CC LAB 1-3

Q1: Find the makespan for the following ETC matrix having 7 task and 3 machine using min-min algorithm. Find the time complexity of min-min algorithm.

Ans:

```
#include <stdio.h>
#include <stdlib.h>
#include <stdbool.h>

int main(){
   int n,m;
   printf("Enter the number of virtual machines and number of tasks: ");
   scanf("%d %d",&n,&m);

   int a[m][n];
   bool visited[m];
   for(int i=0;i<m;i++){
      printf("Enter times for task %d\n",i+1);
      for(int j=0;j<n;j++){
         scanf("%d",&a[i][j]);

      }
      visited[i]=false;
   }
   int cnt=0;
   int max_time[n];
   for(int i=0;i<n;i++){
      max_time[i]=0;
   }
   while(cnt < m){
      int min=1e9;
      int machine_no=-1;
      int task_no=-1;
      for(int i=0;i<m;i++){
         if(visited[i]==true)continue;
         for(int j=0;j<n;j++){
            if(min> a[i][j]){
               min=a[i][j];
               machine_no=j;
               task_no=i;
            }
         }
      }

      visited[task_no]=true;
```

```
      max_time[machine_no]=min;
      cnt++;
      printf("Task %d is assigned to machine %d\n",task_no+1,machine_no+1);
      for(int i=0;i<m;i++){
         if(visited[i]==true)continue;
         a[i][machine_no]+=min;
      }
   }
   int ans=0;
   for(int i=0;i<n;i++){
         if(ans<max_time[i]){
            ans=max_time[i];
         }
   }
   printf("The maximum time required is %d\n",ans);

}
```

OUTPUT:

```
PS C:\Users\KIIT\Desktop\Assignments\CC LAB\Lab1> gcc minmin.c
PS C:\Users\KIIT\Desktop\Assignments\CC LAB\Lab1> ./a.exe
Enter the number of virtual machines and number of tasks: 3
7
Enter times for task 1
15 7 9
Enter times for task 2
9 8 8
Enter times for task 3
11 6 8
Enter times for task 4
10 8 9
Enter times for task 5
5 7 8
Enter times for task 6
4 7 8
Enter times for task 7
5 6 4
Task 6 is assigned to machine 1
Task 7 is assigned to machine 3
Task 3 is assigned to machine 2
Task 5 is assigned to machine 1
Task 2 is assigned to machine 3
Task 1 is assigned to machine 2
Task 4 is assigned to machine 1
The maximum time required is 23
```

Q2: Find the makespan for the following ETC matrix having 7 task and 3 machine using max-min algorithm. Find the time complexity of max-min algorithm.

Ans:

```
#include <stdio.h>
#include <stdlib.h>
#include <stdbool.h>
int main(){
   int n,m;
   printf("Enter the number of virtual machines and number of tasks: ");
   scanf("%d %d",&n,&m);

   int a[m][n];
   bool visited[m];
   for(int i=0;i<m;i++){
      printf("Enter times for task %d\n",i+1);
      for(int j=0;j<n;j++){
         scanf("%d",&a[i][j]);
      }
      visited[i]=false;
   }
   int cnt=0;
   int max_time[n];
   for(int i=0;i<n;i++){
      max_time[i]=0;
   }
   while(cnt < m){
      int machine_no=-1;
      int task_no=-1;
      int check_time[m];
      int check_machine[m];
      for(int i=0;i<m;i++){
         if(visited[i]==true){
            check_time[i]=0;
            continue;
         }
         int min=1e9;
         for(int j=0;j<n;j++){
            if(min> a[i][j]){
               min=a[i][j];
               check_machine[i]=j;
            }
         }
         check_time[i]=min;
      }
      int min=0;
      for(int i=0;i<m;i++){
         if(min< check_time[i]){
            min=check_time[i];
```

```
            machine_no=check_machine[i];
            task_no=i;
          }
        }
        visited[task_no]=true;
        max_time[machine_no]=min;
        cnt++;
        printf("Task %d is assigned to machine %d and time is %d\n",
task_no+1,machine_no+1,min);
        for(int i=0;i<m;i++){
          if(visited[i]==true)continue;
          a[i][machine_no]+=min;
        }
    }
    int ans=0;
    for(int i=0;i<n;i++){
          if(ans<max_time[i]){
            ans=max_time[i];
          }
    }
    printf("The maximum time required is %d\n",ans);
}
```

OUTPUT:

```
PS C:\Users\KIIT\Desktop\Assignments\CC LAB\Lab2> gcc maxmin.c
PS C:\Users\KIIT\Desktop\Assignments\CC LAB\Lab2> ./a.exe
Enter the number of virtual machines and number of tasks: 3
7
Enter times for task 1
15 7 9
Enter times for task 2
9 8 8
Enter times for task 3
11 6 8
Enter times for task 4
10 8 9
Enter times for task 5
5 7 8
Enter times for task 6
4 7 8
Enter times for task 7
5 6 4
Task 2 is assigned to machine 2 and time is 8
Task 1 is assigned to machine 3 and time is 9
Task 3 is assigned to machine 1 and time is 11
Task 4 is assigned to machine 2 and time is 16
Task 5 is assigned to machine 1 and time is 16
Task 6 is assigned to machine 3 and time is 17
Task 7 is assigned to machine 2 and time is 30
The maximum time required is 30
```