for the tickets but he wants your help to give him back the change of Rs. N using the minimum number of rupee notes.

Consider a currency system in which there are notes of seven denominations, namely, Rs. 1, Rs. 2, Rs. 5, Rs. 10, Rs. 50, Rs. 100. If the change is given to Pranav Rs. N is input, write a program to computer smallest number of notes that will combine to give Rs. N.

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int N,x;
    cin>>N;
    x=N/100;
    int y=N%100;
```

```

int z=y/50;
int a=y%50;
int b=a/10;
int c=a%10;
int d=c/5;
int e=c%5;
int f=e/2;
int g=e%2;
cout<<x+z+b+d+f+g<<endl;
}

```

**Status :** Correct

**Marks :** 10/10

### 13. Problem Statement:

Roots of a quadratic equation:

Lakshman is an engineer and he is always dealing with the derivations which usually end up in quadratic equations.

To make his work simple write a program to solve Quadratic Equations.

$$\begin{aligned}
 \text{root}_1 &= \frac{-b + \sqrt{b^2 - 4ac}}{2a} \\
 \text{root}_2 &= \frac{-b - \sqrt{b^2 - 4ac}}{2a}
 \end{aligned}$$

Round off the answers up to four decimal places.

### Answer

```

#include<bits/stdc++.h>
using namespace std;
int main()
{
    float a,b,c,x,y,d,r,i;
    cin>>a>>b>>c;
    d = pow(b,2) - 4*a*c;
    if(a==0 && b==0 && c==0)
    {
        cout<<"Root1: -nan\nRoot2: -nan"<<endl;
    }
    else

```

```

{
if(d>0)
{
    x=(-b+sqrt(d))/(2*a);
    y=(-b-sqrt(d))/(2*a);
    cout<<"Root1: "<<fixed<<setprecision(4)<<x<<endl;
    cout<<"Root2: "<<fixed<<setprecision(4)<<y<<endl;
}
else if(d==0)
{
    cout<<"Root1: "<<fixed<<setprecision(4)<<-b/(2*a)<<endl;
    cout<<"Root2: "<<fixed<<setprecision(4)<<-b/(2*a)<<endl;

}
else
{
    r=-b/(2*a);
    i=sqrt(-d)/(2*a);
    cout<<"Root1: "<<fixed<<setprecision(4)<<r<<" +
"<<fixed<<setprecision(4)<<i<<"i"<<endl;
    cout<<"Root2: "<<fixed<<setprecision(4)<<r<<" -
"<<fixed<<setprecision(4)<<i<<"i"<<endl;
}
}}

```

**Status :** Correct

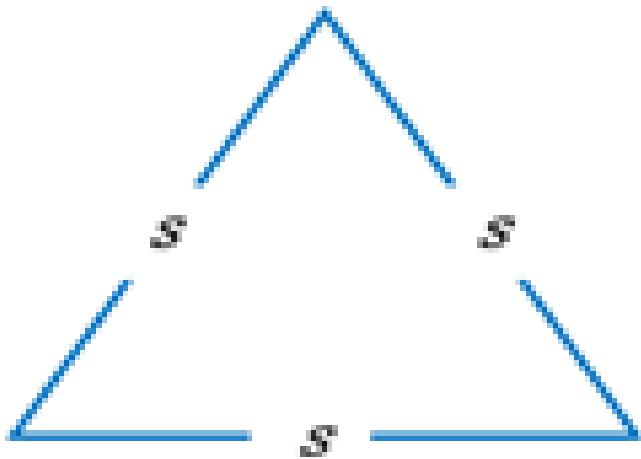
**Marks :** 10/10

#### 14. Problem Statement:

Area of an equilateral triangle:

Ragu's grandparents have their land in an equilateral triangle shape. They have to sow apple seeds for cultivation. Calculate the total area of the land so that they can buy the required amount of seeds. Round off the area to two decimal places.

.



$$A = \frac{\sqrt{3}}{4} s^2$$

**Answer**

```
// You are using GCC
#include<bits/stdc++.h>
using namespace std;
int main()
{
    float a,s;
    cin>>s;
    a=(sqrt(3)/4)*pow(s,2);
    cout<<fixed<<setprecision(2)<<a;
}
```

**Status :** Correct

**Marks :** 10/10

15. Problem Statement:

Evaluation of expression:

Sasikumar is a mathematics teacher and he is preparing a question paper of his own, So he needs to calculate the answers to the questions he

prepared without any errors. As he is busy with his work he has no time to make it.

Write the program and trace the output for the following expressions:

a)  $x = a + b * 5 / 4 + c \% 3 * 5$ , where a, b and c are variables ( inputs ).

b)  $y = u > v ? u : v$  ; where u and v are variables ( inputs ).

c)  $z = ++i \& \& ++j \& \& ++k$ ; where i, j, and k are variables ( inputs ).

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int a,b,c,u,v,i,j,k;
    float x,y,z;
    cin>>a>>b>>c>>u>>v>>i>>j>>k;
    x = a+b*5/4+c%3*5;
    y = u>v?u:v;
    z = ++i&&++j&&++k;
    cout<<"x = "<<x<<endl<<"y = "<<y<<endl<<"z = "<<z<<endl;
    return 0;
}
```

**Status : Correct**

**Marks : 10/10**

16. Problem Statement :

ASCII Values - II

Write a program to get a number(ASCII value) as input and print its equivalent character.

**Answer**

```
// You are using GCC
#include<iostream>
```

```
using namespace std;
int main()
{
    int s;
    cin>>s;
    cout<<char(s);
}
```

**Status :** Correct

**Marks :** 10/10

## 17. Problem Statement :

The newspaper Agency

Each Sunday, a newspaper agency sells  $w$  copies of a special edition newspaper for Rs. $x$  per copy. The cost to the agency of each newspaper is Rs. $y$ . The agency pays a fixed cost for storage, delivery, and so on of Rs.100 per Sunday. The newspaper agency wants to calculate the profit which it obtains only on Sundays. Can you please help them out by writing a program to compute the profit if  $w$ ,  $x$ , and  $y$  are given?

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int w,x,y;
    cin>>w>>x>>y;
    cout<<(w*(x-y))-100<<endl;
}
```

**Status :** Correct

**Marks :** 10/10

## 18. Problem Statement :

Four musketeers

Dhoni joined the group of 3 Musketeers and now their group is called four Musketeers. Meanwhile, Dhoni also moved to a new house in the same locality nearby to the other three. Currently, the houses of Sachin, Dravid and Ganguly are located in the shape of a triangle. When the three musketeers asked Dhoni about the location of his house, he said that his house is equidistant from the houses of the other 3. Can you please help them find out the location of the house? Given the 3 locations  $\{(a_1, b_1), (a_2, b_2) \text{ and } (a_3, b_3)\}$  of a triangle, write a program to determine the point which is equidistant from all the 3 points.

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int a,b,c,d,e,f;
    cin>>a>>d>>b>>e>>c>>f;
    cout<<(float)(a+b+c)/3<<endl<<(float)(d+e+f)/3<<endl;
}
```

**Status :** Correct

**Marks :** 10/10

## 19. Problem Statement :

The misers discount

Mrs.Bhulbhul is a miser to the core. She saves money even on petite things. One day she heard a discount offer announced in a mall. She wants to purchase a lot of items to save her money. The discount is given only when at least two items are bought. Since each item has different discount prices, she finds it difficult to check the amount she has saved. So she approaches you to device an automated discount calculator to make her easy while billing.

**Answer**

```
// You are using GCC
#include<iostream>
```

```

using namespace std;
int main()
{
    float a,b,c;
    cin>>a>>b>>c;
    cout<<(a+b)<<endl;
    cout<<(a+b)-(((a+b)*c)/100)<<endl;
    cout<<(((a+b)*c)/100);
}

```

**Status :** Correct

**Marks :** 10/10

## 20. Problem Statement :

### Area Calculation

Sheela has three things in her bag. She wants to compute the area of 3 things but 3 things are in different shapes. The three things are a square shape, rectangular shape, and circular shape respectively. Write a program to help Sheela to calculate the area of different shapes.

### Answer

```

// You are using GCC
#include<iostream>
#include<iomanip>
using namespace std;
int main()
{
    int s,l,b;
    float r;
    cin>>s>>l>>b>>r;
    cout<<s*s<<endl;
    cout<<l*b<<endl;
    cout<<fixed<<setprecision(2)<<3.14*r*r;
}

```

**Status :** Correct

**Marks :** 10/10



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## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_CPP\_COD\_CONTROL STATEMENTS

Attempt : 1

Total Mark : 200

Marks Obtained : 200

### Section 1 : CODING

#### 1. Problem Statement :

#### Anna University Grading System

The newly appointed Vice-Chancellor of Anna University wanted to create an automated grading system for the students to check their grades. When a student enters a mark, the grading system displays the corresponding grade. Write a program to solve the given problem. The grades for marks 100 - S, 90-99 are A, 80-89 is B, 70-79 in C, 60-69 is D, 50-59 is E and less than 50 is F.

#### *Answer*

```
#include<iostream>
using namespace std;
int main()
{
    int marks;
    cin>>marks;
    if(marks>100 || marks<0)
    {
        cout<<"Invalid Input";
```

```

    }
    else
    {
        switch(marks/10){
            case 10:
                cout<<"S";
                break;
            case 9:
                cout<<"A";
                break;
            case 8:
                cout<<"B";
                break;
            case 7:
                cout<<"C";
                break;
            case 6:
                cout<<"D";
                break;
            case 5:
                cout<<"E";
                break;
            default:
                cout<<"F";
            }
        }
    }
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement :

Profit or loss

A fruit seller buys a dozen of bananas at Rs.X. He sells 1 banana at Rs.Y.  
Write a program to determine the profit or loss in Rs. for the fruit seller.

**Answer**

// You are using GCC

```

#include<iostream>
using namespace std;
int main()
{
    float buy,sell;
    cin>>buy>>sell;
    if((sell*12)<buy)
        cout<<"Loss : Rs."<<buy-(sell*12);
    else
        cout<<"Profit : Rs."<<(sell*12)-buy;
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement :

#### Hotel Tariff Calculator

Write a program to calculate the hotel tariff. The room rent is 20% high during peak seasons [April, May, June, November, December]. Note: Use the switch construct.

#### Answer

```

// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int month,rent,days;
    float tariff;
    cin>>month>>rent>>days;
    if(month==4 || month==5 || month==6 || month==11 ||month==12)
    {
        tariff=(rent*days)+((rent/5)*days);
        cout<<tariff<<endl;
    }
    else if(month<1 || month>12)
        cout<<"Invalid Input";
    else
        cout<<rent*days;
}

```

}

**Status :** Correct

**Marks :** 10/10

#### 4. Problem Statement:

Kalyani Jewellers has planned to build a new showroom in Coimbatore city. They have selected the area to build the showroom and it is in a triangle shape. Ravi, a civil engineer from VIP construction is the in-charge of this project. Ragavan, founder of VIP construction asked Ravi to find the exact shape of the selected area. Help Ravi to find the exact triangle shape.

Equilateral Triangle - If all sides are equal

Isosceles Triangle - If any two sides are equal

Scalene Triangle - No sides are equal

#### **Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    float a,b,c;
    cin>>a>>b>>c;
    if(a==b&&b==c&&c==a)
        cout<<"Equilateral Triangle"<<endl;
    else if(a==b||b==c||c==a)
        cout<<"Isosceles Triangle"<<endl;
    else
        cout<<"Scalene Triangle"<<endl;
}
```

**Status :** Correct

**Marks :** 10/10

#### 5. Problem Statement:

John's little brother is struggling with maths. He decided to design a

calculator with basic operations such as Addition, Subtraction, Multiplication, Division, and Modulus. The calculator should input two numbers and an operator from the user. It should perform an operation according to the operator entered and must take input in the given format. If any other operations are performed, display it as "Invalid Input". Help John to design a calculator.

### ***Answer***

```
#include<iostream>
#include<iomanip>
using namespace std;
int main()
{
    int num_1,num_2;
    char op;
    cin>>num_1>>num_2>>op;
    switch(op)
    {
        case '+':
            printf("%.2f",float(num_1+num_2));
            break;
        case '-':
            printf("%.2f",float(num_1-num_2));
            break;
        case '*':
            printf("%.2f",float(num_1*num_2));
            break;
        case '/':
            if(num_2==0)
            {
                cout<<"Invalid Input"<<endl;
                break;
            }
            printf("%.2f",float(num_1)/float(num_2));
            break;
        case '%':
            printf("%.2f",float(num_1%num_2));
            break;
        default:
            cout<<"Invalid Input"<<endl;
    }
}
```

```
}
```

**Status :** Correct

**Marks :** 10/10

## 6. Problem Statement :

### Amoeba Multiplication

The environmental eco-club has discovered a new Amoeba that grows in the order of a Fibonacci series every month. They are exhibiting their amoeba at a national conference. They want to know the size of the amoeba at a particular time instant. If a particular month's index is given, write a program to display the amoeba's size.....???

For Example, The size of the amoeba on month 1, 2, 3, 4, 5, 6, ..will be 0, 1, 1, 2, 3, 5, 8 respectively.

### Answer

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int n,t1=0,t2=1,p;
    cin>>n;
    if(n==1)
        cout<<t1;
    else if(n==2)
        cout<<t2;
    else
    {
        for(int i=3;i<=n;i++)
        {
            p=t1+t2;
            t1=t2;
            t2=p;
        }
        cout<<p;
    }
}
```

Status : Correct

Marks : 10/10

## 7. Problem Statement:-

Write a program to generate the first 'n' terms of the following series 121, 225, 361,...

### Answer

```
// You are using GCC
#include<iostream>
using namespace std;
int main(){
    int N=11,n;
    cin>>n;
    while(n-->0)
    {
        cout<<N*N<<" ";
        N+=4;
    }
}
```

Status : Correct

Marks : 10/10

## 8. Problem Statement:

### Team Event

Super Quiz Bee is a famous quiz Competition that tests students on a wide variety of academic subjects. This week's competition was a Team event and students who register for the event will be given a unique registration code N. The participants are teamed into 10 teams and the team to which a participant is assigned to depends on the absolute difference between the first and last digit in the registration code.

The event organizers wanted your help in writing an automated program that will ease their job of assigning teams to the participants. If the

registration number given is less than 10, then the program should display "Invalid Input".

**Answer**

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    int n,len,ten=1,f,l;
    cin>>n;
    int temp=n;
    while(temp!=0)
    {
        temp/=10;
        if(temp!=0)
        {ten*=10;}
    }
    if(n>=10)
    {
        f=n/ten;
        l=n%10;
        cout<<abs(f-l);
    }
    else
    {
        cout<<"Invalid Input";
    }
    return 0;
}
```

**Status :** Correct

**Marks :** 10/10

**9. Problem Statement:**

**Lucky Pairs**

Richie and Riya are participating in a game called "Lucky pairs" at the Annual Game Fair in their Company. As per the rules of the contest, two members form a team and Richie initially has the number A and Riya has



the number B.

There are a total of N turns in the game, and Richie and Riya alternatively take turns. In each turn, the player whose turn it is multiplies his or her number by 2. Richie has the first turn. Suppose after the entire N turns, Richie's number has become C and Riya's number has become D. The final score of the team will be the sum of the scores (C+D) of both the players after N turns.

Write a program to facilitate the quiz organizers to find the final scores of the teams

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int a,b,n,i;
    cin>>a>>b>>n;
    if(n%2==0)
    {
        for(i=0;i<(n/2);i++)
        {
            a*=2;
            b*=2;
        }
        cout<<a+b;
    }
    else
    {
        for(i=0;i<((n/2)+1);i++)
        {
            a*=2;
            for(i=0;i<(n/2);i++)
            {
                b*=2;
            }
        }
        cout<<a+b;
    }
}
```

Status : Correct

Marks : 10/10

## 10. Problem Statement:

### AES Numbers

Varun is the founder of Event Management Company, "Sparsh Services". In the company, all the financial transactions are carried out online and Varun has strictly insisted his staff do any transactions on web browsers that supports AES encryption numbers.

A number is an AES number if it has exactly four divisors. In other words, there are exactly four numbers that divide into it evenly. For example, 10 is an AES number because it has exactly four divisors (1, 2, 5, 10). 12 is not an AES number because it has too many divisors (1, 2, 3, 4, 6, 12). 11 is not an AES number either. There is only one AES number in the range 10...12.

Given a range of numbers, write a program that counts how many numbers from that range are AES numbers.

### Answer

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int n,m;
    cin>>n>>m;
    int i,j,k,a,b=0;
    for(i=n;i<=m;++i)
    {
        a=0;
        for(j=1;j<=i;++j)
        {
            k=i%j;
            if(k==0)
                a+=1;
        }
    }
}
```

```

    }
    if(a==4)
        b+=1;
    }
    cout<<b;
}

```

**Status :** Correct

**Marks :** 10/10

## 11. Problem Statement:

### Checking alphabets

Write a program to check whether the given character is a vowel or consonant

#### Answer

```

// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    char n;
    cin>>n;
    if(n=='a' || n=='e' || n=='i' || n=='o' || n=='u' || n=='A' || n=='E' || n=='I' || n=='O' || n=='U')
        cout<<"Vowel";
    else
        cout<<"Consonant";
}

```

**Status :** Correct

**Marks :** 10/10

## 12. Problem Statement :

### Age Detector

Ask a user for their birth year encoded as two digits (like "62") and for the current year, also encoded as two digits (like "99"). Write a program to find

the user's current age in years.

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int n,m,j;
    cin>>n>>m;
    if(n>m){
        j=(m-n)+100;
        cout<<j;}
    else{
        j=m-n;
        cout<<j;}
}
```

**Status :** Correct

**Marks :** 10/10

**13. Problem Statement :**

**Lab Allocation I**

There are 3 labs in the CSE department(L1, L2, and L3) with a seating capacity of x, y, and z respectively. Find the lab which has minimal seating capacity.

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int a,b,c;
    cin>>a>>b>>c;
    if(a<b&&b<c)
        cout<<"L1";
```

```

    else if(b<a&& b<c)
    cout<<"L2";
    else
    cout<<"L3";
}

```

**Status :** Correct

**Marks :** 10/10

#### 14. Problem Statement:-

Write a program to generate the following series 0 2 8 14 24 34 48 62 80 98 .....

#### Answer

```

// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int n;
    cin>>n;
    int i,a;
    for(i=1;i<=n;i++)
    {
        if(i%2==0)
        {
            a=(i*i)-2;
            cout<<a<<" ";
        }
        else
        {
            a=(i*i)-1;
            cout<<a<<" ";
        }
    }
}

```

**Status :** Correct

**Marks :** 10/10

### 15. Problem Statement:-

Write a program to generate the first 'n' terms of the following series 1, 2, 3, 6, 9, 18, 27,...

#### **Answer**

```
// You are using GCC
#include<iostream>
#include<cmath>
using namespace std;
int main()
{
    int n;
    cin>>n;
    int i,a1=1,a2=2;
    if(n>=1)
        cout<<a1<<" ";
    if(n>=2)
        cout<<a2<<" ";
    if(n>3)
    {
        for(i=3;i<=n;++i)
        {if(i%2==0){
            a2*=3;
            cout<<a2<<" ";
        }
        else
        {
            a1*=3;
            cout<<a1<<" ";
        }
    }
}}
```

**Status :** Correct

**Marks :** 10/10

### 16. Problem Statement :

Pattern 1

Write a program to print the given pattern.

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main(){
    int n;
    cin>>n;
    int a;
    a=(2*n)-1;
    int i,j;
    for(i=1;i<=n;++i)
    {for(j=1;j<=a;++j)
    cout<<j<<" ";
    a-=2;
    cout<<endl;
    }
}
```

**Status :** Correct

**Marks :** 10/10

17. Problem Statement :

Pattern 2

Write a program to print the given pattern.

**Answer**

```
// You are using GCC
#include<bits/stdc++.h>
using namespace std;
int main()
{
    int n,temp=1;
    cin>>n;
    if(n%2==0)
    {
        for(int i=1;i<=n;)
```

```

{
    for(int j=0;j<2;j++)
    {
        for(int k=0;k<temp;k++)
        {
            if(i%2==0)
                cout<<"0 ";
            else
                cout<<"1 ";
        }
        i++;
        cout<<endl;
    }
    temp++;
}
}
else
{
    if(n>=1)
        cout<<"0 "<<endl;
    if(n>1){
        for(int i=2;i<=n;i++)
        {
            for(int j=1;j<=temp+1;j++)
            {
                if(j%2==1)
                    cout<<"1 ";
                else
                    cout<<"0 ";
            }
            ++temp;
            cout<<endl;
        }
    }
}
}
}

```

**Status :** Correct

**Marks :** 10/10

18. Problem Statement :



## Collatz Problem

The rules for generating Collatz Sequence are: If  $n$  is even:  $n = n / 2$  If  $n$  is odd:  $n = 3n + 1$

For example, if the starting number is 5 the sequence is: 5 -> 16 -> 8 -> 4 -> 2 -> 1 It has been proved for almost all integers, and the repeated application of the above rule will result in a sequence that ends at 1.

### Answer

```
// You are using GCC
#include<iostream>
using namespace std;
int main(){
    int m=0, n;
    cin>>n;
    cout<<n<<endl;
    for(;n!=1;m++)
    {
        if(n%2==1)
        {
            n=(3*n)+1;
            cout<<n<<endl;
        }
        else
        {
            n/=2;
            cout<<n<<endl;
        }
    }
    cout<<m;
}
```

Status : Correct

Marks : 10/10

## 19. Problem Statement :

Comparing 2 integers

Get two integers x and y from the user and write a program to relate 2 integers as equal to, less than or greater than.

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int n,m;
    cin>>n>>m;
    if(n==m)
        cout<<n<<" and "<<m<<" are equal";
    else if(n>m)
        cout<<n<<" greater than "<<m;
    else
        cout<<n<<" less than "<<m;
}
```

**Status :** Correct

**Marks :** 10/10

**20. Problem Statement :**

**Matinee Movie Tickets**

Ask the customer's age and for the time on a 24-hour clock (where noon is 12.00 and 4:30 PM is 16.30). The show timings are 10.15, 13.30, 18.00 and 22.00. The normal adult ticket price is \$\\\$8.00, however, the adult matinee price is \$\\\$5.00. Adults are those over 13 years. The normal children's ticket price is \$\\\$4.00, however, the children's matinee price is \$\\\$2.00. Write a program that determines the price of a movie ticket

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
```

```
int a;  
float s;  
cin>>a>>s;  
if(a>=13 && s<=12.00)  
cout<<"$8.00";  
else if(a>=13 && s>12.00)  
cout<<"$5.00";  
else if(a<13 && s<=12.00)  
cout<<"$4.00";  
else  
cout<<"$2.00";  
}
```

**Status :** Correct

**Marks :** 10/10

# Sri Krishna College of Technology

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Batch :2021-25

Degree :B.TECH - IT

## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_CPP\_COD\_ARRAYS

Attempt : 1

Total Mark : 150

Marks Obtained : 150

### Section 1 : CODING

#### 1. Problem Statement :

Array deletion

Given an array with 'n' elements, Suresh wants to delete an element at a particular position in the array. Help him in deleting the element and displaying the updated array.

**Answer**

```
#include<iostream>
using namespace std;
int main()
{
    int n,x,i;
    cin>>n;
    int arr[n];
    for(i=0;i<n;i++)
        cin>>arr[i];
    cin>>x;
    cout<<"Array after deletion:"<<endl;
    for(i=0;i<n;i++)
```

```

{
    if(arr[i]==x)
    {
        ++i;
        if(i>=n)
            break;
    }

    cout<<arr[i]<<endl;
}
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement :

### Array median

Write a program to find the median of the elements in the array. The Median is the middle value in the sorted list. If there are an even number of elements in the list, the median is the mean of the 2 middle values.

### Answer

```

// You are using GCC
#include<iostream>
#include<iomanip>
#include<algorithm>
using namespace std;
void mean(int arr[],int n)
{ double sum;
  if(n%2==0)
  {
    sum=arr[n/2]+arr[(n/2)-1];
    sum/=2;
  }
  else
    sum=arr[n/2];
  cout<<"Median = "<<fixed<<setprecision(1)<<sum;
}

```

```

}
int main()
{
    int n,x,i;
    cin>>n;
    int arr[n];
    for(i=0;i<n;i++)
    cin>>arr[i];
    sort(arr,arr+n);
    mean(arr,n);
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement :

Count distinct elements

Howard Wolowitz and Rajesh Koothrapalli were developing a plan to find the ideal woman for Sheldon Cooper. There were puzzles, translations, and questions to check a person's intelligence. One such question was to come up with a C++ program to count the number of distinct elements in an array. Ramona Nowitzki is a postdoctoral researcher and former graduate student of Caltech who is a huge fan of Sheldon's work and she wanted to impress Sheldon by writing a program to count the number of distinct elements in an array. Can you help Ramona?

#### **Answer**

```

// You are using GCC
#include<iostream>
#include<algorithm>
using namespace std;
int main()
{
    int a,x=0;
    cin>>a;
    int arr[a];
    for(int i=0;i<a;i++)
    cin>>arr[i];
    sort(arr,arr+a);
}

```

```

for(int i=0;i<a;i++)
{
    if(arr[i]==arr[i+1]);
    else
        x+=1;
}
cout<<"There are "<<x<<" distinct element in the array.";
}

```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem Statement:

##### Lucy at the Film Festival

LucarnosFilm Festival is an annual film festival and is also known for being a prestigious platform for art house films. This time at the Lucarnos Film festival there are N movies screened, each of different genres ranging from drama movies to comedy ones and teen movies to horror ones. Lucy is a huge fan of movies and visited the film festival, but she's not sure which movie she should watch.

Each movie can be characterized by two integers  $L_i$  and  $R_i$ , denoting the length and the rating of the corresponding movie. Lucy wants to watch exactly one movie with the maximal value of  $L_i \times R_i$ . If there are several such movies, she would pick one with the maximal  $R_i$  among them. If there is still a tie, she would pick the one with the minimal index among them.

Write a program to help Lucy pick a movie to watch at the film festival.

##### Answer

```

#include<iostream>
using namespace std;
int main()
{
    int n,ind=0,tem1=0;
    cin>>n;

```

```

int a[2][n];
for(int i=0;i<2;i++)
for(int j=0;j<n;j++)
cin>>a[i][j];
for(int i=0;i<n;i++)
{
    int temp=a[0][i];
    if(tem1<(a[1][i])*temp)
    {
        tem1=a[1][i]*temp;
        ind=i;
    }
    else if(tem1==(a[1][i])*temp)
    {
        if(a[1][i]==a[1][ind])
            ind=i<ind?i:ind;
        else if(a[1][i]>a[1][ind])
            ind=i;
    }
}
cout<<ind+1;
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 5. Problem Statement:

### Version Management System

A version Management system (VMS) is a repository of files, often the files for the source code of computer programs, with monitored access. Every change made to the source is tracked, along with who made the change, why they made it, and references to problems fixed, or enhancements introduced, by the change.

In this problem, we will consider a simplified model of a development project. Let's suppose that there are N source files in the project. All the



source files are distinct and numbered from 1 to N.

A VMS which is used for maintaining the project contains two sequences of source files. The first sequence contains M source files that are ignored by the VMS. If a source file is not in the first sequence, then it's considered to be unignored. The second sequence contains K source files that are tracked by the VMS. If a source file is not in the second sequence, then it's considered to be untracked.

A source file can either be or not be in any of these two sequences. Your task is to calculate two values: the number of source files of the project, that are both tracked and ignored, and the number of source files of the project, that are both untracked and unignored.

### **Answer**

```
#include<iostream>
using namespace std;
int main()
{
    int n,m,k,zero=0;
    cin>>n>>m>>k;
    int a[m],a1[n],b[k],b1[n];
    for(int i=0;i<m;i++) cin>>a[i];
    for(int i=0;i<k;i++) cin>>b[i];
    for(int i=1;i<=n;i++)
    {
        int check=0;
        for(int j=0;j<m;j++)
        {
            if(a[j]==i) check++;
            if(j==m-1&&check==0)
            {
                a1[zero]=i;
                zero+=1;
            }
        }
    }
    int zero1=0;
    for(int i=1;i<=n;i++)
    {
```

```

    int check=0;
    for(int j=0;j<k;j++)
    {
        if(b[j]==i) check++;
        if(j==k-1&&check==0)
        {
            b1[zero1]=i;
            zero1+=1;
        }
    }
}
int check1=0,check2=0;
for(int i=0;i<m;i++) for(int j=0;j<k;j++) if(a[i]==b[j]) check1++;
for(int i=0;i<zero1;i++) for(int j=0;j<zero1;j++) if(a1[i]==b1[j]) check2++;
cout<<check1<<" "<<check2;
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 6. Problem Statement :

### Sum of Zig-Zag

Rickon Stark is not able to figure out the method to calculate the sum of the Zig-Zag pattern in the Matrix. Can you help Rickon to write a C++ program to find the sum of the Zig-Zag pattern in a given matrix?

### Answer

```

#include<iostream>
using namespace std;
int main()
{
    int r,c,sum=0,i,j;
    cin>>r>>c;
    int a[r][c];
    for(i=0;i<r;i++)
    for(j=0;j<c;j++)
    cin>>a[i][j];
    for(i=0;i<r;i++)

```

```

for(j=0;j<c;j++)
{
    if(i==0||i==r-1||i==j)
        sum+=a[i][j];
}
cout<<"Sum of Zig-Zag pattern is "<<sum<<endl;
}

```

**Status :** Correct

**Marks :** 10/10

## 7. Problem Statement :

### Maximum Element In Each Row

There are some students in the class. The class Adviser needs a recruitment process for above 60% of students. In each and every row there was a student above 60%. Help your adviser to find the students in each row.

### Answer

```

// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int n,m;
    cin>>n>>m;
    int a[n][m];
    for(int i=0;i<n;i++)
        for(int j=0;j<m;j++)
            cin>>a[i][j];
    for(int i=0;i<n;i++)
    {
        int max=0;
        for(int j=0;j<m-1;j++)
            max=a[i][j]>a[i][j+1]?a[i][j]:a[i][j+1];
        cout<<max<<" ";
    }
    return 0;
}

```

```
}
```

**Status :** Correct

**Marks :** 10/10

## 8. Problem Statement :

### Transpose Matrix

Sheldon Cooper has a square-shaped puzzle made up of small square pieces containing numbers on them. He wants to rearrange the puzzle by changing the elements of a row into a column element and the column element into a row element without altering the shape of the puzzle. Help Sheldon solves this puzzle. Write a program to find the transpose of the given 2D matrix.

### Answer

```
#include<iostream>
using namespace std;
int main()
{
    int r,c,i,j;
    cin>>r;
    c=r;
    int arr[r][c];
    for(i=0;i<r;i++)
    for(j=0;j<c;j++)
    cin>>arr[i][j];
    for(i=0;i<r;i++)
    {
        for(j=0;j<c;j++)
        cout<<arr[i][j]<<" ";
        cout<<endl;
    }
    cout<<"Transpose matrix is:"<<endl;
    for(i=0;i<r;i++)
    {
        for(j=0;j<c;j++)
        cout<<arr[j][i]<<" ";
    }
    cout<<endl;
```

}

Status : Correct

Marks : 10/10

## 9. Problem Statement:

### Full Islands:

Nurikabe logical game (sometimes called Islands in the Stream) is a binary determination puzzle. The puzzle is played on a typically rectangular grid of cells, some of which contain numbers. You must decide for each cell if it is white or black (by clicking on them) according to the following rules:

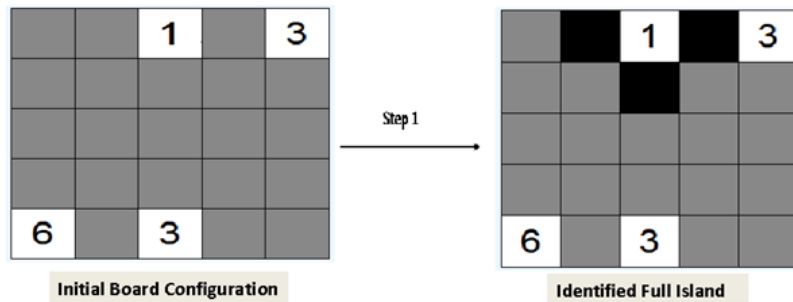
- All of the black cells must be connected.
- Each numbered cell must be part of a white island of connected white cells.
- Each island must have the same number of white cells as the number it contains (including the numbered cell).
- Two islands may not be connected.
- There cannot be any 2x2 blocks of black cells.

Unnumbered cells start out grey and cycle through white and black when clicked. Initially numbered cells are white in color.

### Problem Statement:

Step 1 of solving the puzzle is identifying "Full islands".

An island is full if it contains as many white cells as the number in the region. Any 1s are trivially full regions. When you encounter a full region, any cells that border it must be black. Here we show the cells that must be black due to a single-celled white island.



Write a program that when given the initial board configuration will identify the full islands.

### Answer

```
#include<iostream>
using namespace std;
int main()
{
    int n,i1,j1;
    cin>>n;
    int a[n][n];
    for(int i=0;i<n;i++)    for(int j=0;j<n;j++)    cin>>a[i][j];
    for(int i=0;i<n;i++)
    {
        for(int j=0;j<n;j++)
        {
            if(a[i][j]==1)
            {
                if(i==0)
                {
                    if(a[i+1][j]!=1&&a[i][j+1]!=1)    a[i+1][j]=0;
                }
                else a[i-1][j]=0;
                if(i==n-1)    a[i-1][j]=0;
                else
                {
                    if(a[i+1][j]!=1&&a[i][j+1]!=1)    a[i+1][j]=0;
                }
                if(j==n-1)    a[i][j-1]=0;
                else
                {
                    if(a[i][j+1]!=1)    a[i][j+1]=0;
                }
                if(j==0)
```

```

        {
            if(a[i][j+1]!=1) a[i][j+1]=0;
        }
        else a[i][j-1]=0;
    }
}
}
cout<<endl;
for(int i=0;i<n;i++)
{
    for(int j=0;j<n;j++) cout<<a[i][j]<<" ";
    cout<<endl;
}
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 10. Problem Statement:

### Identify Neighbour Numbers:

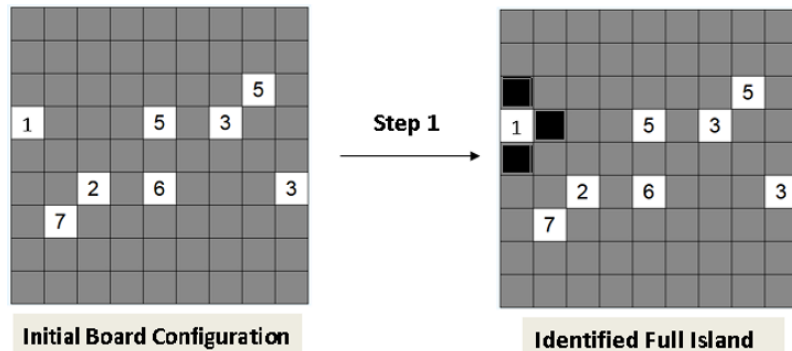
Nurikabe logical game (sometimes called Islands in the Stream) is a binary determination puzzle. The puzzle is played on a typically rectangular grid of cells, some of which contain numbers. You must decide for each cell if it is white or black (by clicking on them) according to the following rules:

- All of the black cells must be connected.
- Each numbered cell must be part of a white island of connected white cells.
- Each island must have the same number of white cells as the number it contains (including the numbered cell).
- Two islands may not be connected.
- There cannot be any 2x2 blocks of black cells.

Unnumbered cells start out grey and cycle through white and black when clicked. Initially numbered cells are white in color.

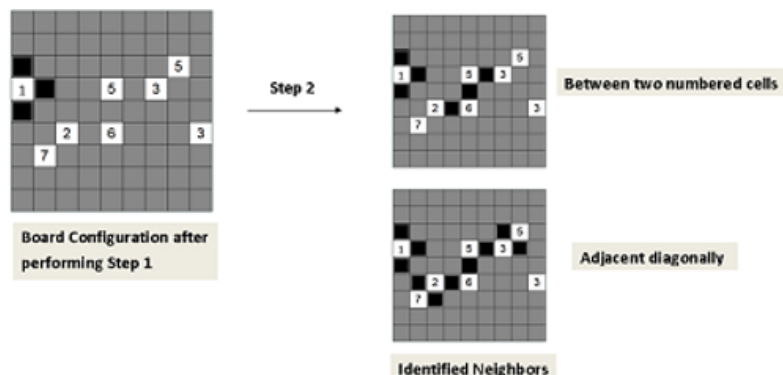
### Problem Statement:

Step 1 of solving the puzzle is identifying "Full islands".  
The below figure is the one after identifying full islands.



Step 2 of solving the puzzle is to identify the neighbors.

Since two numbers in a nurikabe puzzle cannot be part of the same island, any cell that has two numbered neighbors must be black. The two cases are when a cell is between two numbered cells, or (as in the image) when two numbered cells in the nurikabe are adjacent diagonally



Given the board configuration after performing step 1. Write a program to find the board configuration after step 2.

**Answer**

```
#include<iostream>
using namespace std;
int main()
{
    int n;
    cin>>n;
```



```

int a[n][n];
for(int i=0;i<n;i++) for(int j=0;j<n;j++) cin>>a[i][j];
for(int i=0;i<n;i++)
{
    for(int j=0;j<n;j++)
    {
        if(a[i][j]>0&&a[i][j]<20)
        {
            if((a[i+2][j]<20&&a[i+2][j]>0)&&i+2<n) a[i+1][j]=0;
            if((a[i-2][j]<20&&a[i-2][j]>0)&&i-2>=0) a[i-1][j]=0;
            if((a[i][j+2]<20&&a[i][j+2]>0)&&j+2<n) a[i][j+1]=0;
            if((a[i][j-2]<20&&a[i][j-2]>0)&&j-2>=0) a[i][j-1]=0;
            if((a[i+1][j+1]<20&&a[i+1][j+1]>0)&&(((i+1)<n)&&((j+1)<n)))
            {
                a[i+1][j]=0;
                a[i][j+1]=0;
            }
            if((a[i+1][j-1]<10&&a[i+1][j-1]>0)&&(((i+1)<n)&&((j-1)>=0)))
            {
                a[i][j-1]=0;
                a[i+1][j]=0;
            }
        }
    }
}
for(int i=0;i<n;i++)
{
    for(int j=0;j<n;j++) cout<<a[i][j]<<" ";
    cout<<endl;
}
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 11. Problem Statement :

### Maximum Element in an Array

You are playing the PUBG game and you entered into the Bootcamp. There you viewed the dropbox which was filled with guns. you have to choose the

biggest gun in the dropbox. Find the biggest gun and you will get the chicken dinner.

**Answer**

```
#include<iostream>
using namespace std;
int main()
{
    int n,i,j,max;
    cin>>n;
    int arr[16];
    for(i=0;i<n;i++)
    cin>>arr[i];
    max=arr[0];
    for(i=0;i<n;i++)
    {
        if(arr[i]>max)
        {
            max=arr[i];
        }
    }
    cout<<max<<" is the maximum element in the array.";
}
```

**Status : Correct**

**Marks : 10/10**

12. Problem Statement :

Sum of 2 arrays

Ramu has some number of Apples and he arranges that in a matrix format. Raju has another number of Apples. He also wants to arrange that in a matrix format. Ragul wants to calculate the total number of apples. Help him to find out the total number of apples.

**Answer**

```
#include<iostream>
using namespace std;
int main()
```

```

{
    int i,n,a[16],b[16];
    cin>>n;
    for(i=0;i<n;i++)
        cin>>a[i];
    for(i=0;i<n;i++)
        cin>>b[i];
    for(i=0;i<n;i++)
        cout<<a[i]+b[i]<<endl;
}

```

**Status :** Correct

**Marks :** 10/10

### 13. Problem Statement :

Sum of even numbers

Kuty and Pappu are playing a coding game. Kuty gives a set of numbers to Pappu to find the even numbers in the set and sum them. Write a program to help Pappu to solve the game and to win the dairy milk.

**Answer**

```

#include<iostream>
using namespace std;
int main()
{
    int n,i,sum,arr[16];
    cin>>n;
    for(i=0;i<n;i++)
        cin>>arr[i];
    for(i=0;i<n;i++)
    {
        if(arr[i]%2==0)
            sum+=arr[i];
    }
    cout<<"The sum of even numbers in the array is "<<sum;
}

```

**Status :** Correct

**Marks :** 10/10

#### 14. Problem Statement :

##### Maximum Element In Each Column

In a family, the people are arranged in rows and columns. Male persons in the families are arranged in a row and females are arranged in a column. Find the biggest women in each column. Help me to find the biggest woman. Write a program to find the maximum element in each column of the matrix.

##### **Answer**

```
// You are using GCC//
#include<iostream>
using namespace std;
int main()
{
    int i,j,r,c,max=0,a[11][11];
    cin>>r>>c;
    for(i=0;i<r;i++)
    for(j=0;j<c;j++)
    cin>>a[i][j];
    for(j=0;j<c;j++)
    {
        max=0;
        for(i=0;i<r;i++)
        {
            if(a[i][j]>max)
                max=a[i][j];
        }
        cout<<max<<" ";
    }
}
```

**Status :** Correct

**Marks :** 10/10

#### 15. Problem Statement :

##### Matrix Sum

Shobha and Siddhesh were playing puzzles. They are having two puzzles in their hand. They need to join the puzzle to get the correct puzzle. Help them to find the puzzle.

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int arr[11][11],m,n,i,j,sum=0;
    cin>>m>>n;
    for(i=0;i<m;i++)
    for(j=0;j<n;j++)
    cin>>arr[i][j];
    for(i=0;i<m;i++)
    for(j=0;j<n;j++)
    sum+=arr[i][j];

    cout<<sum;
}
```

**Status :** Correct

**Marks :** 10/10

# Sri Krishna College of Technology

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Batch :2021-25

Degree :B.TECH - IT

## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_CPP\_COD\_STRINGS

Attempt : 1

Total Mark : 150

Marks Obtained : 150

### Section 1 : CODING

1. Problem statement :

String - Copy

Write a program to copy a string from one variable to another using string library functions:

**Answer**

```
#include<iostream>
#include<string.h>
using namespace std;
int main()
{
    char str[12];
    cin>>str;
    int i,l,temp;
    l=strlen(str);
    for(i=0;i<l/2;i++)
    {
        temp=str[i];
        str[i]=str[l-i-1];
        str[l-i-1]=temp;
    }
}
```

```
}  
cout<<str;  
return 0;  
}
```

**Status :** Correct

**Marks :** 10/10

2. Problem statement :

String - Reverse

Write a program to find the reverse of the given without string using string library functions:

**Answer**

```
#include<iostream>  
#include<string.h>  
using namespace std;  
int main()  
{  
    char str[12];  
    cin>>str;  
    int i,l,temp;  
    l=strlen(str);  
    for(i=0;i<l/2;i++)  
    {  
        temp=str[i];  
        str[i]=str[l-i-1];  
        str[l-i-1]=temp;  
    }  
    cout<<str;  
    return 0;  
}
```

**Status :** Correct

**Marks :** 10/10

3. Problem statement :

String - Compare

Write a program to find whether the given two strings are the same or not

using string library functions:

**Answer**

```
#include<iostream>
#include<cstring>
using namespace std;
int main()
{
    char str1[20],str2[20];
    cin>>str1>>str2;
    int n;
    n=strcmp(str1,str2);
    if(n==0)
    {
        cout<<"Strings are same";
    }
    else
    {
        cout<<"Strings are not same";
    }
    return 0;
}
```

**Status :** Correct

**Marks :** 10/10

4. Problem statement :

Delete Vowels

Write a program to delete all vowels present in a string.

**Answer**

```
#include<iostream>
#include<cstring>
using namespace std;
int main()
{
    char str[200];
    int i;
    cin>>str;
```



```

while(str[i]!='\0')
{
    if(str[i]=='a' || str[i]=='e' || str[i]=='i' || str[i]=='o' || str[i]=='u' || str[i]=='A' || str[i]=='E' ||
str[i]=='l' || str[i]=='O' || str[i]=='U')
    {

    }
    else
    {
        cout<<str[i];
    }
    i++;
}
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

5. Problem statement :

String palindrome

Write a program to find whether the given string is a palindrome or not without using string library functions.

**Answer**

```

#include<iostream>
#include<string.h>
#include<algorithm>
using namespace std;
int main()
{
    char s[100];
    cin>>s;
    int l=strlen(s);
    int flag=1;
    for(int i=0,j=l-1;i<l/2;i++,j--)
    {
        if(s[i]!=s[j])
        {

```

```

        flag=0;
        break;
    }
}
if(flag==1)
cout<<"Palindrome";
else
cout<<"Not a Palindrome";
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 6. Problem Statement:

### Alternating Code

It is IPL season and the first league match of Dhilip's favorite team, "Chennai Super Kings". The CSK team is playing at the IPL after 2 years and like all Dhoni lovers, Dhilip is also eagerly awaiting to see Dhoni back in action.

After waiting in long queues, Dhilip succeeded in getting the tickets for the big match. On the ticket, there is a letter code that can be represented as a string of upper-case Latin letters.

Dhilip believes that the CSK Team will win the match in case exactly two different letters in the code alternate. Otherwise, he believes that the team might lose. Please see the note section for the formal definition of alternating code.

You are given a ticket code. Please determine, whether CSK Team will win the match or not based on Dhilip's conviction. Print "YES" or "NO" (without quotes) corresponding to the situation.

**Note:**

Two letters x, y where  $x \neq y$  are said to be alternating in a code if the code is of the form "xyxyxy...".

**Answer**

```

// You are using GCC
#include<bits/stdc++.h>
using namespace std;
int main()
{
    string s;
    int l=0,f=0;
    getline(cin,s);
    for(int i=0;s[i]!='\0';i++)
    {
        l++;
    }
    for(int i=0;i<l-2;i++)
    {
        if(s[i]!=s[i+2])
        {
            f=1;
            break;
        }
    }
    if(f==0)
    {
        cout<<"Yes";
    }
    else{
        cout<<"No";
    }
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 7. Problem Statement:

### Caption Contest

Exeter Caption Contest is a competition open to all writers worldwide. The entrants will have one day to compose and submit a caption that will be based on the theme posted on the competition page.

Robin, a creative writer had penned two captions for the contest but he unknowingly misplaced them. After searching long, he managed to locate his captions, but some letters in them have become unreadable. The captions were on two very old sheets of paper, each of which originally contained a string of lowercase English letters. The strings on both sheets have equal lengths.

Robin would like to estimate the difference between these strings. Let's assume that the first string is named  $S_1$ , and the second  $S_2$ . The unreadable symbols are specified with the question mark symbol '?'. The difference between the strings equals to the number of positions  $i$ , such that  $S_1[i]$  is not equal to  $S_2[i]$ , where  $S_1[i]$  and  $S_2[i]$  denote the symbol at  $i$ th position in  $S_1$  and  $S_2$ , respectively.

Robin would like to know the minimal and the maximal difference between the two strings if he changes all unreadable symbols to lowercase English letters. Robin is not an expert in programming and so he needs your help solving this problem!

### ***Answer***

```
// You are using GCC
#include<bits/stdc++.h>
using namespace std;
int main()
{
    char s1[50],s2[50];
    int max=0,min=0;
    cin.getline(s1,50);
    cin.getline(s2,50);
    int l1=strlen(s1);
    int l2=strlen(s2);
    int l=l1;
    for(int i=0;i<l;i++)
    {
        if(s1[i]!=s2[i]&& s1[i]!='?' && s2[i]!='?')
        {
            min++;
            max++;
        }
    }
}
```

```

    }
    else if(s1[i]=='?'&& s2[i]=='?')
    {
        max++;
    }
    else if(s1[i]=='?'||s2[i]=='?')
    {
        max++;
    }
}
cout<<min<<" "<<max;
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 8. Problem Statement:

### Little Authors

"Little Authors" Slogan Writing Competition was organized for School students at Orchids Senior School. Any student who is creative and effective in communicating ideas in short, yet powerful about any instant topic can participate in the competition. The important guideline for the contest is that the Slogan should contain a string where the number of occurrences of some character in it is equal to the sum of the numbers of occurrences of other characters in the string.

Write a program to help the event organizers to determine whether the submitted Slogans adhere to the given condition.

### Answer

```

// You are using GCC
#include<bits/stdc++.h>
using namespace std;
int main()
{
    string s;
    int c=0;

```

```

cin>>s;
int l;
l=s.length();
for(int i=0;i<l;i++)
{
    int c1=0;
    for(int j=0;j<l;j++)
    {
        if(s[i]==s[j])
        {
            c1++;
        }
    }
    if(c<c1)
    {
        c=c1;
    }
}
if(c==(l-c))
{
    cout<<s<<" :Yes";
}
else
{
    cout<<s<<" :No";
}
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 9. Problem Statement:

### Balls for Challenge

The Circoloco Children Carnival is the City's largest and most successful event dedicated to children and families. The main focus at the carnival is the workshop arena where kids can participate in engaging and educational activities.

Charlie, a little boy accompanied by his Mom visited the fair, where he participated in the "Balls for Challenge" activity. He was given many balls of white and black colors. During the play, he arranged the balls into two rows both consisting of N number of balls. These two rows of balls are given to you in the form of strings X, Y. Both these strings consist of 'W' and 'B', where 'W' denotes a white-colored ball and 'B' a black colored.

Other than these two rows of balls, Charlie has an infinite supply of extra balls of each color. He wants to create another row of N balls, Z in such a way that the sum of Hamming distance between X and Z, and hamming distance between Y and Z is maximized.

Hamming Distance between two strings X and Y is defined as the number of positions where the color of balls in row X differs from the row Y ball at that position. e.g. Hamming distance between "WBB", "BWB" is 2, as, at positions 1 and 2, corresponding colors in the two strings differ. As there can be multiple such arrangements of row Z, Charlie wants you to find the lexicographically smallest arrangement which will maximize the above value.

### ***Answer***

```
// You are using GCC
#include<iostream>
#include<cstring>
using namespace std;
int main()
{
    string a,b;
    cin>>a>>b;
    int c=0;
    int z=a.length();
    for(int i=0;i<z;i++)
    {
        if(a[i]==b[i])
        {
            if (a[i]=='W')
                cout<<"B";
            else
                cout<<"W";
```

```

    }
    else
    {
        if (c%2==0)
            cout<<a[i];
        else
            cout<<b[i];
        c++;
    }
}
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 10. Problem Statement:

### Peter at Challenger Series

The Table tennis Challenger Series is the springboard to fame for the future stars of professional table tennis. Peter is very passionate about table tennis and made his debut in the first league match of the Series against a prominent player Horejsi.

Peter found some statistics of matches which described who won the points in order. A game shall be won by the player first scoring 11 points except in the case when both players have 10 points each, then the game shall be won by the first player subsequently gaining a lead of 2 points. Could you please help Peter find out who the winner was from the given statistics? (It is guaranteed that statistics represent always a valid, finished match.)

### Answer

```

// You are using GCC
#include<bits/stdc++.h>
using namespace std;
int main()
{
    string s;

```



```

int l,win=0,lose=0;
cin>>s;
l=s.length();
for(int i=0;i<l;i++)
{
    if(s[i]=='1')
    {
        ++win;
    }
    else
    {
        ++lose;
    }
}
if(win>lose)
{
    cout<<"Win";
}
else
{
    cout<<"Lose";
}
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

11. Problem statement :

String - Upper case

Write a program to change the given string to uppercase without using string library functions

**Answer**

```

#include<iostream>
#include<cstring>
using namespace std;
int main()
{
    char s[100];

```

```

cin.getline(s,100);
int i,l;
l=strlen(s);
for(i=0;i<l;i++)
{
    if(s[i]>='a' && s[i]<='z')
        s[i]=s[i]-32;
}
cout<<s;
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

12. Problem statement :

String lowercase

Write a program to change the given string to lowercase without using string library functions.

**Answer**

```

#include<iostream>
#include<string.h>
#include<cctype>
using namespace std;
int main()
{
    char str[100];
    cin.getline(str,100);
    int i,len;
    char asci;
    len=strlen(str);
    cout<<"String with lowercase is ";
    for(i=0;i<len;i++)
    {
        asci=(int) str[i]+32;

        cout<<asci;
    }
}

```

}

Status : Correct

Marks : 10/10

### 13. Problem Statement:

#### Number Challenge

Mike set off with great zeal to the "Kracker Jack Fun Fair 2017". There were numerous activities in the fair, though Mike being a math expert, liked to participate in the Number Challenge.

Mike was given a string D of numbers containing only digits 0's and 1's. His challenge was to make the number have all the digits the same. For that, he should change exactly one digit, i.e. from 0 to 1 or from 1 to 0. If it is possible to make all digits equal (either all 0's or all 1's) by flipping exactly 1 digit then he has to output "Yes", else print "No" (without quotes).

Write a program to help Mike win over his challenge.

#### Answer

```
// You are using GCC
#include<bits/stdc++.h>
using namespace std;
int main()
{
    char ch[50];
    int i,len=0,c=0,cn=0;
    cin>>ch;
    for(i=0;ch[i];i++)
    {
        len++;
    }
    for(i=0;ch[i];i++)
    {
        if(ch[i]=='1')
        {
            c++;
        }
        else if(ch[i]=='0')
        {
            cn++;
        }
    }
    if(c==len || cn==len)
    {
        cout<<"Yes";
    }
    else
    {
        cout<<"No";
    }
}
```

```

        {
            cn++;
        }
    }
    if(len-c==1||len-cn==1)
    {
        cout<<"Yes";
    }
    else
    {
        cout<<"No";
    }
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

#### 14. Problem Statement:

##### Wildcard Matching

Sunil is a little scientist. Sunil has planned to design a wildcard pattern matcher to exhibit at the "Young Inventors", a tech talent show organized at his school.

Sunil wanted to design the wildcard pattern matcher supporting the wildcard character '?'. The wildcard character '?' can be substituted by any single lower case English letter for matching. He has two strings X and Y of equal length, made up of lower case letters and the character '?'.

Sunil wants your help in designing the device, to know whether the strings X and Y can be matched or not. Write a program to check whether the given strings can be matched or not.

##### **Answer**

```

#include<iostream>
#include<string>
using namespace std;
int main()
{
    string s1,s2;

```

```

cin>>s1>>s2;
int i,min=0;
for(i=0;s1[i];i++)
{
    if(s1[i]!='?'&& s2[i]!='?')
    {
        if(s1[i]!=s2[i])
        {
            min++;
        }
    }
}
if(min==0)
{
    cout<<"Yes";
}
else
{
    cout<<"No";
}
}

```

**Status :** Correct

**Marks :** 10/10

15. Problem statement:

String-count the vowels

Write a program to count the number of vowels in the given string.

**Answer**

```

#include<iostream>
#include<string.h>
using namespace std;
int main()
{
    char str[100];
    int i,vow=0;
    cin.getline(str,100);
    for(i=0;i<str[i];i++)
    {

```

```
        if(str[i]=='a'||str[i]=='A'||str[i]=='e'||str[i]=='E'||str[i]=='i'||str[i]=='I'||str[i]=='o'||  
str[i]=='O'||str[i]=='u'||str[i]=='U')  
        {  
            vow++;  
        }  
    }  
    cout<<"Number of vowels:"<<vow;  
    return 0;  
}
```

**Status :** Correct

**Marks : 10/10**

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Batch :2021-25

Degree :B.TECH - IT

## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_CPP\_COD\_POINTERS

Attempt : 1

Total Mark : 100

Marks Obtained : 100

### Section 1 : CODING

#### 1. Problem Statement:

Write a C++ program that fetches a word and prints the same using pointers.

#### *Answer*

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    char a[50];
    cin>>a;
    char *p=a;
    cout<<p<<"\n";
}
```

**Status :** Correct

**Marks :** 10/10

#### 2. Problem Statement:

Write a C++ program to find the modulus of two numbers using pointers.

**Answer**

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    int a,b;
    cin>>a>>b;
    int*c=&a;
    int *d=&b;
    int e=a*b;
    cout<<a<<" "<<b<<" "<<e;

}
```

**Status : Correct****Marks : 10/10****3. Problem Statement:**

Write a C++ program to print the sum of array elements using pointers.

**Answer**

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    int n,sum=0,*m,i;
    cin>>n;
    int a[n];
    if(n>0 && n<=10)
    {
        for(i=0;i<n;i++)
        {
            cin>>a[i];
        }
        for(i=0;i<n;i++)
        {
            sum=sum+a[i];
        }
        m=&sum;
        cout<<*m;
    }
}
```



```

    }
    else
    {
        cout<<"Invalid";
    }
}

```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem Statement:

Write a C++ program to fetch five integers in an array and print them in reverse order using pointers.

#### Answer

```

#include<bits/stdc++.h>
using namespace std;
int main()
{
    int a[5],i,*ptr;
    for(i=0;i<5;i++)
    {
        cin>>a[i];
    }
    ptr=&a[5-1];
    if(cin.fail())
    {
        cout<<"Invalid";
    }
    else
    {
        for(i=0;i<5;i++)
        {
            cout<<" "<<*ptr--;
        }
    }
}

```

**Status :** Correct

**Marks :** 10/10

### 5. Problem Statement:

Using pointers, write a C++ program to sort an integer array in ascending order.

#### **Answer**

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    int n,*p,i;
    cin>>n;
    int a[n];
    for(i=0;i<n;i++)
    {
        cin>>a[i];
    }
    sort(a,a+n);
    for(i=0;i<n;i++)
    {
        p=&a[i];
        cout<<*p<<" ";
    }
}
```

**Status :** Correct

**Marks : 10/10**

### 6. Problem Statement:

Maximum Element in an Array

Write a program to find the maximum element in an array using pointers.

Note:

Refer to the problem requirements

#### **Answer**

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
```

```

int i,n;
cin>>n;
int a[n];
for(i=0;i<n;i++)
{
    cin>>a[i];
}
sort(a,a+n);
int*e=&a[n-1];
cout<<*e<<" is the maximum element";
}

```

**Status :** Correct

**Marks :** 10/10

## 7. Problem Statement:

Write a program to count the number of vowels and consonants in a given string using pointers

### Answer

```

#include<bits/stdc++.h>
using namespace std;
int main()
{
    char a[150];
    int i,vow=0,cons=0,*m,*n;
    cin>>a;
    for(i=0;a[i];i++)
    {
        if(a[i]=='a' || a[i]=='e' || a[i]=='i' || a[i]=='o' || a[i]=='u' || a[i]=='A' || a[i]=='E' || a[i]=='I' ||
a[i]=='O' || a[i]=='U')
        {
            vow++;
        }
        else if(a[i]>='a'&&a[i]<='z' || a[i]>='A'&&a[i]<='Z')
        {
            cons++;
        }
    }
    m=&vow;
    n=&cons;
}

```

```
    cout<<*m<<" "<<*n;
}
```

**Status :** Correct

**Marks :** 10/10

## 8. Problem Statement:

Write a C++ program to concatenate two arrays using pointers.

### Answer

```
#include<iostream>
using namespace std;
int main()
{
    int n1,i,j,*p,*q;
    cin>>n1;
    int a[n1];
    for(i=0;i<n1;i++)
    {
        cin>>a[i];
    }
    int n2;
    cin>>n2;
    int b[n2];
    for(i=0;i<n2;i++)
    {
        cin>>b[i];
    }
    p=a;
    q=b;
    for(i=0,j=n1;i<n2;i++,j++)
    {
        *(p+j) = *(q+i);
    }
    for(i=0;i<j;i++)
    {
        cout<<a[i]<<" ";
    }
    return 0;
}
```

Status : Correct

Marks : 10/10

9. Problem Statement:

Write a program to replace a character with a given character in a string.

Note: Replace 'a' by '\*'.

**Answer**

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    char a[150],*m;
    int i;
    cin>>a;
    for(i=0;a[i];i++)
    {
        if(a[i]=='a')
        {
            a[i]='*';
        }
    }
    for(i=0;a[i];i++)
    {
        m=&a[i];
        cout<<*m;
    }
}
```

Status : Correct

Marks : 10/10

10. Problem Statement:

Write a program to search for an element in a 1D array using pointers.

**Answer**

```
#include<bits/stdc++.h>
using namespace std;
```

```

int search(int,int*,int);
int main()
{
    int n,m;
    cin>>n;
    int a[n];
    for(int i=0;i<n;i++)
    {
        cin>>a[i];
    }
    cin>>m;
    search(n,a,m);
    return 0;
}
int search(int n,int*a,int m)
{
    int l,i;
    for(i=0;i<n;i++)
    if(m==a[i])
    {
        l=1;
        break;
    }
    if(l==1)
    cout<<m<<"is found at index"<<i;
    else
    cout<<"Not found";
}

```

**Status :** Correct

**Marks :** 10/10

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## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_CPP\_COD\_FUNCTIONS

Attempt : 1

Total Mark : 100

Marks Obtained : 100

### Section 1 : CODING

#### 1. Problem Statement:

#### Expression Evaluation

In the Mini project 7th, the module is to evaluate the expression  $y = x + x^2 + \dots + x^n$ . Rita allotted this function to Malini. Collect and display the values returned by the called function. Test your program and report the results obtained.

Help Malini to write a program to evaluate the expression?

Get the value of x and n from the user as input

Use the following function:

```
int calculate(int x,int n)
```

where the first argument corresponds to the value of x and the second corresponds to n respectively.

#### **Answer**

```
// You are using GCC
```

```
// You are using GCC
#include<iostream>
#include<cmath>
using namespace std;
int calculate(int x,int n)
{ int res=0;
  for(int i=1;i<=n;i++)
  {
    res=res+pow(x,i);
  }
  return res;
}
int main()
{
  int x,n;
  cin>>x>>n;
  cout<<calculate(x,n);
  return 0;
}
```

**Status :** Correct

**Marks :** 10/10

## 2. Problem statement:

Write a C++ code to swap three numbers in a cyclic order by passing references to a function. Your function prototype must be

```
void swap(int&, int&, int&);
```

### Answer

```
// You are using GCC
// You are using GCC
#include<iostream>
using namespace std;
void swap(int *a,int *b,int *c)
{
  int t1;
  t1=*a;
  *a=*b;
  *b=*c;
  *c=t1;
}
```



```

}
int main()
{
    int a,b,c;
    cin>>a>>b>>c;
    swap(&a,&b,&c);
    cout<<"a = "<<a<<"\nb = "<<b<<"\nc = "<<c;
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem statement:

Manoj wants to give an even a number of chocolates to his friend. The number should also be a multiple of 10. Write a program to obtain a number and if it is even, checks whether it is a multiple of 10 or not else print not even.

call ismultiple functions from iseven function.

Function Requirements:

void iseven(int x) to print whether the input number is even or not.

void ismultiple(int x) to print whether the input number is a multiple or not

### **Answer**

```

// You are using GCC
// You are using GCC
#include<iostream>
using namespace std;
void iseven(int x);
void ismultiple(int x);
int main()
{
    int n;
    cin>>n;
    iseven(n);
    return 0;
}

```

```

}
void iseven(int x)
{
    if(x%2==0)
    {
        cout<<x<<" is Even number"<<endl;
        ismultiple(x);
    }
    else
        cout<<x<<" is Not even";
}
void ismultiple(int x)
{
    if(x%10==0)
        cout<<"Multiple of 10";
    else
        cout<<"Not a multiple of 10";
}

```

**Status :** Correct

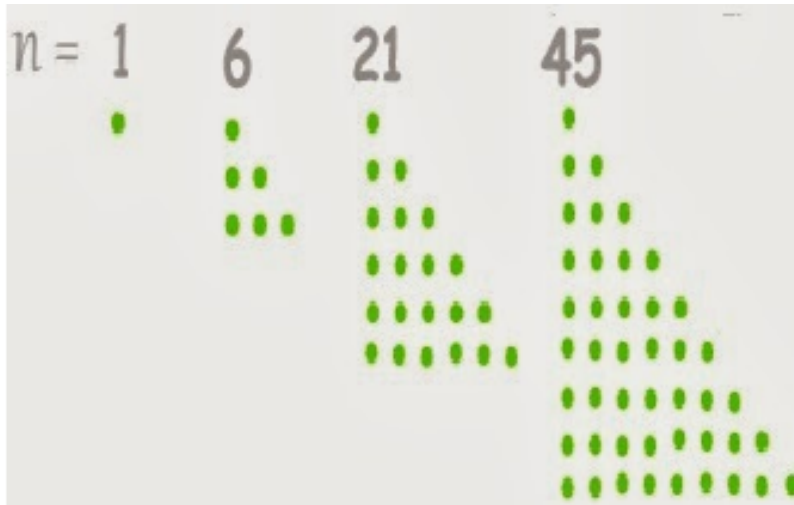
**Marks :** 10/10

#### 4. Problem statement:

##### Right Triangle of Dots

The much-awaited event in the entertainment industry every year is the "Screen Awards". This year the event is going to be organized on December 25 to honor the Artists for their professional excellence in Cinema. The Organizers of the event, J&R Events, decided to design the logo of the Screen Awards as a digitized image and display it on the LED panel boards for the show promotions all across the venue. The Event team wanted to border the logo with right triangles which will describe it better.

For this purpose, the Event development team is in the task to find if N dots can make a right triangle or not (all N dots must be used). Given N dots, we can make it look like a Right Triangle (45-45-90 triangle) exactly with N dots. Rearrange the given N dots, like this:



Your task is to help the team write a program using functions to find if N dots can make a right triangle or not.

Function Specifications:

Use the function name, return type, and the argument type as:

int find(int)

The function must return 1 if you can make a right triangle using N dots, else return 0.

Note:

The main function is already provided and well defined. The function mentioned above is to be defined by you to solve this problem

**Answer**

```
// You are using GCC
// You are using GCC
#include<iostream>
using namespace std;
int find(int);
int main()
{
    int n;
    cin>>n;
    int f=find(n);
    if(f==1)
        cout<<"We can create Right Triagle of dots with "<<n<<" dots";
```

```

    else
    cout<<"We can't create Right Triagele of dots with "<<n<<" dots";
    return 0;
}
int find(int n)
{
    int sum=0,i=0;
    while(sum<n)
    {
        sum=sum+i;
        i++;
    }
    if(sum==n)
    return 1;
    else
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 5. Problem Statement:

### Addition Challenge

Charlie set off with great zeal to the "Kracker Jack Fun Fair 2017". There were numerous activities in the fair, though Charlie being a Math expert, liked to participate in the Addition Challenge.

The Challenge given to him was to find S, where  $S = 20 + 21 + 22 + \dots + 2N$ . He would succeed in his challenge if he manages to tell the answer for the problem before others. He requests your help to solve the problem in a flash.

Help Charlie to find S and win over the challenge.

Method Name	Description
<code>int findSum(int)</code>	This method should return S.

In the Main function, obtain input from the user in the console and display S by calling the findSum method

### Answer

```
// You are using GCC
#include<iostream>
#include<cmath>
using namespace std;
int findSum(int);
int findSum(int n)
{ int S=0;
  for(int i=0;i<=n;i++)
    S=S+pow(2,i);
  return S;
}
int main()
{
  int n;
  cin>>n;
  cout<<findSum(n);
  return 0;
}
```

Status : Correct

Marks : 10/10

6. Problem statement :

Factorial

Write a program to compute the factorial of a number using recursion.

### Answer

```
// You are using GCC
// You are using GCC
#include<iostream>
using namespace std;
int fact(int n);
int main()
```

```

{
    int n;
    cin>>n;
    cout<<"The factorial of "<n<<" is "<<fact(n);
    return 0;
}
int fact(int n)
{
    if(n==0)
        return 1;
    else
        return n*fact(n-1);
}

```

**Status :** Correct

**Marks :** 10/10

7. Problem statement :

GCD of 2 Numbers

Write a program to compute the GCD of 2 numbers using recursion.

**Answer**

```

#include<bits/stdc++.h>
using namespace std;
int gcd(int n,int m)
{
    if(n%m==0)
        return m;
    else
        gcd(m,(n%m));
}
int main()
{
    int n,m,result;
    cin>>n>>m;
    result=gcd(max(m,n),min(m,n));
    cout<<result;
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

8. Problem statement :

Sum of elements in Array

Write a program to compute the sum of elements in an array using recursion.

**Answer**

```
#include<bits/stdc++.h>
using namespace std;
int sum(int a[],int n);
int main()
{
    int n,i;
    cin>>n;
    int a[n];
    for(i=0;i<n;i++)
    {
        cin>>a[i];
    }
    cout<<sum(a,n);
}
int sum(int a[],int n)
{
    if(n<=0)
        return 0;
    return sum(a,n-1)+a[n-1];
}
```

**Status :** Correct

**Marks :** 10/10

9. Problem Statement:

Auditions

"Singing Champs" is a famous reality series. The show organizers have planned to roll out the show's 5th season in the coming month. The

auditions for the show is announced at various Cities widely and the organizers have inaugurated the first audition today.

Large mass of people gathered at the venue. Based on the selection procedure for the first level, all the people are made to stand in a queue. Participants who are standing in the even positions of the queue are selected initially. Of the selected people a queue is formed and again out of these only people on even position are selected. This continues until we are left with one person.

To help them in the selection procedure, the organizers approached you to write a recursive method for determining the position of that final person in the original queue.

Method Name	Description
<u>int</u> <u>findPos(int)</u>	This recursive method should return the <u>position(original queue)</u> of that person who is left.

In the Main function, obtain input from the user in the console and display the position(original queue) of that person who is left by calling the findPos method

### **Answer**

```
#include<bits/stdc++.h>
using namespace std;
int findPos(int);
int findPos(int n)
{
    if(n==1)
    {
        return 1;
    }
    return 2*findPos(int (n/2));
}
int main()
{
    int n;
    cin>>n;
```



```
    cout<<findPos(n);  
}
```

**Status :** Correct

**Marks :** 10/10

## 10. Problem Statement:

### Entrance Test

"Success Academy" has arranged for a entrance test for High School students from rural villages. Those successful students of the test will be awarded the scholarship for their IIT/JEE preparations at Success Academy. Sunil, the co-coordinator and founder of the academy has given one problem for the first stage of the test. The problem goes like this:

Given two integers x and n, find the number of ways to express x as sum of n-th powers of unique natural numbers. It is given that  $1 \leq n \leq 20$ .

Sunil himself has not computed the solution of the problem. Write a recursive method to help him find the answer for the same to evaluate the students.

Method Name	Description
<code>int countWays(int,int)</code>	This recursive method should return the number of ways to express x as sum of n-th powers of unique natural numbers.

In the Main function, obtain input from the user in the console and display the number of ways to express x as sum of n-th powers of unique natural numbers by calling the countWays method

### Answer

```
// You are using GCC  
#include<iostream>  
#include<cmath>  
using namespace std;  
int countWays(int,int);
```

```

int checkrecursive(int x,int n,int check)
{
    int val=x-pow(check,n);
    if(val==0) return 1;
    if(val<0) return 0;
    return checkrecursive(val,n,check+1)+checkrecursive(x,n,check+1);
}
int main()
{
    int x,n;
    cin>>x>>n;
    cout<<countWays(x,n);
    return 0;
}
int countWays(int x,int n)
{
    return checkrecursive(x,n,1);
}

```

**Status :** Correct

**Marks :** 10/10

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2021\_25 II\_Data Structure Through CPP - IRC

## IRC\_CPP\_COD\_STRUCTURE AND UNION AND FILE HANDLING

Attempt : 1

Total Mark : 120

Marks Obtained : 120

### Section 1 : CODING

1. Problem statement :

Student structure

Create a structure student with the following members

Roll Number

Five subject marks

Average

Grade

Given the five subject marks, Calculate the average and grade.

GRADE CALCULATION:

1)if avg>70 the grade will be 1

2)if avg 50 to 70 the grade will be 2

3)if avg is below 50 the grade will be 3 (Note: rn- Roll Number, s-Subjects, avg- Average)

**Answer**

```

// You are using GCC
#include<bits/stdc++.h>
using namespace std;
struct student{
    int rn;
    int s[5];
    int avg;
};
int main()
{
    int n,sum=0,avg,gr;
    cin>>n;
    struct student s1[n];
    int i,j;
    for(i=0;i<n;i++)
    {
        cin>>s1[i].rn;
        for(j=0;j<5;j++)
        {
            cin>>s1[i].s[j];
        }
    }
    for(i=0;i<n;i++)
    {
        int sum=0;
        for(j=0;j<5;j++)
        {
            sum+=s1[i].s[j];
        }
        avg=sum/5;
        if(avg>70)
            gr=1;
        else if(avg>=50 && avg<=70)
            gr=2;
        else if(avg<50)
            gr=3;
        cout<<s1[i].rn<<" ";
        for(j=0;j<5;j++)
        {
            cout<<s1[i].s[j]<<" ";
        }
        cout<<avg<<" "<<gr<<endl;
    }
}

```

```
}  
}
```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement:

Write a program to add two distances (in inch-feet) system using structures.

### Answer

```
// You are using GCC  
#include<bits/stdc++.h>  
using namespace std;  
struct distance{  
    int feet;  
    float inches;  
};  
int main()  
{  
    struct distance d[2];  
    float sum1,sum2;  
    for(int i=0;i<2;i++)  
    {  
        cin>>d[i].feet>>d[i].inches;  
    }  
    for(int i=0;i<2;i++)  
    {  
        sum1+=d[i].feet;  
        sum2+=d[i].inches;  
    }  
    if(sum2>12)  
    {  
        sum1++;  
        sum2=sum2-12;  
    }  
    cout<<" Sum: "<<sum1<<" feet, "<<sum2<<" inches. ";  
}
```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statements:

Write a program to find the difference between two time periods using structures.

#### **Answer**

```
// You are using GCC
#include<bits/stdc++.h>
using namespace std;
struct time{
    int hour;
    int min;
    int sec;
};
void computeTime(struct time, struct time, struct time*);
int main()
{
    struct time t1,t2,difference;
    cin>>t1.hour>>t1.min>>t1.sec;
    cin>>t2.hour>>t2.min>>t2.sec;
    if(t1.hour>23|| t2.hour>23||t1.min>=60|| t2.min>=60||t1.sec>=60||t2.sec>=60
    ||t1.hour<0||t2.hour<0||t1.min<0||t2.min<0||t1.sec<0||t2.sec<0)
    {
        cout<<"-1";
        return 0;
    }
    computeTime( t1,t2,&difference);
    cout<<"Difference:
    "<<t1.hour<<":"<<t1.min<<":"<<t1.sec<<"- "<<t2.hour<<":"<<t2.min<<":"<<t2.sec<<""
    << difference.hour<<":"<<difference.min<<":"<<difference.sec;
    return 0;
}
void computeTime(struct time t1, struct time t2, struct time*difference)
{
    if(t2.sec>t1.sec)
    {
        --t1.min;
        t1.sec = t1.sec+60;
    }
    difference->sec=t1.sec-t2.sec;
    if(t2.min>t1.min)
    {
```

```

        --t1.hour;
        t1.min= t1.min+60;
    }
    difference->min= t1.min-t2.min;
    difference->hour=t1.hour-t2.hour;
}

```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem Statement:

Write a program having a structure employee with members Employee Name, Employee number, Designation, Department, BasicSalary, DA, HRA, PF, and totalSalary.

Prompt the user to enter employee details for n employees and calculate totalSalary as

TotalSalary = BasicSalary + DA + HRA + PF

Finally print the Salaryslip for an employee based on the given employee number

#### Answer

```

// You are using GCC
#include<bits/stdc++.h>
using namespace std;
struct employee{
    string name;
    int num;
    string designation;
    string department;
    int bs;
    int da;
    int hra;
    int pf;
    int total;
};
int main()
{

```

```

struct employee a[10];
for(int i=0;i<10;i++)
{
    cin>>a[i].name;
    cin>>a[i].num;
    cin>>a[i].designation;
    cin>>a[i].department;
    cin>>a[i].bs;
    cin>>a[i].da;
    cin>>a[i].hra;
    cin>>a[i].pf;
    a[i].total=a[i].bs+a[i].da+a[i].hra+a[i].pf;
}
int number;
cin>>number;
for(int i=0;i<10;i++)
{
    if(a[i].num==number)
    {
        cout<<"SALARY SLIP"<<endl;
        cout<<"Employee Name : "<<a[i].name<<endl;
        cout<<"Employee Total Salary : "<<a[i].total;
        return 0;
    }
}
cout<<"No Records Found for given Employee Number!";
}

```

**Status :** Correct

**Marks :** 10/10

## 5. Problem Statement:

Create a structure named DEPT with the following fields: Name, emp-id, years\_of\_experience, and Basic salary. Define an array of structures for 'n' employees and check the following constraints and print the results.

- Increase 10% to the salaries of those employees who have worked for 10 years or more
- Increase 5% to the salaries of those employees who have experienced between 5 to 9 years.



- Increase 2% to the salaries of those employees who have experienced between 1 to 4 years.

### **Answer**

```
// You are using GCC
#include<iostream>
#include<bits/stdc++.h>
using namespace std;
struct DEPT{
    string name;
    int emp_id;
    int yoe;
    int basic_salary;
};
int main()
{
    int n;
    cin>>n;
    struct DEPT a[n];
    for(int i=0;i<n;i++)
    {
        cin>>a[i].name;
        cin>>a[i].emp_id;
        cin>>a[i].yoe;
        cin>>a[i].basic_salary;
        if(a[i].yoe>=10)
            a[i].basic_salary+=a[i].basic_salary*10/100;
        else if(a[i].yoe>=5&&a[i].yoe<=9)
            a[i].basic_salary+=a[i].basic_salary*0.05;
        else if(a[i].yoe>=1&&a[i].yoe<=4)
            a[i].basic_salary+=a[i].basic_salary*0.02;
    }
    for(int i=0;i<n;i++)
    {
        cout<<"Employee Name: "<<a[i].name<<endl;
        cout<<"Employee Id : "<<a[i].emp_id<<endl;
        cout<<"years of experience : "<<a[i].yoe<<endl;
        cout<<" salary : " <<a[i].basic_salary<<endl;
        cout<<endl;
    }
}
```

```
}
```

**Status :** Correct

**Marks : 10/10**

#### 6. Problem statement:

Write a program to demonstrate union to store and display employee details such as Employee ID, Employee Name, Date of birth, Date of Joining, and Current salary.

Use union name as union Employee

#### **Answer**

```
// You are using GCC
#include<iostream>
#include<bits/stdc++.h>
using namespace std;
struct data{
    int id;
    string name;
    string dob;
    string doj;
    float salary;
};
int main()
{
    struct data a;
    cin>>a.id;
    cin>>a.name;
    cin>>a.dob;
    cin>>a.doj;
    cin>>a.salary;
    cout<<"ID : "<<a.id<<endl;
    cout<<"Name : "<<a.name<<endl;
    cout<<"DOB : "<<a.dob<<endl;
    cout<<"DOJ : "<<a.doj<<endl;
    cout<<"Salary : "<<a.salary<<endl;
    return 0;
}
```

**Status : Correct**

**Marks : 10/10**

7. Problem statement :

Book

Create a union named book with the following members

Name

Price

In the main method, get the inputs from the user and print them.

**Answer**

```
// You are using GCC
#include<iostream>
#include<string.h>
using namespace std;
union sub{
    char name[100];
    int n;
};
int main()
{
    union sub s,g;
    cin>>s.name;
    cin>>g.n;
    cout<<s.name<<" "<<g.n;
}
```

**Status : Correct**

**Marks : 10/10**

8. Problem Statement:

In an online grocery shop, customers want to purchase multiple items. Create a structure to store the Item code, Brand name, Item Name, Quantity, Price of the product. Generate the Bill number, Display the purchased product, name, amount and quantity, and the total bill amount.

a. Write a function MESSAGE() to alert the customer with the product name if the rate of a product is more than Rs.1000.

b. Write a function VOUCHER() to generate the voucher for Rs.200 if the bill amount is greater than Rs.10000.

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
struct store{
    int billno;
    string bname;
    string iname;
    int quantity;
    int price;
    int h;
};
int main()
{
    int n,total=0;
    cin>>n;
    struct store a[n];
    for(int i=0;i<n;i++)
    {
        cin>>a[i].billno>>a[i].bname>>a[i].iname>>a[i].quantity>>a[i].price;
    }
    for(int i=0;i<n;i++)
    {
        a[i].h = a[i].quantity * a[i].price;
        if(a[i].h>1000)
            cout<<a[i].iname<<" costs more than 1000"<<endl;
        total=total+a[i].h;
    }
    cout<<total<<endl;
    if(total>10000)
        cout<<"You have won a voucher of Rs.200"<<endl;
    else
        cout<<"No voucher"<<endl;
    return 0;
}
```

**Status :** Correct

**Marks :** 10/10

## 9. Problem Statement:

Read and print the contents of the file

Write the program to create a file "sample.txt". Open the file and read the content and print it.

Rule:

The file name should be sample.txt.

### ***Answer***

```
#include <iostream>
#include <fstream>
using std::ofstream;
using std::ifstream;
using namespace std;

int main()
{
    fstream file;

    // You are using GCC
    file.open("sample.txt",ios::out);
    string str="Today C++ is the most widely used System Programming Language.
\nMost of the state of the art software have been implemented using C++.
\nEasy to learn\nStructured language\nIt produces efficient programs.\nIt can
handle low-level activities.\nIt can be compiled on a variety of computers.";
    ofstream fout;
    fout.open("sample.txt");
    fout<<str<<endl;
    fout.close();
    cout<<"File content:\n";
    while(!file.eof())
    {
        file>>str;
        cout<<str;
    }

    file.close();
    //ifile.close();
```

```
    return 0 ;  
}
```

**Status :** Correct

**Marks :** 10/10

#### 10. Problem Statement:

Maximum and Minimum number in a file:

Write a program to create a file with integer values and open the file in reading mode to read the content of the file then find the maximum and minimum value.

Rule:

The input file name should be named "sample.txt".

#### **Answer**

```
#include <iostream>  
#include <fstream>  
using std::ofstream;  
using namespace std;  
  
int main()  
{  
    // You are using GCC  
    int n;  
    cin>>n;  
    int a[n];  
    for(int i=0;i<n;i++)  
    {  
        cin>>a[i];  
    }  
    int max=0,min=a[0];  
    for(int i=0;i<n;i++)  
    {  
        if(max<a[i])  
            max=a[i];  
    }  
    for(int i=0;i<n;i++)  
    {
```

```

        if(a[i]<min)
        {
            min=a[i];
        }
    }
    fstream file;
    file.open("sample.txt",ios::out);
    ofstream out;
    out.open("sample.txt");
    out<<min<<max;
    out.close();
    while(file)
    {
        file>>max>>min;
        cout<<max<<" "<<min;

    }
    file.close();
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 11. Problem Statement:

Count the number of uppercase and lowercase letters - Files

Write a program to read the content from the file(sample.txt) and count the number of uppercase and lowercase letters.

Rules:

The input file should be named "sample.txt".The input file should be named "sample.txt".

## Answer

```

#include<iostream>
#include <fstream>
using namespace std;

```

```

int main()
{
    ofstream fout;
    fout.open("sample.txt");

    // You are using GCC
    char str[300]="Time is a Great Teacher BUT Unfirtunately It Kilss All Its Pupils\n";
    fout<<str;
    fout.close();
    ifstream fin;
    fin.open("sample.txt");
    int ucount=0,lcount=0;
    char ch;
    while(!fin.eof())
    {
        fin.get(ch);
        if(ch>='A'&&ch<='Z')
            ucount++;
        if(ch>='a'&&ch<='z')
            lcount++;
    }
    cout<<"Number of uppercase letters in file are"<<ucount<<endl;
    cout<<"Number of lowercase letters in file are"<<lcount<<endl;

    fin.close();
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 12. Problem Statement:

Number Of Lines in the file

Write the program to create a file "sample.txt". Open the file and read the content to count the number of lines.

Rule:

The file name should be sample.txt.



### **Answer**

```
#include <iostream>
#include <fstream>
using std::ofstream;
using std::ifstream;
using namespace std;

int main()
{
    fstream file;

    // You are using GCC
    file.open("sample.txt",ios::out);
    string str="Today C++ is the most widely used System Programming Language.
\nMost of the state of the art software have been implemented using C++.
\nEasy to learn\nStructured language\nIt produces efficient programs.\nIt can
handle low-level activities.\nIt can be compiled on a variety of computers.\n";
    ofstream fout;
    fout.open("sample.txt");
    fout<<str<<endl;
    fout.close();
    cout<<"File content:\n";
    while(!file.eof())
    {
        file>>str;
        cout<<str;
    }
    ifstream ifile;
    int count;
    ifile.open("sample.txt");
    while(getline(ifile,str))
    {
        count++;
    }
    cout<<"Numbers of lines in the file : "<<count-1;

    file.close();
    ifile.close();

    return 0 ;
}
```

**Status :** Correct

**Marks :** 10/10

# Sri Krishna College of Technology

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## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_CPP\_COD\_CLASSES AND OBJECTS

Attempt : 1

Total Mark : 100

Marks Obtained : 100

### Section 1 : CODING

#### 1. Problem Statement:

Create a class named Input with two data members - One string and One integer.

In the main method, create an object for the class. Get the inputs from the user and print them.

#### **Answer**

```
#include<bits/stdc++.h>
using namespace std;
class obj
{
    public:
    string name;
    int num;
    void get()
    {
        cin>>name>>num;
    }
    void put()
    {
```

```

        cout<<num<<":"<<name;
    }
};
int main()
{
    obj n;
    n.get();
    n.put();
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement:

### Calendar

Create a class DateTime with the following member functions.

Hours, Minutes, Date, Month, and Year - Integer

Define a member function init() - to get the class variables

Define a member function display() - to print the class variables.

In the main method, create an object for the class and call the necessary methods.

### Answer

```

#include<bits/stdc++.h>
using namespace std;
class func
{
    public:
    int hours,mins,date,mon,year;
    void get()
    {
        cin>>hours>>mins>>date>>mon>>year;
    }
    void put()
    {
        if(date<0||date>31||mon<0||mon>12||year<0||year>9999||hours>24||mins>60||
mins<0)
        {

```

```

        cout<<"Invalid";
    }
    else
    {
        cout<<"Date:"<<date<<"-"<<mon<<"-"<<year<<endl;
        cout<<"Time:"<<hours<<" hrs"<<mins<<" mins"<<endl;
        cout<<"Total mins:"<<(hours*60+mins);
    }
}
};
int main()
{
    func n;
    n.get();
    n.put();
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement:

Create a class named Demo with two static integer variables as its private attributes and the following member functions.

get() - to get the values of x and y

fun() - to print the value of x and y

Default values of x and y are 10 and 20.

In the main method, create an object for the Demo class and call the methods.

### Answer

```

#include<bits/stdc++.h>
using namespace std;
class demo
{
    public:
        static int X,Y;
        void get()

```

```

    {
        cin>>X>>Y;
    }
    void put()
    {
        cout<<"value of X: "<<X<<endl;
        cout<<"value of Y: "<<Y<<endl;
    }

};
int demo::X=10;
int demo::Y=20;

int main()
{
    demo n;
    n.put();
    n.get();
    n.put();
}

```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem Statement:

Create a class named Box with length as its private attribute.

Create a constructor and assign the length as 0.

Create a member function get() - get the value of length as input.

Include a Friend Function

int printVolume(Box) - calculate the volume of the box and return it.

In the main method, create an object for Box and call the necessary methods.

#### **Answer**

```

#include<bits/stdc++.h>
using namespace std;
class box
{

```

```

public:
int length;
void get()
{
    cin>>length;
}
void put()
{
    cout<<length*length*length;
}
};
int main()
{
    box n;
    n.get();
    n.put();
}

```

**Status :** Correct

**Marks :** 10/10

## 5. Problem Statement:

Write a program to find the area of the wall. Create a class Wall with the following private attributes

length - double

height - double

Include parameterized constructor Wall(double length, double height) and a method calculateArea() which returns the area of the wall. In the main method get the length and breadth of two walls from the user.

## Answer

```

#include<bits/stdc++.h>
using namespace std;
class wall
{
    private:
    double l,h;
    double lenght ,height;
    public:

```

```

wall(double l,double h)
{
    lenght=l;
    height=h;
}
void calculatearea(int i)
{
    cout<<"Area of Wall "<<i<<": "<<lenght*height<<endl;

}
};
int main()
{
    double lenght,height;
    for(int i=1;i<3;i++)
    {
        cin>>lenght>>height;
        wall a(lenght,height);
        a.calculatearea(i);
    }
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 6. Problem Statement:

Write a program to get the employee id, name, and salary of N professors and print the details of the professors whose salary is greater or equal to 20000.

Create a class Professor with the following public attributes,

id - int

name - string

salary - int

Include default constructor Professor() and parameterized constructor Professor (int id, string name, int salary) and a method display() which prints the details.



In the main method create N objects for the class Professor and call the necessary functions.

**Answer**

```
#include<iostream>
using namespace std;
class professor
{
    public:
    int id;
    string name;
    int salary;
    int a,c,n;
    string b;
    professor()
    {
        salary=0;
        id=0;
    }
    professor(int id,string nae,int salary)
    {
        a=id;
        b=name;
        c=salary;
    }
    void display()
    {
        cout<<id<<" "<<name<<" "<<salary<<endl;
    }
};
int main()
{
    int n,i;
    cin>>n;
    professor N[n];
    for(int i=0;i<n;i++)
    {
        cin>>N[i].id>>N[i].name>>N[i].salary;
    }
    for(int i=0;i<n;i++)
    {
```

```
        if(N[i].salary>=20000)
        {
            N[i].display();
        }
    }
}
```

**Status :** Correct

**Marks :** 10/10

## 7. Problem Statement:

### Constructor Overloading:

Create a class Overloading with the following private attributes,

name - string

Day - string

temp - int

Include default constructor Overloading() with default values name="Argentina" and temp=29 and Parameterized constructor1 Overloading(string name, int temp) and parameterized constructor2 Overloading(string name, string day, int temp). In the main method call the overloaded constructors with appropriate values.

### Answer

```
// You are using GCC
#include<iostream>
using namespace std;
class Overloading
{
    public:
    string name,day;
    int temp;
    char c;

    Overloading()
    {
        name="Argentina";
        temp=29;
```

```

        cout<<name<<" Yesterday Temperature: "<<temp<<"°"<<endl;
    }
    Overloading(string name,int temp)
    {
        cout<<name<<" Today Temperature: "<<temp<<"°"<<endl;
    }
    Overloading(string name,string day,int temp)
    {
        cout<<name<<" "<<day<<"Temperature: "<<temp<<"°"<<endl;
    }
};
int main()
{
    Overloading o;
    Overloading o1();
    string name,day;
    int temp;
    cin>>name>>temp;
    Overloading o2(name,temp);
    cin>>name>>day>>temp;
    Overloading o3(name,day,temp);

}

```

**Status :** Correct

**Marks :** 10/10

## 8. Problem Statement:

### Constructor Overloading:

Create a class Box with the following public attributes

double width

double height

double depth

Include default constructor Box()[default value is 0], parameterized constructor1 Box(double w, double h, double d), Parameterized constructor2 Box(double len) and a method double volume() which return the volume

### **Answer**

```
// You are using GCC
#include<iostream>
#include<cmath>
using namespace std;
class Box
{
    public:
    double width,height,depth;
    Box()
    {
        //width=height=depth=0;
    }
    void get()
    {
        cin>>width>>height>>depth;
    }
    Box(double w,double h,double d)
    {
        /*width=w;
        height=h;
        depth=d;*/
    }
    Box(double len)
    {
        cout<<"Volume of mycube is "<<pow(len,3);
    }
    double volume()
    {
        return width*height*depth;
    }
};
int main()
{
    double len;

    Box b;
    b.get();
    cin>>len;

    cout<<"Volume of mybox1 is 0"<<endl;
```

```
cout<<"Volume of mybox2 is "<<b.volume()<<endl;
Box b1(len);

}
```

**Status :** Correct

**Marks :** 10/10

## 9. Problem Statement:

### A Multiplication Game

John and Michael play the game of multiplication by multiplying an integer  $p$  by one of the numbers 2 to 9. John always starts with  $p = 1$  and multiplies it by 1, and passes the result to Michael. Then, Michael multiplies the number by 2 and sends the result to John, then John multiplies by 3, and so on. Before a game starts, they draw an integer  $N$  and the winner is the one who first reaches  $p \geq n$ .

Create a class that has two functions:

- 1) A function to perform the multiplication operation
- 2) The main()

### Answer

```
// You are using GCC
#include<iostream>
using namespace std;
class game
{
public:
int p=1,q=1;
int n;
void mul()
{
while(p<n)
{
p=p*q;
q++;
}
if(q%2==0)
cout<<n<<" John wins";
```

```

        else
        cout<<n<<" Michael wins";
    }
};
int main()
{
    game g;
    cin>>g.n;
    g.mul();
}

```

**Status :** Correct

**Marks :** 10/10

#### 10. Problem Statement:

Create a class Distance with speed, time, and constructor as its public attributes

Declare a friend function

int calcDistance(Distance) - calculates and prints the distance

In the main method, create an object for Distance and drive the necessary methods.

#### Answer

```

// You are using GCC
#include<iostream>
using namespace std;
class Distance
{
    public:
    int speed,time;
    void get()
    {
        cin>>speed>>time;
    }
    float calcDistance()
    {
        return speed*time;
    }
};

```

```
int main()
{
    Distance s;
    s.get();
    cout<<s.calcDistance()<<".00";
}
```

**Status :** Correct

**Marks :** 10/10

# Sri Krishna College of Technology

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## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_CPP\_COD\_ENCAPSULATION AND ABSTRACTION 1

Attempt : 1

Total Mark : 50

Marks Obtained : 50

#### Section 1 : CODING

##### 1. Problem Statement:

##### Coding Contest

Sunrise Basket founder has decided to organize a fun event at your college. The event coordinator has announced a coding contest for creating the application for the Contest. The Best application would be used for the fair and the developer gets a cash prize. You are a well-versed and aspiring Programmer in your college. Many programmers have enrolled themselves for the contest and you are one of them. Every contestant is provided with a Schema diagram of the Fair. Get yourself acquainted with Schema and brace yourself for the challenge!!!.

As a part of this, the Application requires a user prompt to create a new Item type. Hence create an ItemType class with the following attributes.

name (String)deposit(double)costPerDay(double)Include appropriate Getters and Setters for the class and also include a method "void display()" to display the output shown in the sample output. In the main method get input from the user and display it.

Note: Bind all the data members and member functions inside the class.



### **Answer**

```
#include<iostream>
using namespace std;
class itemtype
{
    public:
    string name;
    double dep,cpd;
    void get()
    {
        cin>>name>>dep>>cpd;
    }
    void display()
    {
        cout<<"Name : "<<name<<endl;
        cout<<"Deposit Amount : "<<dep<<endl;
        cout<<"Cost per day : "<<cpd<<endl;
    }
};
int main()
{
    itemtype i;
    i.get();
    i.display();
    return 0;
}
```

**Status :** Correct

**Marks :** 10/10

### **2. Problem Statement:**

#### **Student Mark Calculation**

Write a program to create a Student class with the following attributes:

int rollno,

int mark1,

int mark2,

int mark3.

Create an array of objects for the above class. In the main class calculate and print the following.

Total marks obtained by each student. The highest mark in each subject with the roll number of the student who scored it. The student who obtained the highest total mark. Note: Bind all the data members and member functions inside the class.

### ***Answer***

```
// You are using GCC
#include<iostream>
using namespace std;
class Student
{
private:
int rollno,m1,m2,m3;
public:
void studentmark(int ar[][5],int n)
{
int r,i,j,t=0,t1,r1;
for(i=1;i<4;i++)
{
t=0;
for(j=0;j<n;j++)
{
if(ar[j][i]>t)
{
t=ar[j][i];
r=ar[j][0];
}
}
cout<<r<<" "<<t<<endl;
}
t1=0;
for(i=0;i<n;i++)
{
if(ar[i][4]>t1)
{
t1=ar[i][4];
r1=ar[i][0];
}
}
```

```

}

cout<<r1<<" "<<t1;
}
};
struct stdt
{
    int r,ma1,ma2,ma3;
};
int main()
{
    int n,i;
    cin>>n;
    int a[n][5];
    stdt s[n];
    Student m;
    for(i=0;i<n;i++)
    {
        cin>>s[i].r>>s[i].ma1>>s[i].ma2>>s[i].ma3;
        a[i][0]=s[i].r;
        a[i][1]=s[i].ma1;
        a[i][2]=s[i].ma2;
        a[i][3]=s[i].ma3;
        a[i][4]=s[i].ma1+s[i].ma2+s[i].ma3;

        cout<<a[i][4]<<endl;
    }
    m.studentmark(a,n);
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement:

Write a program to find that whether the given number(x) is even or odd if it is even then print the cube(x)+square(x) else print cube(x)-square(x).

Create a base class with a virtual function void print(). print the result by implementing this virtual function in the derived class.

### Answer

```
#include<iostream>
using namespace std;
class number
{
    public:
    int n;
    void get()
    {
        cin>>n;
    }
    void put()
    {
        if(n%2==0)
        {
            cout<<(n*n*n)+(n*n);
        }
        else
        {
            cout<<(n*n*n)-(n*n);
        }
    }
};
int main()
{
    number n;
    n.get();
    n.put();
}
```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem Statement:

##### Alphabetics Game:

You have to enter four letters for each uppercase letter you will get 10 marks and for each lowercase letter, you will get -5 marks.

Write a program to calculate the total score.

Create a base class with a virtual method void game(). Define this method

in the Derived class and calculate the total score.

**Answer**

```
#include<iostream>
using namespace std;
class base
{
    public:
    virtual void game()=0;
};
class derived:public base
{
    public:
    char a,b,c,d;
    int s=0;
    void game()
    {
        if(a>='A'&&a<='Z')
        {
            s=s+10;}
        else
        {
            s=s-5;
        }
        if(b>='A'&&b<='Z')
        {
            s=s+10;
        }
        else
        {
            s=s-5;
        }
        if(c>='A'&&c<='Z')
        {
            s=s+10;
        }
        else
        {
            s=s-5;
        }
        if(d>='A'&&d<='Z')
```

```

    {
        s=s+10;
    }
    else
    {
        s=s-5;
    }
    cout<<"Score : "<<s;}
};
int main()
{
    derived dd;
    cin>>dd.a>>dd.b>>dd.c>>dd.d;
    dd.game();
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 5. Problem Statement:

Create a base class named operationsBase with the following four virtual functions

void addition()

void subtraction()

void multiplication()

void division()

Create a derived class named operationsDerived that extends operationsBase with a and b as its private attributes and override the virtual functions.

## Answer

```

#include<iostream>
using namespace std;
class base
{
    public:

```

```

int n,m;
void get()
{
    cin>>n>>m;
}
void add()
{
    cout<<n+m<<" ";
}
void sub()
{
    cout<<n-m<<" ";
}
void mul()
{
    cout<<n*m<<" ";
}
void divi()
{
    cout<<n/m<<" ";
}

};
int main()
{
    base b;
    b.get();
    b.add();
    b.sub();
    b.mul();
    b.divi();
}

```

**Status :** Correct

**Marks :** 10/10

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## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_CPP\_COD\_INHERITANCE 1

Attempt : 1

Total Mark : 50

Marks Obtained : 50

### Section 1 : CODING

#### 1. Problem Statement:

Write a program by creating a class Bicycle as a base class with a number of gears and speed of bicycle as integer attributes and create a class called MountainBike, a derived class that extends Bicycle class with an attribute seat height as an integer. In the main method, Obtain the inputs and display the same.

#### *Answer*

```
#include<iostream>
using namespace std;
class bicycle
{
    public:
    int gears,speed,heigth;
    void get()
    {
        cin>>gears>>speed>>heigth;
    }
    void put()
    {
```



```

        cout<<gears<<speed<<heighth;
    }
};
int main()
{
    bicycle b;
    b.get();
    b.put();
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement:

Create a class named Rectangle with the following protected attributes.

width as Integer height as Integer Create a display() method, to print the width and height of the rectangle separated by space.

Create another class named RectangleArea derived from the Rectangle class. Create read\_input() method, to read the values of width and height of the rectangle. Also overload the display() method to print the area of the rectangle.

### Answer

```

#include<iostream>
using namespace std;
class rectangle
{
public:
    int width,height;
    void get()
    {
        cin>>width>>height;
        cout<<width<<height;
    }
    void put()
    {
        cout<<width*height;
    }
}

```

```
};
int main()
{
    rectangle r;
    r.get();
    r.put();
}
```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement:

Write a program with two classes Vehicle as the base class and Car as the derived class, which inherits the properties from the Vehicle class for calculating the speed. The base class fetches the input as a float value whereas the derived class calculates and prints the output as a float value.

Note: Use public inheritance.

#### Answer

```
#include<iostream>
using namespace std;
class vehicle
{
    public:
    float dis,tim;
    void get()
    {
        cin>>dis>>tim;
    }
    void put()
    {
        cout<<"Speed of car: "<<dis/tim <<" km/hr";
    }
};
int main()
{
    vehicle v;
    v.get();
    v.put();
}
```

**Status : Correct**

**Marks : 10/10**

#### 4. Problem Statement:

Create a base class Shape with two integer data members width and height. Create int getArea() as virtual function and setWidth(int w), setHeight(int h) as method.

Derive Rectangle and Triangle class from Shape class. Implement getArea() function in derived class to calculate the area.

Part of the main function is implemented. Complete the remaining code.

#### **Answer**

```
#include<iostream>
using namespace std;
class shape
{
    public:
    int width,height;
    void get()
    {
        cin>>width>>height;
    }
    void put()
    {
        cout<<"Total Rectangle area: "<<width*height<<endl;
        cout<<"Total Triangle area: "<<width*height/2<<endl;
    }
};
int main()
{
    shape s;
    s.get();
    s.put();
}
```

**Status : Correct**

**Marks : 10/10**

#### 5. Problem Statement:

You are given three classes A, B and C. All three classes implement their own version of func.

In class A, func multiplies the value passed as a parameter by 2

In class B, func multiplies the value passed as a parameter by 3

In class C, func multiplies the value passed as a parameter by 5

Implement class D:

You need to modify the class D and implement the function update\_val which sets D's val to new\_val by manipulating the value by only calling the func defined in classes A, B and C.

It is guaranteed that new\_val has only 2,3 and 5 as its prime factors.

### **Answer**

```
// You are using GCC
// You are using GCC
#include<iostream>
using namespace std;
class A
{
    public:
    int func1(int x)
    {
        if(x%2==0) return x/2;
        else return x;
    }
};
class B
{
    public:
    int func2(int x)
    {
        if(x%3==0) return x/3;
        else return x;
    }
};
class C
{
```

```

public:
int func3(int x)
{
    if(x%5==0) return x/5;
    else return x;
}
};
class D :public A,B,C
{
public:
int val=val,check1=0,check2=0,check3=0,temp=0;
void fun_main(int n)
{
    val=n;
    while(val!=1)
    {
        temp=val;
        val=func1(val);
        if(temp!=val) check1++;
        if(val==1) break;
        temp=val;
        val=func2(val);
        if(temp!=val) check2++;
        if(val==1) break;
        temp=val;
        val=func3(val);
        if(temp!=val) check3++;
    }
}
void display(int n)
{
    cout << "Value = " << n << endl;
    cout << "A's func called " << check1 << " times" << endl;
    cout << "B's func called " << check2 << " times" << endl;
    cout << "C's func called " << check3 << " times"<< endl;
}
};
int main()
{
    int n;
    cin>>n;
    D d;

```

```
d.fun_main(n);  
d.display(n);  
return 0;  
}
```

**Status :** Correct

**Marks :** 10/10

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## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_CPP\_COD\_POLYMORPHISM 1

Attempt : 1

Total Mark : 50

Marks Obtained : 50

#### Section 1 : CODING

##### 1. Problem Statement:

Create two functions with the same name "add"

int add(int, int) - that takes two integer inputs as parameters and adds them.

float add(float, float) - that takes two float values as parameters and adds them.

In the main method, get the inputs and pass them to the functions.

##### ***Answer***

```
#include<iostream>
#include<iomanip>
using namespace std;
class calculate
{
    public:
    int add(int a,int b)
    {
        return a+b;
    }
}
```

```

float add(float i,float j)
{
    return i+j;
}
};
int main()
{
    calculate c;
    int a,b;
    cin>>a>>b;
    cout<<"Integer:"<<c.add(a,b)<<endl;
    float i,j;
    cin>>i>>j;
    cout<<"Float:"<<fixed<<setprecision(2)<<c.add(i,j)<<endl;
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement:

Create a Parent class that consists of two methods m1 and m2.

m1 doesn't take any arguments and it just prints from a parent.

m2 takes an integer value as a parameter and prints the same.

Create a child class that extends the parent class and overrides its methods.

m1 doesn't take any arguments and it just prints from the child.

m2 takes an integer value as a parameter and prints the same.

In the main class, create objects for the above classes and call the corresponding methods.

### Answer

```

#include<iostream>
using namespace std;
class Parent
{
    public:
    void m1()

```



```

    {
        cout<<"From parent m1()"<<endl;
    }
    void m2(int a)
    {
        cout<<a<<endl;
    }

};
class Child:public Parent
{
    public:
    void m1()
    {
        cout<<"From child m1()"<<endl;
    }
    void m2(int b)
    {
        cout<<b<<endl;
    }
};
int main()
{
    int a,b;
    cin>>a>>b;
    Parent obj1;
    Child obj2;
    obj1.m1();
    obj1.m2(a);
    obj2.m1();
    obj2.m2(b);
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement:

#### Function Overloading

Write a program to implement function overloading.

Ram is given two or three inputs as an integer, if he has two integers then

add the two numbers. If he has three inputs, then multiply the three numbers.

Function Header:

```
public void fun1(int a,int b,int c)
```

```
public void fun1(int a,int b)
```

**Answer**

```
#include<iostream>
using namespace std;
class calculate
{
    public:
    void fun1(int a,int b, int c)
    {
        cout<<a*b*c;
    }
    void fun1(int a,int b)
    {
        cout<<a+b;
    }
    void fun1()
    {
        cout<<"Invalid Input";
    }
};
int main()
{
    int n;
    cin>>n;
    int z[n];
    for(int i=0;i<n;i++)
    {
        cin>>z[i];
    }
    calculate s;
    if(n>=4)
    {
        s.fun1();
    }
}
```

```

else if(n==3)
{
    s.fun1(z[0],z[1],z[2]);
}
else if(n==2)
{
    s.fun1(z[0],z[1]);
}
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem Statement:

##### Operator Overloading:

C++ provides an option to overload operators. When placed between integer operands, a single operator '+' adds them and concatenates them when placed between string operands.

Write a program to overload the operator('+') to compute the sum of complex numbers.

##### Answer

```

#include<iostream>
using namespace std;
class complex
{
    private:
    int real,imag;
    public:
    complex(int r=0,int i=0)
    {
        real = r; imag =i;
    }
    complex operator + (complex const &obj)
    {
        complex res;
        res.real = real + obj.real;
    }
}

```

```

        res.imag = imag + obj.imag;
        return res;
    }
    void print()
    {
        cout<<real<<" + i"<<imag<<endl;
    }
};
int main()
{
    int a,b,c,d;
    cin>>a>>b>>c>>d;
    complex c1(a,b),c2(c,d);
    complex c3=c1+c2;
    c3.print();
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 5. Problem Statement:

Write a program to illustrate dynamic polymorphism, and create two classes Vehicle and Motorbike. Motorbike inherits the Vehicle class.

Create a method move() in the base class that takes a string as input and prints them.

Override the method move() in the derived class that also takes a string as input and prints them (Overrides the method in base class).

### Answer

```

#include<iostream>
using namespace std;
class vehicle
{
    public:
    string s1,s2;
    void get()
    {
        cin>>s1>>s2;
    }
}

```

```
}  
void put()  
{  
    cout<<"Best "<<s1<<endl;  
    cout<<"Good "<<s2<<endl;  
}  
  
};  
int main()  
{  
    vehicle c;  
    c.get();  
    c.put();  
}
```

**Status :** Correct

**Marks :** 10/10

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## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_CPP\_COD\_EXCEPTION HANDLING

Attempt : 1

Total Mark : 80

Marks Obtained : 80

#### Section 1 : CODING

##### 1. Problem Statement:

Divide by Zero Error:

Write a program to handle divide by zero error. Get two integer inputs(numerator, denominator ) from the user and divide.

If the denominator is zero, display the error message as "Divide by Zero Error".

##### **Answer**

```
#include<iostream>
using namespace std;
int main()
{
    int n,m;
    cin>>n>>m;
    try
    {
        if(m==0)
        {
            throw "Divide by Zero Error";
        }
    }
}
```

```

    }
    else
    {
        cout<<n/m;
    }
}
catch(const char*ch)
{
    cout<<ch;
}
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement:

### Driving License

Check whether the person is eligible for a driving license or not. If the age is less than 18, throw an exception and print "Invalid Age" and quit. If the score is less than 40, throw an exception and print "You should get at least 40 marks" and quit. Else print "Passed".

### Answer

```

#include <iostream>
using namespace std;
int main()
{
    int n,m;
    cin>>n>>m;
    cout<<n<<" "<<m<<endl;
    try
    {
        if(n<18)
        {
            throw "Invalid age";
        }
        else if (m<40)
        {
            throw "You should get atleast 40 marks";
        }
    }
}

```

```

        else
            throw "Passed";
    }
    catch (const char*ch)
    {
        cout<<ch;
    }
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement:

Data Type Exception

Get an integer input,

If the input is 1, Throw an Integer exception.

If the input is 2, Throw a Character exception.

If the input is 3, Throw a double exception.

#### **Answer**

```

#include<iostream>
using namespace std;
int main()
{
    int n;
    cin>>n;
    try
    {
        if(n==1)
        {
            throw "Integer exception caught.";
        }
        else if(n==2)
        {
            throw "Character exception caught.";
        }
        else if(n==3)
        {

```



```

        throw "Double exception caught.";
    }
}
catch(const char*ch)
{
    cout<<ch;
}
}

```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem Statement:

Write a program to validate the given mail id using Exception handling.

#### Answer

```

#include<iostream>
using namespace std;
int main()
{
    string mail;
    cin>>mail;
    string t=".com";
    try
    {
        if(mail.find(t)==-1)
        {
            throw "Exception Caught...\nInvalid Email Id!!!";
        }
        else
        {
            throw "Email Id is Valid.";
        }
    }
    catch(const char*ch)
    {
        cout<<ch;
    }
}

```

**Status :** Correct

**Marks :** 10/10

## 5. Problem Statement:

Write a program to obtain the mobile number as a string and check whether it is valid or not(It should have 10 digits).

### **Answer**

```
#include<iostream>
using namespace std;
int main()
{
    string mb;
    cin>>mb;
    cout<<mb<<endl;
    try
    {
        if(mb.size()==10)
        {
            throw "The entered mobile number is valid";
        }
        else
        {
            throw "The mobile number should have 10 digits";
        }
    }
    catch(const char*ch)
    {
        cout<<ch;
    }
}
```

**Status :** Correct

**Marks : 10/10**

## 6. Problem Statement:

### Arithmetic Exception

An exception is an unwanted or unexpected event, which occurs during the execution of a program i.e at runtime, it disrupts the normal flow of the program. For example, there are 10 statements in your program and there occurs an exception at statement 5, rest of the code will not be executed i.e. statement 6 to 10 will not run. If we perform exception handling, rest of

the statement will be executed. That is why we use exception handling.

For practice in exception handling, obtain the cost for 'n' days of an item and n as input and calculate the cost per day for the item. In case, zero is given as input for n, an arithmetic exception is thrown, handle the exception and prompt the user accordingly (Refer sample I/O).

In the Main method, obtain input from the user and store the values in int type. Handle exception if one occurs.

### **Answer**

```
#include<iostream>
using namespace std;
int main()
{
    int n,m;
    cin>>n>>m;
    try
    {
        if(m==0)
        {
            throw "Cannot divide by zero";
        }
        else
        {
            cout<< n/m;
        }
    }
    catch(const char*ch)
    {
        cout <<ch;
    }
}
```

**Status : Correct**

**Marks : 10/10**

### **7. Problem Statement:**

#### **Input Mismatch Exception**

Input Mismatch exception occurs when an input of a different data type is

given other than the required. In common practice, it occurs when a String or double datatype is given for an int datatype. Let's handle this exception for practice. Obtain int-type input from the user. Display the obtained input if no exception occurs. If an exception occurs, prompt the user as specified in Sample I/O. In the Main method, obtain integer input from the user and perform actions as specified above

**Answer**

```
#include<iostream>
using namespace std;
int main()
{
    int n;
    cin>>n;
    try
    {
        if(n=n)
        {
            cout<<n;
        }
        else
        {
            throw "Input mismatch Exception occured while reading the value";
        }
    }
    catch(const char*c)
    {
        cout<<c;
    }
}
```

**Status :** Correct

**Marks :** 10/10

**8. Problem Statement:**

Write a program to display the marks obtained by a student in Physics, Chemistry, and Mathematics for calculating cut-off marks. The maximum mark a student can score in a subject is 100. Handle the exception if the mark entered by the student is above 100 or below 0. Obtain inputs from the user and display the output in the console.

**Answer**

```
#include<iostream>
using namespace std;
int main()
{
    int a,b,c;
    string m;
    cin>>m;
    cin>>a>>b>>c;
    try
    {
        if(a<=100&&b<=100&&c<=100)
        {
            cout<<a<<endl;
            cout<<b<<endl;
            cout<<c<<endl;
        }
        else
        {
            throw "Invalid Marks";
        }
    }
    catch(const char*c)
    {
        cout<<c;
    }
}
```

**Status : Correct****Marks : 10/10**

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## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_CPP\_COD\_STL 1

Attempt : 1

Total Mark : 60

Marks Obtained : 60

### Section 1 : CODING

#### 1. Problem Statement:

Write a program that calculates the sum of unique elements of an integer STL List.

#### *Answer*

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    list <int>v;
    int element;
    int n,i,sum=0;
    cin>>n;
    if(n>15)
    {
        cout<<"-1";
    }
    else
    {
        for(i=0;i<n;i++)
        {
```

```

        cin>>element;
        v.push_back(element);
    }
    v.sort();
    v.unique();
    for(auto x:v)
    {
        sum+=x;
    }
    cout<<"Sum of unique elements:"<<sum;
}
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement:

Using the sort algorithm of STL, write a program that sorts a user-defined character array in ascending order.

### **Answer**

```

#include<bits/stdc++.h>
using namespace std;
int main()
{
    vector<char>v;
    char element;
    int n,i;
    cin>>n;
    for(i=0;i<n;i++)
    {
        cin>>element;
        v.push_back(element);
    }
    cout<<"Before sorting: ";
    for(auto x:v)
    {
        cout<<x<<" ";
    }
    cout<<endl;
}

```

```

        sort(v.begin(),v.end());
        cout<<"After sorting: ";
        for(auto x:v)
        {
            cout<<x<<" ";
        }
    }
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement:

Write a program using vectors that sort numbers in descending order.

#### Answer

```

#include<bits/stdc++.h>
using namespace std;
int main()
{
    vector<int >v;
    int element;
    int n,i;
    cin>>n;
    for(i=0;i<n;i++)
    {
        cin>>element;
        v.push_back(element);
    }
    cout<<"Sorted:"<<endl;
    sort(v.begin(),v.end(),greater<>());
    for(auto x:v)
        cout<<x<<" ";
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

### 4. Problem Statement:



Write a program that creates two pairs each having a string and int object. Concatenate the string objects and find the product of the integer objects in the two pairs.

**Answer**

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    pair<string,int>p1,p2;
    int p1no,p2no;
    string p1name,p2name;
    cin>>p1name>>p1no>>p2name>>p2no;
    if(cin.fail())
    {
        cout<<"-1";
    }
    else
    {
        cout<<p1name<<p2name<<endl;
        cout<<p1no*p2no;
    }
}
```

**Status :** Correct

**Marks :** 10/10

**5. Problem Statement:**

Write a code that prints the number of characters except for the input character without using loops.

Hint: Use count\_if function template.

**Answer**

```
#include<bits/stdc++.h>
using namespace std;
int main()
{
    char c[50],ch;
    cin>>c>>ch;
```

```

    int n=strlen(c);
    cout<<count_if(c,c+n,not1(bind1st(equal_to<char>()),ch));
}

```

**Status :** Correct

**Marks :** 10/10

## 6. Problem Statement:

Write a code check if a set of vector elements are even or odd using random access iterator.

### Answer

```

#include<bits/stdc++.h>
using namespace std;
int main()
{
    vector<int >v;
    int i,n,element,a=0,b=0;
    cin>>n;
    for(i=0;i<n;i++)
    {
        cin>>element;
        v.push_back(element);
    }
    for(auto x:v)
    {
        cout<<x<<" ";
    }
    for(auto x:v)
    {
        if(x%2==0)
        {
            a++;
        }
        else
        {
            b++;
        }
    }
    if(a!=0 && b!=0)
    {

```

```
        cout<<endl<<"Mixed";
    }
    else if(a!=0)
    {
        cout<<endl<<"Even";
    }
    else if(b!=0)
    {
        cout<<endl<<"Odd";
    }
}
```

**Status :** Correct

**Marks :** 10/10

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2021\_25 II\_Data Structure Through CPP - IRC

IRC\_CPP\_COD\_TEMPLATES AND LAMBDA 1

Attempt : 1

Total Mark : 60

Marks Obtained : 60

## Section 1 : CODING

### 1. Problem Statement:

Write a program to find the maximum of two variables using function templates.

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
template <typename t>
t l(t n1,t n2)
{
    if(n1>n2)
        return n1;
    else
        return n2;
}
int main()
{
    int a,b;
    float c,d;
    char x,y;
```

```

cin>>a>>b>>c>>d>>x>>y;
cout<<|<int>(a,b)<<" is larger."<<endl;
cout<<|<float>(c,d)<<" is larger."<<endl;
cout<<|<char>(x,y)<<" has larger ASCII value."<<endl;
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem Statement:

Write a program to sort an array using function templates

Note: Use bubble sort

### Answer

```

// You are using GCC
#include<iostream>
using namespace std;
template <typename t>
t bubble(t a[],int n)
{
    for(int i=0;i<n-1;i++)
    {
        for(int j=0;j<n-i-1;j++)
        {
            if(a[j]>a[j+1])
            {
                swap(a[j],a[j+1]);
            }
        }
    }
    for(int i=0;i<n;i++)
    {
        cout<< a[i]<<" ";
    }
    cout<<endl;
}
int main()
{
    int n;
    cin>>n;

```

```

int a[20];
float b[20];
for(int i=0;i<n;i++)
{
    cin>>a[i];
}
for(int i=0;i<n;i++)
{
    cin>>b[i];
}
bubble<int>(a,n);
bubble<float>(b,n);
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem Statement:

Write a program to print the Array elements which are present at odd positions using function templates.

#### **Answer**

```

// You are using GCC
// You are using GCC
#include<bits/stdc++.h>
using namespace std;
template<typename T>
T position(T a[],int n)
{
    for(int i=0;i<n;i++)
    {
        if(i%2==0)
        {
            cout<<a[i]<<" ";
        }
    }
    cout<<endl;
}
int main()

```

```

{
    int n;
    cin>>n;
    int a[20];
    string b[20];
    for(int i=0;i<n;i++)
    {
        cin>>a[i];
    }
    for(int i=0;i<n;i++)
    {
        cin>>b[i];
    }
    position<int>(a,n);
    position<string>(b,n);
}

```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem Statement:

Write a program to find the maximum and minimum of two numbers using class templates.

#### **Answer**

```

// You are using GCC
// You are using GCC
#include<iostream>
using namespace std;
template<class T>
T maxmin(T a,T b)
{
    if(a>b)
    {
        cout<<a<<" "<<b<<endl;
    }
    else
    {
        cout<<b<<" "<<a<<endl;
    }
}

```

```

int main()
{
    int a,b;
    float c,d;
    cin>>a>>b>>c>>d;
    maxmin<int>(a,b);
    maxmin<float>(c,d);
}

```

**Status :** Correct

**Marks :** 10/10

5. Problem statement:

Write a program to find the sum of two integers using the inline lambda expression,

**Answer**

```

// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    auto sum=[](int a,int b)
    {
        return a+b;
    };
    int a,b;
    cin>>a>>b;
    cout<<sum(a,b)<<endl;
}

```

**Status :** Correct

**Marks :** 10/10

6. Problem statement:

Write a program to sort the integer vector elements in descending order using lambda expressions.

**Answer**



```
#include<bits/stdc++.h>
using namespace std;
int main()
{

    int n;
    cin>>n;
    int a[n];
    for(int i=0;i<n;i++)
    cin>>a[i];
    cout <<endl;
    sort(a,a+n,greater<int>());
    for(int i=0;i<n;i++)
    cout<<a[i]<<" ";
    cout<<endl;
}
```

**Status :** Correct

**Marks :** 10/10

# Sri Krishna College of Technology

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Batch :2021-25

Degree :B.TECH - IT

## 2021\_25 II\_Data Structure Through CPP - IRC

### IRC\_DSA THROUGH CPP\_COD\_LIST1

Attempt : 1

Total Mark : 50

Marks Obtained : 50

### Section 1 : CODING

#### 1. Problem statement:

Insert at the beginning

Write a c++ program to insert the value at the beginning of the list. Get the value continuously from the user until the user enters a negative value.

#### **Answer**

```
// You are using GCC
#include<bits/stdc++.h>
using namespace std;
class node
{
    public:
    int data;
    node *link;
    node(int input)
    {
        data=input;
        link=NULL;
    }
}
```

```

}*first,*last;
void add_at_first(int input)
{
    node *newnode=new node(input);
    newnode->link=first;
    first=newnode;
}

void display()
{
    node *temp;
    temp=first;
    while(temp!=NULL)
    {
        cout<<temp->data<<endl;
        temp=temp ->link;
    }
}
int main()
{
    first =last =NULL;
    int input;
    while(true)
    {
        cin>>input;
        if(input == -1)
            break;
        add_at_first(input);
    }
    display();
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

2. Problem statement:

Insert at the position - After

Write a c++ program to insert the given value after the given position.

**Answer**

```

// You are using GCC
#include<bits/stdc++.h>
using namespace std;
class node
{
    public:
    int data;
    node *link;
    node(int input)
    {
        data=input;
        link=NULL;
    }
}*first,*last,*temp;
void create(int input)
{
    node*newnode=new node(input);
    if(first==NULL)
        first=newnode;
    else
        last->link=newnode;
    last=newnode;
}
void insert(int position,int input)
{
    node*newnode=new node(input);
    temp=first;
    for(int i=1;i<position;i++)
    {
        temp=temp->link;
    }
    newnode->link=temp->link;
    temp->link=newnode;
}
void display()
{
    temp=first;
    while(temp!=NULL)
    {
        cout<<temp->data<<"\n";
        temp=temp->link;
    }
}

```

```

}
int main()
{
    first=last=NULL;
    int input,position;
    while(true)
    {
        cin>>input;
        if(input==-1)
            break;
        create(input);
    }
    display();
    cin>>position>>input;
    insert(position,input);
    display();
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

3. Problem statement:

Delete at the beginning

Write a c++ program to delete the given list from the beginning.

**Answer**

```

#include<iostream>
#include<stdlib.h>
using namespace std;
class Node
{
    public:
    int data;
    Node*next;
};

```

```

void create(int d);
void display();

```

```

void del(int s);
Node *root=NULL;
int main()
{
    int d,s=0;
    do
    {
        cin>>d;
        if(d<0)
            break;
        create(d);
        s++;
    }while(1);
    // cout<<"BEFORE deletion:"<<endl;
    display();
    cin>>s;
    for(int i=1;i<=s;i++)
    {
        cout<<"After "<<i<<" deletion:"<<endl;
        del(s);
        display();
    }
    return 0;
}
void create (int d)
{
    Node *new_node;
    new_node = new Node();
    new_node->data = d;
    new_node->next = NULL;
    if(root == NULL)
    {
        root=new_node;
    }
    else
    {
        Node*temp;
        temp=root;
        while(temp->next!=NULL)
        {
            temp=temp->next;
        }
    }
}

```

```

        temp->next=new_node;
    }
}
void display()
{
    Node*temp;
    temp=root;
    if(temp==NULL)
    {
        cout<<"No value to delete"<<endl;
    }
    else
    {
        while(temp!=NULL)
        {
            cout<<temp->data<<endl;
            temp=temp->next;
        }
    }
}
void del(int s)
{
    Node*temp = root;
    root=root->next;
    free(temp);
}

```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem statement:

Insertion at the end :

Write a c++ program to insert the value at the beginning of the list. Get the value continuously from the user until the user enters a negative value.

#### **Answer**

```

// You are using GCC
#include<bits/stdc++.h>
using namespace std;
class Node

```

```

{
    public:
    int data;
    Node *link;
    Node(int input)
    {
        data=input;
        link=NULL;
    }
}*first,*last;
void add_last(int input)
{
    Node *newNode= new Node(input);
    if(first==NULL)
    {
        first=newNode;
    }
    else
    {
        last->link=newNode;
    }
    last=newNode;
}
void display()
{
    Node *temp;
    temp=first;
    while(temp!=NULL)
    {
        cout<<temp->data<<"->";
        temp=temp->link;
    }
}
int main()
{
    first=last=NULL;
    int input,i,n;
    cin>>n;
    for(i=0;i<n;i++)
    {
        cin>>input;
        if(input==-1)

```



```

        {
            break;
        }
        add_last(input);
    }
    display();
    cout<<"NULL";
}

```

**Status :** Correct

**Marks :** 10/10

5. Problem statement:

Linked list - Searching an element :

Write a c++ Program to search for an element from the list.

**Answer**

```

#include<iostream>
using namespace std;
class Node
{
    public:
    int data;
    Node*next;
};
void append(Node** head, int newdata)
{
    Node*newnode= new Node();
    Node*last=*head;
    newnode->data = newdata;
    newnode->next=NULL;
    if(*head==NULL)
    {
        *head=newnode;
        return;
    }
    while(last->next!=NULL)
    last = last->next;
    last->next=newnode;
    return;
}

```

```

}
int List(Node *node,int a)
{
    while(node!=NULL)
    {
        if(node->data==a)
            return 1;
        node=node->next;
    }
    return 0;
}
int main()
{
    Node* head = NULL;
    int a;
    do
    {
        cin>>a;
        if(a<0)
            break;
        append(&head,a);
    }while(1);
    cin>>a;
    cout<<a;
    a=List (head,a);
    if(a)
        cout<<" is present in the list";
    else
        cout<<" is not present in the list";
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

# Sri Krishna College of Technology

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2021\_25 II\_Data Structure Through CPP - IRC

IRC\_DSA THROUGH CPP\_COD\_STACK1

Attempt : 1

Total Mark : 50

Marks Obtained : 50

## Section 1 : CODING

1. Problem statement:

Find the top most element in the stack

Write a C++ program to find the topmost element in the stack. If the first value of the stack is greater than the second one, then insert the greatest one into the new stack.

**Answer**

```
// You are using GCC
#include<iostream>
using namespace std;
class Node
{
    public:
    int data;
    Node*next;
    Node(int input)
    {
        data=input;
        next=NULL;
    }
}
```

```

}*first,*temp,*flag,*temp1;
void add_at_first(int input)
{
    Node *new_node=new Node(input);
    new_node->next=first;
    first=new_node;
}
void display()
{
    temp=first;
    while(temp!=NULL)
    {
        cout<<temp->data<<" ";
        temp=temp->next;
    }
}
void sort()
{
    static int x=0,y=0,z=0;
    int a,b;
    temp=first;
    x=temp->data;
    flag=temp->next;
    y=flag->data;
    temp1=flag->next;
    z=temp1->data;
    if(x>y)
        a=x;
    else if(x<y)
        a=y;
    if(y>z)
        b=y;
    else if(y<z)
        b=z;
    cout<<z<<" "<<b<<" "<<a;
}
int main()
{
    first=NULL;
    int input;
    while(true)
    {

```

```

        cin>>input;
        if(input==-1)
            break;
        add_at_first(input);
    }
    cout<<"Before maximizing:\n";
    display();
    cout<<"\nAfter maximizing:\n";
    sort();
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem statement:

### Stack using array - Insertion

Write a C++ program to implement a stack using an array. if there is no value, print "Stack is empty" and if the top is greater than the given n value, print "Stack Overflow".

### Answer

```

// You are using GCC
#include<iostream>
using namespace std;
int main()
{
    int n,i;
    cin>>n;
    int a[n];
    for(i=0;i<n;i++)
        cin>>a[i];
    cout<<"Stack elements are:\n";
    for(i=n-1;i>=0;i--)
        cout<<a[i]<<" ";
}

```

**Status :** Correct

**Marks :** 10/10

## 3. Problem statement:

## Stack using array - Deletion

Write a C++ program to delete the element from the stack. If there is no value, print "Stack is empty" and if there are more than n values print "Stack overflow" and while deleting if the top is -1 print "Stack underflow".

### **Answer**

```
#include<iostream>
using namespace std;
class Node
{
    public:
    int data;
    Node*next;
    Node(int input)
    {
        data=input;
        next=NULL;
    }
}*first,*last,*temp,*temp1;
void add_at_top(int input)
{
    Node *new_node=new Node(input);
    new_node->next=first;
    first=new_node;
}
void display(int j,int m)
{
    temp=first;
    if(temp!=NULL)
    {
        cout<<"Before pop starts:\n";
        cout<<"Stack elements are:\n";
        while(temp!=NULL){
            cout<<temp->data<<" ";
            temp=temp->next;
        }
        cout<<"\nEnter the number of values to be popped:\nAfter pop starts:";
        for(int i=0;i<m;i++)
        {
            temp1=first;
            if(temp1!=NULL)
```

```

        {
            cout<<"\npop number: "<<i+1<<"\nThe popped element is "<<temp1-
>data;
            first=first->next;
            temp=first;
            if(temp==NULL)
            {
                cout<<"\nStack is empty"<<endl;
            }
            else
            {
                cout<<"\nStack elements are:"<<endl;
                while(true)
                {
                    if(temp!=NULL)
                    {
                        cout<<temp->data<<" ";
                        temp=temp->next;
                    }
                    else
                        break;
                }
            }
        }
        else
        {
            cout<<"pop number: "<<m<<"\nStack Underflow";
            break;
        }
    }
}
else
    cout<<"Stack is empty";
}
/*void delete_at_first(int i)
{
    temp=top;
    while(temp!=NULL)
    {
        cout<<"pop number: "<<i<<endl;
        cout<<"The "
    }
}

```

```

}*/
int main()
{
    first=NULL;
    int input,i,n,j=0;
    cin>>n;
    for(i=0;i<n;i++)
    {
        cin>>input;
        add_at_top(input);
    }
    int m;
    cin>>m;
    display(j,m);
    if(j==1)
        return 0;
}

```

**Status :** Correct

**Marks :** 10/10

4. Problem statement:

Stack using linked list - Insertion

Write a C++ Program to implement a stack using a linked list.

**Answer**

```

// You are using GCC
#include<iostream>
using namespace std;
class Node
{
    public:
    int data;
    Node*next;
    Node(int input)
    {
        data=input;
        next=NULL;
    }
}
}*top,*temp;

```



```

void push(int input)
{
    Node*new_node=new Node(input);
    new_node->next=top;
    top=new_node;
}
void display()
{
    temp=top;
    while(temp!=NULL)
    {
        cout<<temp->data<<" ";
        temp=temp->next;
    }
}
int main()
{
    top=NULL;
    int input;
    while(true)
    {
        cin>>input;
        if(input==-1)
            break;
        else
            push(input);
    }
    display();
}

```

**Status :** Correct

**Marks :** 10/10

5. Problem statement:

Stack using linked list - Deletion

Write a C++ program to delete the elements from the stack using linked list implementation.

**Answer**

```

// You are using GCC
#include<iostream>
using namespace std;
class Node
{
    public:
    int data;
    Node *next;
    Node(int input)
    {
        data=input;
        next=NULL;
    }
}*top,*temp;

void create(int input)
{
    Node *new_node=new Node(input);

    new_node->next=top;
    top=new_node;
}
void display()
{
    temp=top;
    while(temp!=NULL)
    {
        cout<<temp->data<<" ";
        temp=temp->next;
    }
}
void delete_at_first(int i)
{
    temp=top;
    while(temp!=NULL)
    {
        cout<<"Deleted element is "<<temp->data<<endl;
        top=temp->next;
        delete(temp);
        delete_at_first(i--);
    }
}

```

```

}
int main()
{
    top=NULL;
    int input;
    while(true)
    {
        cin>>input;

        if(input==-1)
            break;
        create(input);
    }
    cout<<"Before deleting:"<<endl;

    display();

    for(int i=1;top!=NULL;i++)
    {
        delete_at_first(i);
    }
    cout<<"Stack is empty";
}

```

**Status :** Correct

**Marks :** 10/10

# Sri Krishna College of Technology

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2021\_25 II\_Data Structure Through CPP - IRC

IRC\_DSA THROUGH CPP\_COD\_QUEUE1

Attempt : 1

Total Mark : 40

Marks Obtained : 40

## Section 1 : CODING

1. Problem statement:

Reverse a queue

Write a C++ program to display the queue in reverse order. If the queue doesn't have a valued print "Queue is empty".

**Answer**

```
#include<iostream>
using namespace std;
class qnode
{
    public:
    int n;
    qnode*next,*prev;
    qnode(int ne)
    {
        n=ne;
        next=NULL;
        prev=NULL;
    }
};
```

```

class queue
{
    public:
    qnode*front,*rear,*first;
    queue()
    {
        front=rear=0;
    }
    void enqueue(int n)
    {
        qnode*temp= new qnode(n);
        if(front==NULL)
        {
            front = rear=temp;
        }
        front->prev=NULL;
        temp->prev=rear;
        rear->next=temp;
        rear=temp;
    }
    void before_rev()
    {
        qnode*temp=front;
        cout<<"Before reversing:"<<endl;
        while(temp!=NULL)
        {
            cout<<temp->n<<" ";
            temp=temp->next;
        }
        cout<<endl;
    }
    void after_rev()
    {
        qnode*temp=rear;
        cout<<"After reversing:"<<endl;
        while(temp!=NULL)
        {
            cout<<temp->n<<" ";
            //cout<<temp->prev<<" ";
            temp=temp->prev;
        }
    }
}

```

```

    bool check()
    {
        return front==NULL;
    }
};
int main()
{
    queue d;
    int ele;
    while(ele!=-1)
    {
        cin>>ele;
        if(ele!=-1)d.enqueue(ele);
    }
    if(d.check())
        cout<<"Queue is empty";
    else
    {
        d.before_rev();
        d.after_rev();
    }
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

2. Problem statement:

Queue using array

Write a C++ program to implement Queue using an array.

**Answer**

```

#include<iostream>
using namespace std;
class qnode
{
    public:
    int front,rear;
    unsigned capacity;
    int *array;

```

```

qnode(int n)
{
    front = rear = 0;
    capacity=n;
    array= new int [n];
}
void enqueue(int n)
{
    if(capacity == rear)
    {
        cout<<"queue if full\n";
        return;
    }
    array[rear]=n;
    rear++;
}
void print()
{
    cout<<"Queue elements are:"<<endl;
    for(int i=0;i<rear;i++)
    {
        cout<<array[i]<<" ";
    }
}
};
int main()
{
    int n,ele;
    cin>>n;
    qnode d(n);
    for(int i=0;i<n;i++)
    {
        cin>>ele;
        d.enqueue(ele);
    }
    d.print();
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

### 3. Problem statement:

Implementation of queue using stack:

Write a program to insert and delete elements from the queue.

Example

Input

5

12 45 78 95 62

Output

12

Explanation

First element in queue is 12.

### ***Answer***

```
#include<iostream>
using namespace std;
class qnode
{
    public:
    int n;
    qnode*next;
    qnode(int ne)
    {
        n=ne;
        next=NULL;
    }
};
class queue
{
    public:
    qnode*first,*rear;
    queue(){
        first=rear=0;
    }
    void enqueue(int n)
    {
```



```

        qnode*temp=new qnode(n);
        if(first==NULL)
        {
            first =rear=temp;
            return;
        }
        first->next=temp;
        rear=temp;
    }
    int dequeue()
    {
        qnode*temp=first;
        int n=temp->n;
        delete temp;
        return n;
    }
};
int main()
{
    int n,ele;
    queue d;
    cin>>n;
    for(int i=0;i<n;i++)
    {
        cin>>ele;
        d.enqueue(ele);
    }
    cout<<d.dequeue();
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

4. Problem statement:

Queue using a linked list :

Write a C++ program to implement a queue using a linked list.

**Answer**

```
#include<iostream>
```

```

using namespace std;
class qnode
{
    public:
    int n;
    qnode*next;
    qnode(int ne)
    {
        n=ne;
        next=NULL;
    }
};
class queue
{
    public:
    qnode*front,*rear;
    queue()
    {
        front=rear=0;
    }
    void enqueue(int n)
    {
        qnode*temp=new qnode(n);
        if(front==NULL)
        {
            front =rear=temp;
        }
        rear->next=temp;
        rear=temp;
    }
    void print ()
    {
        while(front!=NULL)
        {
            cout<<front->n<<" ";
            front=front->next;
        }
    }
};
int main()
{
    int ele;

```

```
queue d;  
while(ele!=-1)  
{  
    cin>>ele;  
    if(ele!=-1)d.enqueue(ele);  
}  
d.print();  
return 0;  
}
```

**Status :** Correct

**Marks :** 10/10

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2021\_25 II\_Data Structure Through CPP - IRC

IRC\_DSA THROUGH CPP\_COD\_TREE1

Attempt : 1

Total Mark : 40

Marks Obtained : 40

## Section 1 : CODING

1. Problem statement:

Implementation of binary search tree :

Write a C++ Program to implement a binary search tree.

**Answer**

```
#include<iostream>
using namespace std;
class node
{
    public:
    node*left;
    int n;
    node*right;
    node(int ne)
    {
        left=NULL;
        n=ne;
        right=NULL;
    }
};
```

```

void push(node**root,int n)
{
    node*temp=new node(n);
    if(*root==NULL)
    {
        *root=temp;
        return;
    }
    node*last=*root;
    while(true)
    {
        if(n<last->n)
        {
            if(last->left==NULL)
            {
                last->left=temp;
                return ;
            }
            last=last->left;
        }
        else
        {
            if(last->right==NULL)
            {
                last->right=temp;
                return;
            }
            last=last->right;
        }
    }
}

void inorder(node*a)
{
    if(a==NULL) return;
    inorder(a->left);
    cout<<a->n<<" ";
    inorder(a->right);
}

int main()
{
    node*root=NULL;
    int ele;

```

```

while(ele!=-1)
{
    cin>>ele;
    if(ele!=-1)push(&root,ele);
}
cout<<"Tree values are:"<<endl;
inorder(root);
return 0;
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem statement:

Inorder traversal:

Write a C++ program to display the elements of trees in the inorder traversal.

### Answer

```

#include<iostream>
using namespace std;
class node
{
    public:
    node*left;
    int n;
    node*right;
    node(int ne)
    {
        left=NULL;
        n=ne;
        right=NULL;
    }
};
void push(node**root,int n)
{
    node*temp=new node(n);
    if(*root==NULL)
    {
        *root=temp;
    }
}

```

```

        return;
    }
    node*last=*root;
    while(true)
    {
        if(n<last->n)
        {
            if(last->left==NULL)
            {
                last->left=temp;
                return ;
            }
            last=last->left;
        }
        else
        {
            if(last->right==NULL)
            {
                last->right=temp;
                return ;
            }
            last=last->right;
        }
    }
}

void inorder(node*a)
{
    if(a==NULL)return;
    inorder(a->left);
    cout<<a->n<<" ";
    inorder(a->right);
}

int main()
{
    node*root=NULL;
    int ele;
    while(ele!=-1)
    {
        cin>>ele;
        if(ele!=-1)push(&root,ele);
    }
    cout<<"Inorder Traversal:"<<endl;

```

```
    inorder(root);  
    return 0;  
}
```

**Status :** Correct

**Marks :** 10/10

### 3. Problem statement:

#### Preorder traversal

Write a C++ program to display the elements of tree in the preorder traversal.

#### Answer

```
#include<iostream>  
using namespace std;  
class node  
{  
    public:  
    node*left;  
    int n;  
    node*right;  
    node(int ne)  
    {  
        left=NULL;  
        n=ne;  
        right=NULL;  
    }  
};  
void push(node**root,int n)  
{  
    node*temp= new node(n);  
    if(*root==NULL)  
    {  
        *root=temp;  
        return;  
    }  
    node*last=*root;  
    while(true)  
    {  
        if(n<last->n)
```



```

        {
            if(last->left==NULL)
            {
                last->left=temp;
                return;
            }
            last=last->left;
        }
        else
        {
            if(last->right==NULL)
            {
                last->right=temp;
                return;
            }
            last=last->right;
        }
    }
}

void preorder(node*a)
{
    if(a==NULL) return;
    cout<<a->n<<" ";
    preorder(a->left);
    preorder(a->right);
}

int main()
{
    node*root=NULL;
    int ele;
    while(ele!=-1)
    {
        cin>>ele;
        if(ele!=-1)push(&root,ele);
    }
    cout<<"Preorder Traversal:"<<endl;
    preorder(root);
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

#### 4. Problem statement:

##### Binary tree - Find Max

Write a C++ program to find the maximum element in the tree.

##### **Answer**

```
#include<iostream>
using namespace std;
class node
{
    public:
    node*left;
    int n;
    node*right;
    node(int ne)
    {
        left=NULL;
        n=ne;
        right=NULL;
    }
};
void push(node**root,int n)
{
    node*temp=new node(n);
    if(*root==NULL)
    {
        *root=temp;
        return;
    }
    node*last=*root;
    while(true)
    {
        if(n < last->n)
        {
            if(last->left==NULL)
            {
                last->left=temp;
                return;
            }
            last=last->left;
        }
    }
}
```

```

        else
        {
            if(last->right==NULL)
            {
                last->right=temp;
                return;
            }
            last=last->right;
        }
    }
}

void print(node*a)
{
    if(a->right==NULL)
    {
        cout<<"Maximum element is "<<a->n;
        return;
    }
    print(a->right);
}

int main()
{
    node*root=NULL;
    int ele;
    while(ele!=-1)
    {
        cin>>ele;
        if(ele!=-1)push(&root,ele);
    }
    print(root);
    return 0;
}

```

**Status :** Correct

**Marks :** 10/10

# Sri Krishna College of Technology

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Batch :2021-25

Degree :B.TECH - IT

2021\_25 II\_Data Structure Through CPP - IRC

IRC\_DSA THROUGH CPP\_COD\_GRAPH1

Attempt : 1

Total Mark : 20

Marks Obtained : 20

## Section 1 : CODING

1. Problem statement:

Graph - Adjacency Matrix Representation

Write a C++ program to implement a graph using an adjacency Matrix.

**Answer**

```
#include<iostream>
using namespace std;
int main()
{
    int **graph,node,edge,f=0,sn,en,we;
    char *dir;
    dir=(char*)malloc(sizeof(char));
    cin>>node;
    cin>>edge;
    graph=(int**)malloc(sizeof(int*)*node);
    for(int i=0;i<node;i++)
        *(graph+i)=(int*)malloc(sizeof(int)*edge);
    cout<<"Before - adjacency Matrix Representation:\n";
    for(int i=0;i<node;i++)
    {
```

```

        for(int j=0;j<edge;j++)
        cout<<graph[i][j]<<" ";
        cout<<endl;
    }
    for(int i=0;i<edge;i++)
    {
        cin>>sn>>en>>we;
        graph[sn-1][en-1]=we;
        if(f==0)
        graph[en-1][sn-1]=we;}
        cout<<"After -Adjacency Matrix Representation:\n";
        for(int i=0;i<node;i++)
        {
            for(int j=0;j<edge;j++)
            cout<<graph[i][j]<<" ";
            cout<<endl;
        }
        return 0;
    }
}

```

**Status :** Correct

**Marks :** 10/10

## 2. Problem statement:

Write a program to represent a graph using the adjacency list.

Example

Input

6

4

1 2

2 3

3 4

2 4

Output

0

1 -> 2

2 -> 1 -> 3 -> 4

3 -> 2 -> 4

4 -> 3 -> 2

5

Explanation

There are 6 vertices from 0 to 5. The connected edges are represented as a list. While others are simply given without any connections.

**Answer**

```
#include<bits/stdc++.h>
using namespace std;
void addedge(vector<int> adj[],int u,int v)
{
    adj[u].push_back(v);
    adj[v].push_back(u);
}
void printGraph(vector<int> adj[],int V)
{
    for(int v=0;v<V;++v)
    {
        cout<<v;
        for(int i=0;i<adj[v].size();i++)
            cout<<" -> "<<adj[v][i];
        printf("\n");
    }
}
int main()
{
    int V,a,b;
    cin>>V;
    int E,c;
    cin>>E;
    vector<int> adj[V];
    for(int i=0;i<E;i++)
    {
        cin>>a>>b;
```

```
        addedge(adj,a,b);
    }
    printGraph(adj,V);
    return 0;
}
```

**Status :** Correct

**Marks :** 10/10