Experiment 5

Aim:Perform Job Sequencing with a deadline using the Greedy Approach using C/C++.

5.1CO Attained:CO3, CO4 and CO5

5.2Objective:

In the job sequencing problem, the objective is to find a sequence of jobs, which is completed within their deadlines and gives maximum profit.

5.3Resources: Turbo c/Dev C++

5.4Program Logic:

A greedy algorithm is an approach for solving a problem by selecting the best option available at the moment. It doesn't worry whether the current best result will bring the overall optimal result.
The algorithm never reverses the earlier decision even if the choice is wrong. It works in a top-down approach.

```
1. Begin
   2. Sort all the jobs based on profit Pi so
   3. P1 > P2 > P3 ……………………………>=Pn
   4. d = maximum deadline of job in A
   5. Create array S[1,…………………,d]
   6. For i=1 to n do
      7. Find the largest job x
      8. For j=i to 1
         9. If ((S[j] = 0) and (x deadline<= d))
         10. Then
            11. S[x] = i;
            12. Break;
         13. End if
      14. End for
   15. End for
   16. End
```

5.5Procedure:

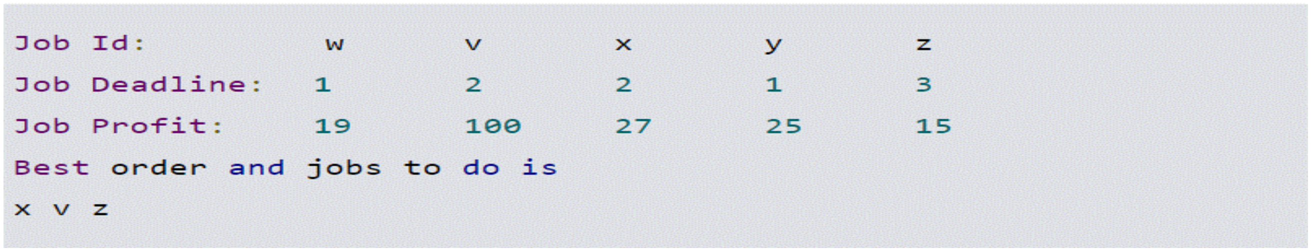
1. Create: Open Dev C++/C and write a program after that save the program with the .c extension.
2. Compile: Alt + F9
3. Execute: Ctrl + F10

5.6Program Code:

```
#include <stdio.h>
#include <stdlib.h>
#include <stdbool.h>
//Job Structure
typedef struct {
    char id;
    int deadline;
    int profit;)}job;
// function to compare two jobs based on their profit. returns true if job b's profit < job a's
profit

int compareJob(const Job *a, const Job *b){
    return b->profit - a->profit;
}
//function finds the best job sequence
void bestJob(Job jobs[],int sizeOfJobs){
//null char array
    char jobsToDo[5]= {'\0'};

for(int i=0, k=0; i<sizeOfJobs; i++){
        k = jobs[i].deadline-1;
//Searching backwards the empty date nearest to deadline
        while(jobsToDo[k] != '\0' && k >= 0){
            k--;
        }
        //if empty date found, set the job
if(k != -1)
jobsToDo[k]= jobs[i].id;
    }
    //output the final job sequence
printf("\nBest order and jobs to do is: ");
    int idx=0;
    while(jobsToDo[idx] != '\0'){
printf("%c ",jobsToDo[idx]);
idx++;
    }}
//function to display the jobs table
void display(Job jobs[], int n){
printf("Job Id:     \t");
for(int i=0; i<n; i++){
printf("%c \t",jobs[i].id);
```

```
    }
printf("\n");

printf("Job Deadline: \t");
for(int i=0; i<n; i++){
printf("%d \t",jobs[i].deadline);
    }
printf("\n");

printf("Job Profit: \t");
for(int i=0; i<n; i++){
printf("%d \t",jobs[i].profit);
    }
printf("\n");
}
int main()
{
//intialize the jobs
    Job jobs[]=  {{'w', 1, 19}, {'v', 2, 100}, {'x', 2, 27},
                   {'y', 1, 25}, {'z', 3, 15}};
//display the jobs data
    display(jobs,5);

//sorting jobs[] w.r.t their profit
qsort(jobs,5,sizeof(jobs[0]),compareJob);

bestJob(jobs,5);
    return 0;
}
```

5.7Conclusion:



```
Job Id:          w       v       x       y       z
Job Deadline:    1       2       2       1       3
Job Profit:      19      100     27      25      15
Best order and jobs to do is
x v z
```

5.8Analysis:

The time complexity of this algorithm is O(n^2).

5.9Lab Viva Questions:

1. What is the most efficient approach to solve this problem?

2. Define greedy approach.
3. Define job scheduling with deadline.