LAB PROGRAM - 03

2. Write a C program to simulate the following CPU scheduling algorithm to find turnaround time and waiting time.

a) SJF Preemptive
b) SJF Non-Preemptive

```c
#include <stdio.h>

#define MAX 100

void sjfNonPreemptive(int n, int at[], int bt[]) {
    int ct[n], tat[n], wt[n], remaining[n];
    int total_tat = 0, total_wt = 0;

    for (int i = 0; i < n; i++) {
        remaining[i] = bt[i];
        ct[i] = -1;
    }

    int completed = 0, time = 0;
    while (completed < n) {
        int min_bt = 9999, index = -1;

        for (int i = 0; i < n; i++) {
            if (at[i] <= time && ct[i] == -1 && bt[i] < min_bt) {
                min_bt = bt[i];
                index = i;
            }
        }

        if (index != -1) {
            time += bt[index];
            ct[index] = time;
            tat[index] = ct[index] - at[index];
            wt[index] = tat[index] - bt[index];
            total_tat += tat[index];
            total_wt += wt[index];
            completed++;
        } else {
            time++;
```

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        }
    }

    printf("\nP#\tAT\tBT\tCT\tTAT\tWT\n");
    for (int i = 0; i < n; i++) {
        printf("%d\t%d\t%d\t%d\t%d\t%d\n", i + 1, at[i], bt[i], ct[i],
tat[i], wt[i]);
    }
    printf("Average TAT: %.2f\n", total_tat / n);
    printf("Average WT: %.2f\n", total_wt / n);
}

void sjfPreemptive(int n, int at[], int bt[]) {
    int ct[n], tat[n], wt[n], remaining[n];
    int total_tat = 0, total_wt = 0;

    for (int i = 0; i < n; i++) {
        remaining[i] = bt[i];
        ct[i] = -1;
    }

    int completed = 0, time = 0;
    while (completed < n) {
        int min_bt = 9999, index = -1;

        for (int i = 0; i < n; i++) {
            if (at[i] <= time && remaining[i] > 0 && remaining[i] <
min_bt) {
                min_bt = remaining[i];
                index = i;
            }
        }

        if (index != -1) {
            remaining[index]--;
            time++;

            if (remaining[index] == 0) {
                ct[index] = time;
                tat[index] = ct[index] - at[index];
```

```
                wt[index] = tat[index] - bt[index];
                total_tat += tat[index];
                total_wt += wt[index];
                completed++;
            }
        } else {
            time++;
        }
    }


    printf("\nP#\tAT\tBT\tCT\tTAT\tWT\n");
    for (int i = 0; i < n; i++) {
        printf("%d\t%d\t%d\t%d\t%d\t%d\n", i + 1, at[i], bt[i], ct[i],
tat[i], wt[i]);
    }
    printf("Average TAT: %.2f\n", total_tat / n);
    printf("Average WT: %.2f\n", total_wt / n);
}

int main() {
    int n, choice;

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

    int at[n], bt[n];
    for (int i = 0; i < n; i++) {
        printf("Enter AT and BT for P%d: ", i + 1);
        scanf("%d %d", &at[i], &bt[i]);
    }

    printf("\nChoose Scheduling Algorithm:\n");
    printf("1. Non-Preemptive SJF\n");
    printf("2. Preemptive SJF (SRTF)\n");
    printf("Enter choice: ");
    scanf("%d", &choice);

    if (choice == 1) {
        sjfNonPreemptive(n, at, bt);
```

```
    } else if (choice == 2) {
        sjfPreemptive(n, at, bt);
    } else {
        printf("Invalid choice!\n");
    }

    return 0;
}
```

Output

```
Enter number of processes: 3
Enter AT and BT for P1: 1 5
Enter AT and BT for P2: 2 4
Enter AT and BT for P3: 3 6

Choose Scheduling Algorithm:
1. Non-Preemptive SJF
2. Preemptive SJF (SRTF)
Enter choice: 1

P#      AT      BT      CT      TAT     WT
1       1       5       6       5       0
2       2       4       10      8       4
3       3       6       16      13      7
Average TAT: 0.00
Average WT: 0.00
PS C:\Users\Admin> ^C
PS C:\Users\Admin>
PS C:\Users\Admin>  & 'c:\Users\Admin\.vscode\extensions\ms-vscode.cpptools-1.23.6
ut-ie5htzet.d42' '--stderr=Microsoft-MIEngine-Error-xwcqpalr.lst' '--pid=Microsoft
Enter number of processes: 3
Enter AT and BT for P1: 1 5
Enter AT and BT for P2: 2 4
Enter AT and BT for P3: 3 6

Choose Scheduling Algorithm:
1. Non-Preemptive SJF
2. Preemptive SJF (SRTF)
Enter choice: 2

P#      AT      BT      CT      TAT     WT
1       1       5       6       5       0
2       2       4       10      8       4
3       3       6       16      13      7
Average TAT: 0.00
Average WT: 0.00
PS C:\Users\Admin>
```