Question :

Write a program to implement the round robin scheduling algorithm having variables time quantum and find the average turnaround time, waiting time, completion time and response time for overall process. Also Print Gantt chart for it.

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Code :

```
#include<stdio.h>

struct times
{
       int p,art,but,wtt,tat,rnt,ct;
};


void sortart(struct times a[],int pro)
{
       int i,j;
       struct times temp;
       for(i=0;i<pro;i++)
       {
              for(j=i+1;j<pro;j++)
              {
                     if(a[i].art > a[j].art)
                     {
                           temp = a[i];
                           a[i] = a[j];
                           a[j] = temp;
                     }
              }
       }
       return;
}

int main()
{
       int i,j,pro,time,remain,flag=0,ts;
       struct times a[100];
       float avgwt=0,avgtt=0;
       printf("Round Robin Scheduling Algorithm\n");
       printf("Enter Number Of Processes : ");
       scanf("%d",&pro);
       remain=pro;
       for(i=0;i<pro;i++)
       {
              printf("Enter arrival time and Burst time for Process P%d : ",i);
              scanf("%d%d",&a[i].art,&a[i].but);
              a[i].p = i;
```

```
                a[i].rnt = a[i].but;
        }
        sortart(a,pro);
        printf("Enter Time Quantum Number : ");
        scanf("%d",&ts);
        printf("\n***************************************\n");
        printf("Gantt Chart\n");
        printf("0");
        for(time=0,i=0;remain!=0;)
        {
                if(a[i].rnt<=ts && a[i].rnt>0)
                {
                        time = time + a[i].rnt;
                        printf(" -> [P%d] <- %d",a[i].p,time);
                        a[i].rnt=0;
                        flag=1;
                }
                else if(a[i].rnt > 0)
                {
                        a[i].rnt = a[i].rnt - ts;
                        time = time + ts;
                        printf(" -> [P%d] <- %d",a[i].p,time);
                }
                if(a[i].rnt==0 && flag==1)
                {
                        remain--;
                        a[i].tat = time-a[i].art;
                        a[i].wtt = time-a[i].art-a[i].but;
                        a[i].ct = a[i].tat+a[i].but;
                        avgwt = avgwt + time-a[i].art-a[i].but;
                        avgtt = avgtt + time-a[i].art;
                        flag=0;
                }
                if(i==pro-1)
                        i=0;
                else if(a[i+1].art <= time)
                        i++;
                else
                        i=0;
        }
        printf("\n\n");
        printf("***************************************\n");
        printf("Pro\tArTi\tBuTi\tCt\tTaTi\tWtTi\n");
        printf("***************************************\n");
        for(i=0;i<pro;i++)
        {

printf("P%d\t%d\t%d\t%d\t%d\t%d\n",a[i].p,a[i].art,a[i].but,a[i].ct,a[i].tat,a[i].wtt);

        }
        printf("***************************************\n");
        avgwt = avgwt/pro;
        avgtt = avgtt/pro;
        printf("Average Waiting Time : %.2f\n",avgwt);
        printf("Average Turnaround Time : %.2f\n",avgtt);
        return 0;
}
```

Output :

```
Round Robin Scheduling Algorithm
Enter Number Of Processes : 5
Enter arrival time and Burst time for Process P0 : 3
6
Enter arrival time and Burst time for Process P1 : 7
4
Enter arrival time and Burst time for Process P2 : 5
8
Enter arrival time and Burst time for Process P3 : 3
5
Enter arrival time and Burst time for Process P4 : 2
7
Enter Time Quantum Number : 5

****************************************
Gantt Chart
0 -> [P4] <- 5 -> [P3] <- 10 -> [P0] <- 15 -> [P2] <- 20 -> [P1] <- 24 -> [P4] <- 26 -
> [P0] <- 27 -> [P2] <- 30

****************************************
Pro     ArTi    BuTi    Ct      TaTi    WtTi
****************************************
P4      2       7       31      24      17
P3      3       5       12      7       2
P0      3       6       30      24      18
P2      5       8       33      25      17
P1      7       4       21      17      13
****************************************
Average Waiting Time : 13.40
Average Turnaround Time : 19.40
```