Lab – 10

- **Aim:**

i) Write a program to solve job-assignment problem using Branch and Bound method.

The problem instance has a number of *agents* and a number of *tasks*. Any agent can be assigned to perform any task, incurring some *cost* that may vary depending on the agent-task assignment. It is required to perform all tasks by assigning exactly one agent to each task and exactly one task to each agent in such a way that the *total cost* of the assignment is minimized.

The general B&B algorithm:

```
Procedure B&B()
begin
    E: nodepointer;
    E := new(node);-- this is the root node which
                   -- is the dummy start node
    H: heap;       -- A heap for all the live nodes
    -- H is a min-heap for minimization problems,
    -- and a max-heap for maximization problems.
   while (true) do
      if (E is a final leaf) then
         -- E is an optimal solution
         print out the path from E to the root;
         return;
      endif
      Expand(E);
      if (H is empty) then
       report that there is no solution;
       return;
      endif
      E := delete-top(H);
   endwhile
end
```

```
Procedure Expand(E)
begin
  - Generate all the children of E;
  - Compute the approximate cost value CC of each child;
  - Insert each child into the heap H;
end
```

References

Books

1) "Fundamentals of Algorithmics" by Brassard and Brately, PHI publication
2) "Introduction to Algorithms" by Cormen, Leiserson, Reivest and Stein, Third Edition, PHI Publication
3) "Fundamentals of Computer Algorithms" by Horowitz, Sahni and Rajasekaran, Second Edition, University Press

Web References

4) www.wikipedia.com
5) https://www.seas.gwu.edu/~ayoussef/cs6212/branchandbound.html