1. Write a C program to simulate the following non-pre-emptive CPU scheduling algorithm to find turnaround time and waiting time.
   FCFS
   SJF (pre-emptive & Non-pre-emptive)

Code:

```
#include <stdio.h>
int at[10], pt[10], ia, ip, n;
int tat[10], wt[10], it, iw, pos, j, i;
float atat = 0, awt = 0;
void fcfs()
{
   int t;
   printf("Enter number of processes: ");
   scanf("%d", &n);

   printf("Enter arrival times:\n");
   for (ia = 0; ia < n; ia++)
      scanf("%d", &at[ia]);

   printf("Enter process times:\n");
   for (ip = 0; ip < n; ip++)
      scanf("%d", &pt[ip]);

   if (at[0] == at[1])
   {
      t = pt[1];
      pt[1] = pt[0];
      pt[0] = t;
   }

   if (at[0] != 0)
      tat[0] = at[0];

   for (it = 0; it < n; it++)
      tat[it] = 0;

   int i = 0;
   for (it = 0; it < n; it++)
   {
      while (i <= it)
         tat[it] += pt[i++];
      i = 0;
   }
```

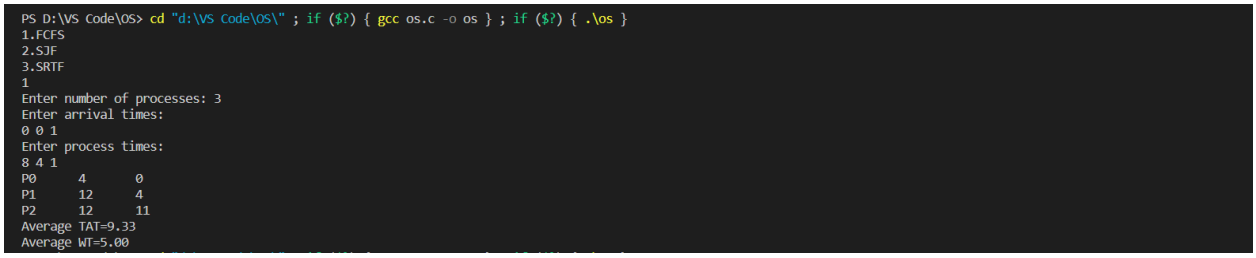
```
    for (it = 0; it < n; it++)
        tat[it] = tat[it] - at[it];

    for (ia = 0; ia < n; ia++)
        wt[ia] = tat[ia] - pt[ia];

    for (i = 0; i < n; i++)
    {
        atat += tat[i];
        awt += wt[i];
    }

    atat = atat / n;
    awt = awt / n;

    for (i = 0; i < n; i++)
    {
        printf("P%d\t%d\t%d\n", i, tat[i], wt[i]);
    }

    printf("Average TAT=%.2f\nAverage WT=%.2f\n", atat, awt);
}

void srtf()
{
    int rt[10], endTime, i, smallest;
    int remain = 0, time, sum_wait = 0, sum_turnaround = 0;
    printf("Enter no of Processes : ");
    scanf("%d", &n);
    printf("Enter arrival times\n");
    for (i = 0; i < n; i++)
    {
        scanf("%d", &at[i]);
    }
    printf("Enter Process times \n");
    for (i = 0; i < n; i++)
    {
        scanf("%d", &pt[i]);
        rt[i] = pt[i];
    }
    rt[9] = 9999;
    for (time = 0; remain != n; time++)
    {
        smallest = 9;
        for (i = 0; i < n; i++)
        {
```

```
            if (at[i] <= time && rt[i] < rt[smallest] && rt[i] > 0)
            {
                smallest = i;
            }
        }
        rt[smallest]--;
        if (rt[smallest] == 0)
        {
            remain++;
            endTime = time + 1;
            printf("\nP%d  %d  %d", smallest + 1, endTime - at[smallest], endTime - pt[smallest] -
at[smallest]);
            sum_wait += endTime - pt[smallest] - at[smallest];
            sum_turnaround += endTime - at[smallest];
        }
    }
    printf("\n\nAverage waiting time = %f\n", sum_wait * 1.0 / n);
    printf("Average Turnaround time = %f", sum_turnaround * 1.0 / n);
}

void sjf()
{
    int completed = 0;
    int currentTime = 0;
    int complete[n], ct[n];

    printf("Enter number of processes: ");
    scanf("%d", &n);

    printf("Enter arrival times:\n");
    for (int ia = 0; ia < n; ia++)
        scanf("%d", &at[ia]);

    printf("Enter process times:\n");
    for (int ip = 0; ip < n; ip++)
        scanf("%d", &pt[ip]);

    for (int i = 0; i < n; i++)
    {
        complete[i] = 0;
        ct[i] = 0;
    }

    while (completed != n)
    {
        int shortest = -1;
```

```
    int min_bt = 9999;

    for (int i = 0; i < n; i++)
    {
        if (at[i] <= currentTime && complete[i] == 0)
        {
            if (pt[i] < min_bt)
            {
                min_bt = pt[i];
                shortest = i;
            }
            if (pt[i] == min_bt)
            {
                if (at[i] < at[shortest])
                {
                    shortest = i;
                }
            }
        }
    }

    if (shortest == -1)
    {
        currentTime++;
    }
    else
    {
        ct[shortest] = currentTime + pt[shortest];
        tat[shortest] = ct[shortest] - at[shortest];
        wt[shortest] = tat[shortest] - pt[shortest];
        complete[shortest] = 1;
        completed++;
        currentTime = ct[shortest];
    }
}

for (int i = 0; i < n; i++)
{
    atat += tat[i];
    awt += wt[i];
}

atat = atat / n;
awt = awt / n;

for (int i = 0; i < n; i++)
```

```
    {
        printf("P%d\t%d\t%d\n", i, tat[i], wt[i]);
    }

    printf("\nAverage TAT = %f\nAverage WT = %f\n", atat, awt);
}

void main()
{
    int op = 1, x;
    printf("1.FCFS \n2.SJF \n3.SRTF\n");
    scanf("%d", &x);
    switch (x)
    {
    case 1:
        fcfs();
        break;
    case 2:
        sjf();
        break;

    case 3:
        srtf();
        break;

    default:
        printf("Invalid option \n");
    }
}
```

Output:



```
PS D:\VS Code\OS> cd "d:\VS Code\OS\" ; if ($?) { gcc os.c -o os } ; if ($?) { .\os }
1.FCFS
2.SJF
3.SRTF
2
Enter number of processes: 3
Enter arrival times:
0 0 1
Enter process times:
8 4 1
P0      13      5
P1      4       0
P2      4       3

Average TAT = 7.000000
Average WT = 2.666667
PS D:\VS Code\OS>
```

```
PS D:\VS Code\OS> cd "d:\VS Code\OS\" ; if ($?) { gcc os.c -o os } ; if ($?) { .\os }
1.FCFS
2.SJF
3.SRTF
3
Enter no of Processes : 3
Enter arrival times
0 0 1
Enter Process times
8 4 1

P3  1  0
P2  5  1
P1  13  5

Average waiting time = 2.000000
Average Turnaround time = 6.333333
PS D:\VS Code\OS>
```

21-06-2023

Write a C programming to simulate CPU Scheduling algorithm (i) FCFS (ii) SJF (iii) SRTF.

(i) void FCFS()

```
{
    int i=0
    for (it=0; it<n; it++)
        tat[it]=0;
    for (it=0; it<n; it++)
    {
        while (ic = it)
        tat[it] += pt[ita];
        i=0;
    }
for (it=0; it<n; it++)
    tat[it] = tat[it] - at[it];
for (ia=0; ia<n; ia++)
    wt[ia] = tat[ia] - pt[ia];
for (i=0; i<n; i++)
{   atat += tat[i];
    awt += wt[i];
}
atat = atat/n;
awt = awt/n;
for (i=0; i<n; i++)
{ printf("pid %d %d %d \n", i, tat[i], wt[i]);
}
printf("Average TAT = %f \n Average WT = %f \n", atat,
                                                 awt);
}
```

```
Void Sjf() {
    int completed=0;
    int currentTime=0;
    int complete[n], ct[n];
    printf("Enter number of processes: ");
    scanf("%d", &n);
    printf("Enter arrival times: ");
    for (i=0; i<n; i++)
        scanf("%d", &at[i]);
    printf("Enter process time: ");
    for (i=0; i<n; i++)
        scanf("%d", &pt[i]);
```

```
for (i=0; i<n; i++)
{
    complete[i]=0;
    ct[i]=0;
}
while(completed!=n)
{
    int shortest=-1;
    int min_bt=9999;
    for(i=0; i<n; i++)
    {
        if(at[i]<=currentTime && complete[i]==0)
        {
            if (pt[i]<min_bt)
            {
                min_bt=pt[i];
                shortest=i;
            }
            if(pt[i]==min_bt)
            {
                if(at[i]<at[shortest])
                {
                    shortest=i;
                }
            }
        }
    }
    if(shortest==-1)
    {
        currentTime++;
    }
    else
    {
        ct[shortest]= currentTime + pt[shortest];
        tat[shortest]= ct[shortest] - at[shortest];
        wt[shortest]= tat[shortest]- pt[shortest];
        complete[shortest]=1;
        completed++;
        currentTime = ct[shortest];
    }
}
for(i=0; i<n; i++)
{
    atat += tat[i];
    awt += wt[i];
}
atat = atat/n;
awt = awt/n;
for(i=0; i<n; i++)
    printf("%d\t%d\t%d\n", i, tat[i], wt[i]);
```

```
printf("\n Average TAT = %of  \n Average WT = %of\n", avgtat, avgwt);
}

void srtf()
{
    int at[10], endTime, i, smallest;
    int remain=0, time, sum_wait=0, sum_turnaround=0;
    printf("Enter number of processes: ");
    scanf("%d", &n);
    printf("Enter arrival time \n");
    for(i=0; i<n; i++)
        scanf("%d", &at[i]);
    printf("Enter processes time \n");
    for(i=0; i<n; i++)
    {
        scanf("%d", &pt[i]);
        rt[i] = pt[i];
    }
    rt[9] = 9999;
    for(time=0; remain!=n; time++)
    {
        smallest=9;
        for(i=0; i<n; i++)
        {
            if(at[i]<=time && rt[i]<rt[smallest] && rt[i]>0)
                smallest = i;
        }
        rt[smallest]--;
        if(rt[smallest]==0)
        {
            remain++;
            endTime = time+1;
            printf("\n P %d %d %d", smallest+1, endTime-
        at[smallest], endTime-pt[smallest]-at[smallest]);
        sum_wait += endTime-pt[smallest]-at[smallest];
            sum_turnaround += endTime-at[smallest];
        }
    }
    printf("\n Average waiting time = %of\n", sum_wait/n);
    printf("\n Average TAT = %of\n", sum_turnaround/n);
}
```

1. FCFS
2. SJF
3. SRTF
1. Enter n

Enter

Enter

P1

P2

P3

A WT

A TAT

Ent

P1

P2

P3

A TAT

Ent

Enter

P1

P2

P3

A T

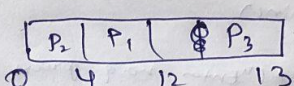
A

1. FCFS
2. SJF
3. SRTF

1. Enter no. of processes 3.

Enter Arrival times 0 0 1
Enter Process times 8 4 1

P1	12	4
P2	4	0
P3	12	11

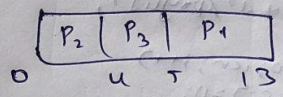


ATAT = 9.3.
AWT = 5.

2.

Enter no. of processes 3.
Enter Arrival times 0 0 1
Enter Process times 8 4 1

P1	13	5
P2	4	0
P3	4	3



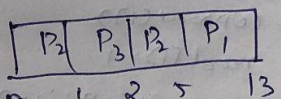
ATAT = 7
AWT = 2.67.

P 22/6/23

3.

Enter no. of processes 3.
Enter Arrival times 0 0 1
Enter Process times 8 4 1

P1	13	5
P2	4	0
P3	4	3.



ATAT = 7
AWT = 2.67.