Question 8

Write a program to implement the Highest Response Ratio Next (Non-preemptive) algorithm and find the average turnaround time, waiting time, completion time and response time for overall process.

Garv nanwani

19BCS049

CODE :

```
#include<iostream>
#include<algorithm>
using namespace std;

struct node{
    char pname[50];
    int btime;
    int atime;
    int wtime;
    float rr=0;
}a[50];

void insert(int n){
    int i;
    for(i=0;i<n;i++){
        cin>>a[i].pname;
        cin>>a[i].atime;
        cin>>a[i].btime;
        a[i].rr=0;
        a[i].wtime=-a[i].atime;
    }
}

bool btimeSort(node a,node b){
    return a.btime < b.btime;
}

bool atimeSort(node a,node b){
    return a.atime < b.atime;
}

bool rrtimeSort(node a,node b){
    return a.rr > b.rr;
}

void disp(int n){
    sort(a,a+n,btimeSort);
    sort(a,a+n,atimeSort);
    int ttime=0,i;
    int j,tArray[n];
    for(i=0;i<n;i++){
```

```
        j=i;
        while(a[j].atime<=ttime&&j!=n){
            j++;
        }

        for(int q = i;q<j;q++){
            a[q].wtime=ttime-a[q].atime;
            a[q].rr=(float)(a[q].wtime+a[q].btime)/(float)a[q].btime;
        }
        sort(a+i,a+j,rrtimeSort);
        tArray[i]=ttime;
        cout<<endl;
        ttime+=a[i].btime;
    }
    tArray[i] = ttime;

    float averageWaitingTime=0;
    float averageResponseTime=0;
    float averageTAT=0;
    cout<<"\n";
    cout<<"P.Name  AT\tBT\tCT\tTAT\tWT\tRT\n";
    for (i=0; i<n; i++){
        cout <<'P'<< a[i].pname << "\t";
        cout << a[i].atime << "\t";
        cout << a[i].btime << "\t";
        cout << tArray[i+1] << "\t";
        cout << tArray[i]-a[i].atime+a[i].btime << "\t";
        averageTAT+=tArray[i]-a[i].atime+a[i].btime;
        cout << a[i].wtime << "\t";
        averageWaitingTime+=tArray[i]-a[i].atime;
        cout << tArray[i]-a[i].atime << "\t";
        averageResponseTime+=tArray[i]-a[i].atime;
        cout <<"\n";
    }
    cout<<"\n";
    cout<<"\nGantt Chart\n";
    for (i=0; i<n; i++){
        cout <<"|  P"<< a[i].pname << "   ";
    }
    cout<<"\n";
    for (i=0; i<n+1; i++){
        cout << tArray[i] << "\t";
    }
    cout<<"\n";
    cout<<"Average Response time: "<<(float)averageResponseTime/(float)n<<endl;
    cout<<"Average Waiting time: "<<(float)averageWaitingTime/(float)n<<endl;
    cout<<"Average TA time: "<<(float)averageTAT/(float)n<<endl;
}

int main(){
    int nop,choice,i;
    cout<<"Enter number of processes\n";
```

```
    cin>>nop;
    cout<<"Enter process, AT, BT\n";
    insert(nop);
    disp(nop);
    return 0;
}
```

Output :

```
Enter number of processes
3
Enter process, AT, BT
1 6 8
2 8 9
3 5 8



P.Name  AT      BT      CT      TAT     WT      RT
P3      5       8       8       3       -5      -5
P1      6       8       16      10      2       2
P2      8       9       25      17      8       8


Gantt Chart
|  P3   |  P1   |  P2
0       8       16      25
Average Response time: 1.66667
Average Waiting time: 1.66667
Average TA time: 10
```