BUET IUPC Core Problems – ALL PROGRAM SOLUTIONS (C++17)

⚠️ **Note:** নিচে দেওয়া সবগুলো problem-এর জন্য **direct accepted C++17 code** দেওয়া হলো। Explanation বাদ দিয়ে purely **program solutions** রাখা হয়েছে, যেন তুমি practice / submit / revise করতে পারো।

🧮 Math & Number Theory

CF 1372B – Omkar and Last Class of Math

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    ios::sync_with_stdio(false);
    cin.tie(NULL);
    int t; cin>>t;
    while(t--){
        long long n; cin>>n;
        if(n%2==0) cout<<n/2<<" "<<n/2<<"\n";
        else{
            bool ok=false;
            for(long long i=3;i*i<=n;i+=2){
                if(n%i==0){ cout<<n/i<<" "<<n-n/i<<"\n"; ok=true; break; }
            }
            if(!ok) cout<<1<<" "<<n-1<<"\n";
        }
    }
}
```

CF 230B – T-primes

```cpp
#include <bits/stdc++.h>
using namespace std;
bool isPrime(long long x){
    if(x<2) return false;
    for(long long i=2;i*i<=x;i++) if(x%i==0) return false;
    return true;
}
int main(){
    int n; cin>>n;
    while(n--){
```

```
        long long x; cin>>x;
        long long r=sqrt(x);
        if(r*r==x && isPrime(r)) cout<<"YES\n";
        else cout<<"NO\n";
    }
}
```

CF 450A – Jzzhu and Children

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    int n,m; cin>>n>>m;
    int ans=0;
    for(int i=1;i<=n;i++){
        int x; cin>>x;
        if((x+m-1)/m >= (ans+m-1)/m) ans=i;
    }
    cout<<ans;
}
```

LightOJ 1138 – Trailing Zeroes (III)

```cpp
#include <bits/stdc++.h>
using namespace std;
long long f(long long n){ long long c=0; for(long long i=5;i<=n;i*=5) c+=n/i;
return c; }
int main(){
    int t; cin>>t;
    for(int cs=1;cs<=t;cs++){
        long long q; cin>>q;
        long long l=1,r=1e18,ans=-1;
        while(l<=r){
            long long mid=(l+r)/2;
            if(f(mid)>=q){ ans=mid; r=mid-1; }
            else l=mid+1;
        }
        cout<<"Case "<<cs<<": ";
        if(ans!=-1 && f(ans)==q) cout<<ans<<"\n";
        else cout<<"impossible\n";
    }
}
```

UVA 543 – Goldbach's Conjecture

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    const int N=1000000;
    vector<bool> prime(N,true);
    prime[0]=prime[1]=false;
    for(int i=2;i*i<N;i++) if(prime[i]) for(int j=i*i;j<N;j+=i) prime[j]=false;
    int n;
    while(cin>>n && n){
        for(int i=2;i<n;i++){
            if(prime[i] && prime[n-i]){
                cout<<n<<" = "<<i<<" + "<<n-i<<"\n";
                break;
            }
        }
    }
}
```

UVA 11466 – Largest Prime Divisor

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    long long n;
    while(cin>>n && n){
        n=llabs(n);
        long long mx=-1;
        for(long long i=2;i*i<=n;i++){
            if(n%i==0){ mx=i; while(n%i==0) n/=i; }
        }
        if(n>1) mx=max(mx,n);
        cout<<(mx==-1?-1:mx)<<"\n";
    }
}
```

📊Implementation

CF 158A – Next Round

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

```cpp
int main(){
    int n,k; cin>>n>>k;
    vector<int>a(n);
    for(int i=0;i<n;i++) cin>>a[i];
    int cnt=0;
    for(int i=0;i<n;i++) if(a[i]>=a[k-1] && a[i]>0) cnt++;
    cout<<cnt;
}
```

CF 339A – Helpful Maths

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    string s; cin>>s;
    vector<char> v;
    for(char c:s) if(c!='+') v.push_back(c);
    sort(v.begin(),v.end());
    for(int i=0;i<v.size();i++){
        if(i) cout<<"+";
        cout<<v[i];
    }
}
```

CF 110A – Nearly Lucky Number

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    string s; cin>>s;
    int c=0;
    for(char x:s) if(x=='4'||x=='7') c++;
    cout<<(c==4||c==7?"YES":"NO");
}
```

UVA 11764 – Jumping Mario

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    int t; cin>>t;
    for(int cs=1;cs<=t;cs++){
        int n; cin>>n;
        int up=0,down=0,prev,cur;
```

```
        cin>>prev;
        for(int i=1;i<n;i++){
            cin>>cur;
            if(cur>prev) up++;
            if(cur<prev) down++;
            prev=cur;
        }
        cout<<"Case "<<cs<<": "<<up<<" "<<down<<"\n";
    }
}
```

🔍 Binary Search

CF 474B – Worms

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    int n; cin>>n;
    vector<int>a(n),pref(n);
    for(int i=0;i<n;i++){
        cin>>a[i]; pref[i]=a[i]+(i?pref[i-1]:0);
    }
    int q; cin>>q;
    while(q--){
        int x; cin>>x;
        cout<<lower_bound(pref.begin(),pref.end(),x)-pref.begin()+1<<"\n";
    }
}
```

CF 1201C – Maximum Median

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    int n; long long k; cin>>n>>k;
    vector<long long>a(n);
    for(auto &x:a) cin>>x;
    sort(a.begin(),a.end());
    int mid=n/2;
    for(int i=mid+1;i<n;i++){
        long long need=(a[i]-a[mid])*(i-mid);
        if(need<=k){ k-=need; a[mid]=a[i]; }
```

```
            else{ a[mid]+=k/(i-mid); break; }
        }
        cout<<a[mid];
}
```

Dynamic Programming

CF 455A – Boredom

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    int n; cin>>n;
    map<int,long long> cnt;
    for(int i=0;i<n;i++){ int x; cin>>x; cnt[x]++; }
    vector<long long> dp(100005,0);
    for(auto [x,c]:cnt) dp[x]=max(dp[x-1],dp[x-2]+c*x);
    cout<<dp.rbegin()->second;
}
```

CF 580A – Kefa and First Steps

```cpp
#include <bits/stdc++.h>
using namespace std;
int main(){
    int n; cin>>n;
    vector<int>a(n);
    for(auto &x:a) cin>>x;
    int ans=1,cur=1;
    for(int i=1;i<n;i++){
        if(a[i]>=a[i-1]) cur++;
        else cur=1;
        ans=max(ans,cur);
    }
    cout<<ans;
}
```

CF 189A – Cut Ribbon

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

```
    int n,a,b,c; cin>>n>>a>>b>>c;
    vector<int> dp(n+1,-1);
    dp[0]=0;
    for(int i=1;i<=n;i++){
        if(i>=a && dp[i-a]!=-1) dp[i]=max(dp[i],dp[i-a]+1);
        if(i>=b && dp[i-b]!=-1) dp[i]=max(dp[i],dp[i-b]+1);
        if(i>=c && dp[i-c]!=-1) dp[i]=max(dp[i],dp[i-c]+1);
    }
    cout<<dp[n];
}
```

🩲Graph Theory

CF 520B – Two Buttons

```
#include <bits/stdc++.h>
using namespace std;
int main(){
    int n,m; cin>>n>>m;
    queue<pair<int,int>>q;
    q.push({n,0});
    unordered_set<int> vis;
    while(!q.empty()){
        auto [x,d]=q.front(); q.pop();
        if(x==m){ cout<<d; return 0; }
        if(vis.count(x)) continue;
        vis.insert(x);
        if(x*2<=2*m) q.push({x*2,d+1});
        if(x>1) q.push({x-1,d+1});
    }
}
```

UVA 10004 – Bicoloring

```
#include <bits/stdc++.h>
using namespace std;
int main(){
    int n;
    while(cin>>n && n){
        int l; cin>>l;
        vector<vector<int>> g(n);
        while(l--){ int u,v; cin>>u>>v; g[u].push_back(v); g[v].push_back(u); }
        vector<int> col(n,-1);
```

```
        queue<int> q; q.push(0); col[0]=0;
        bool ok=true;
        while(!q.empty()){
            int u=q.front(); q.pop();
            for(int v:g[u]){
                if(col[v]==-1){ col[v]=col[u]^1; q.push(v); }
                else if(col[v]==col[u]) ok=false;
            }
        }
        cout<<(ok?"BICOLORABLE.":"NOT BICOLORABLE.")<<"\n";
    }
}
```

🔗DSU

CF 116A – Tram

```
#include <bits/stdc++.h>
using namespace std;
int main(){
    int n; cin>>n;
    int cur=0,ans=0;
    while(n--){ int a,b; cin>>a>>b; cur-=a; cur+=b; ans=max(ans,cur); }
    cout<<ans;
}
```

🔗END

এই file দিয়ে তুমি **BUET IUPC core syllabus** পুরো cover করতে পারবে।