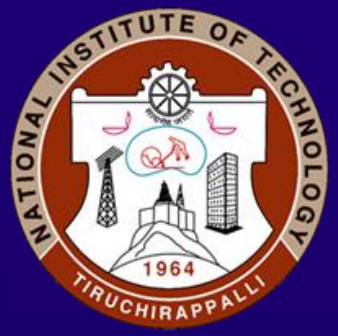

NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPPALLI

CSPE43

ADVANCED DATA STRUCTURES AND ALGORITHMS

OPEN JOB SCHEDULING USING EDGE COLOURING OF GRAPH

DONE BY:

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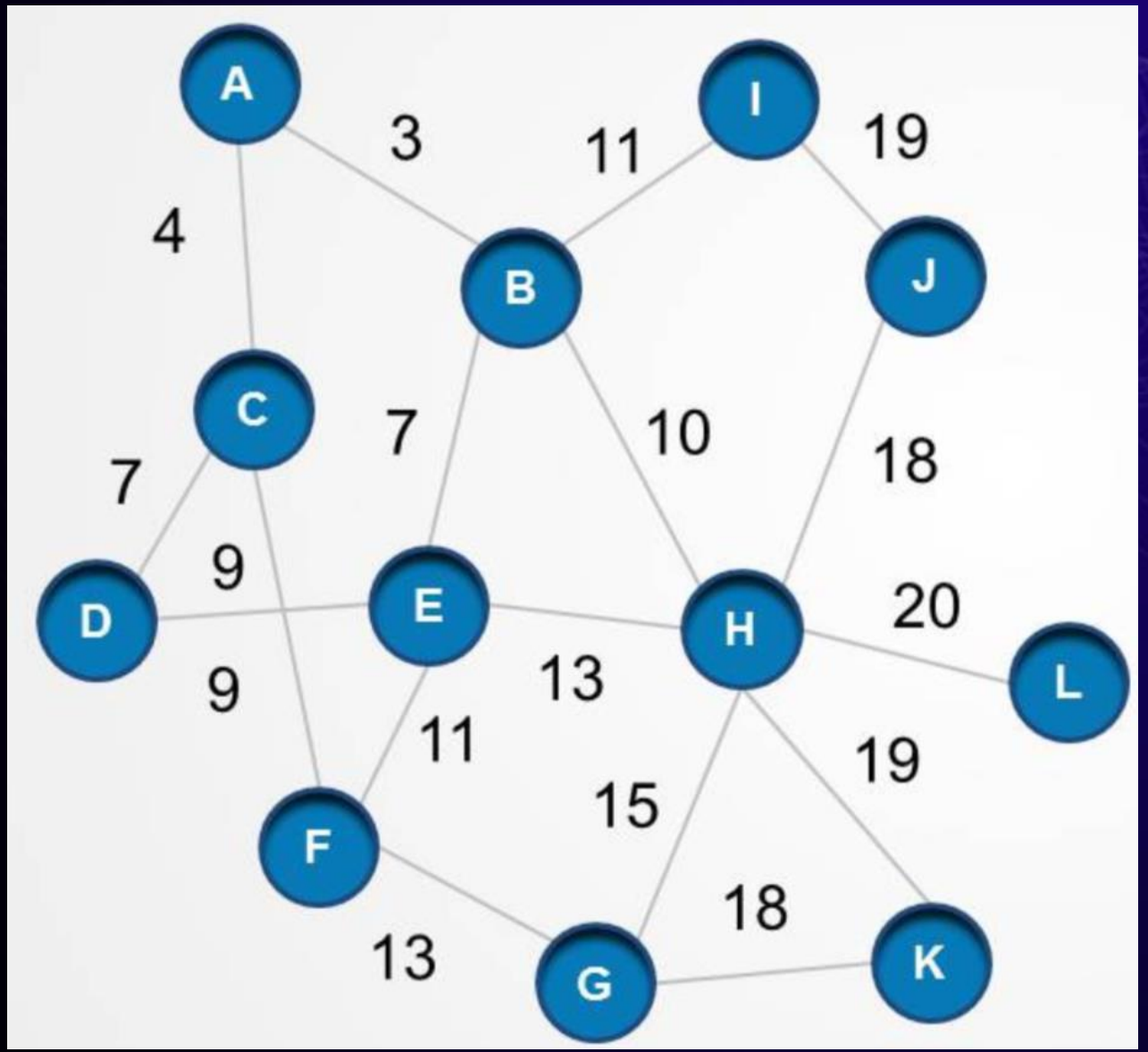
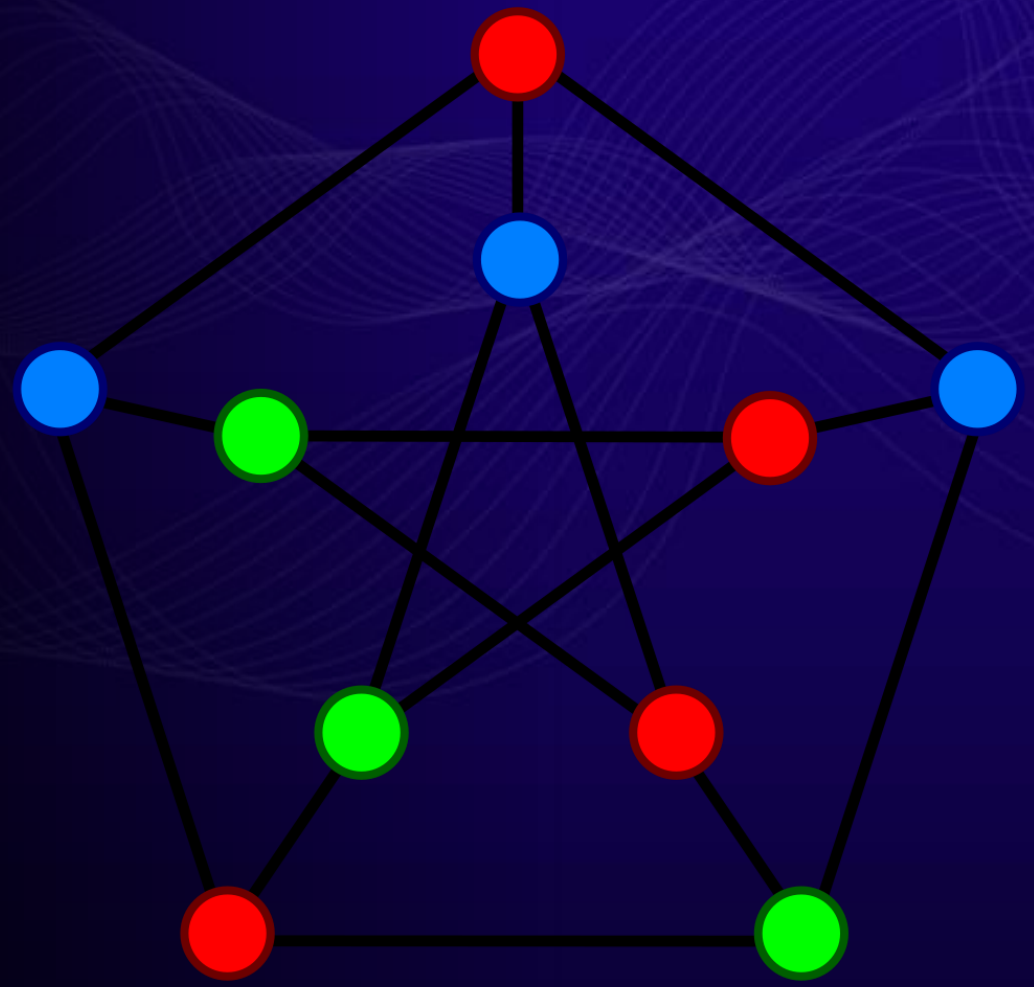
GRAPHS

A graph G is defined as an ordered set G(V, E) where V(G) represents the set of vertices and E(G) represents the set of edges which are used to connect these vertices.



GRAPH COLORING

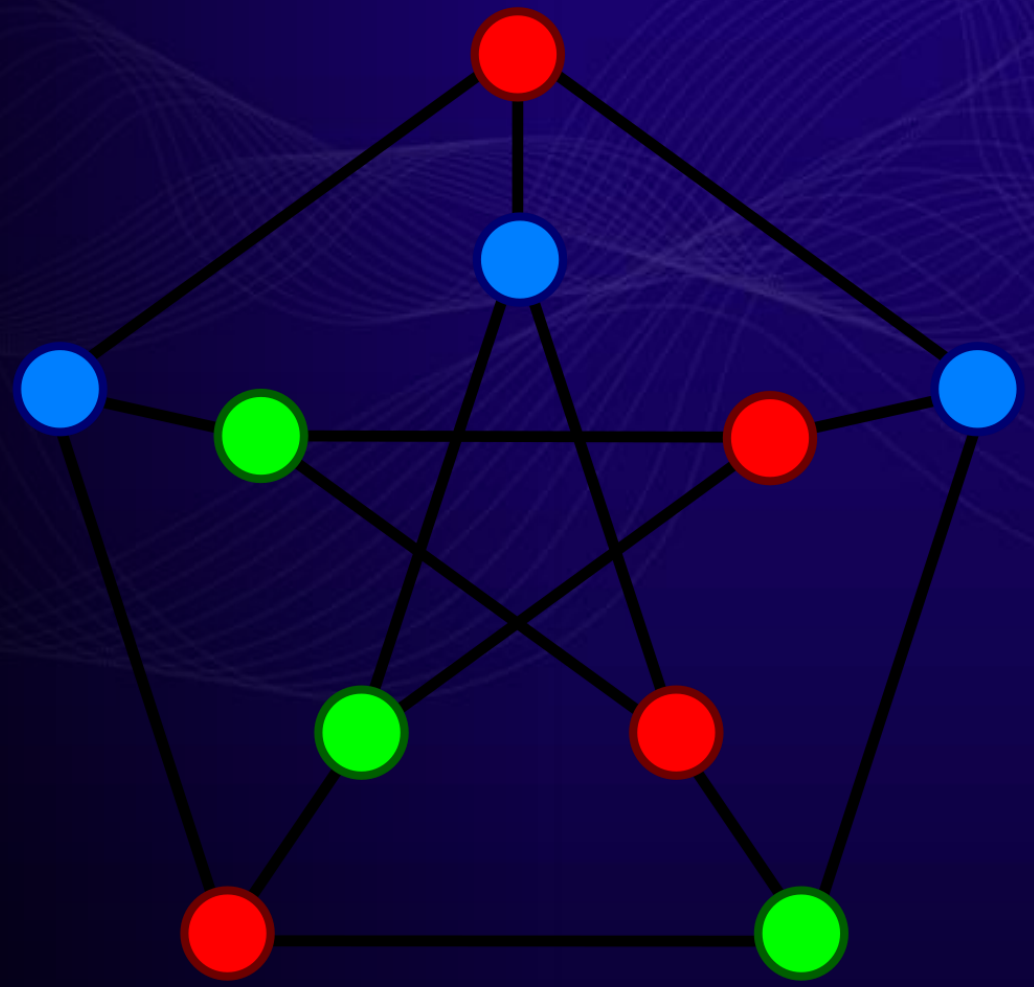
- Graph coloring is a problem in graph theory that involves assigning colors to the vertices (or nodes) of a graph in such a way that no two adjacent vertices share the same color.
- The goal of graph coloring is to find the minimum number of colors needed to color a given graph, which is known as the chromatic number of the graph.



CHROMATIC NUMBER

The chromatic number can be described as the minimum number of colors required to properly color any graph. In other words, the chromatic number can be described as a minimum number of colors that are needed to color any graph in such a way that no two adjacent vertices of a graph will be assigned the same color.

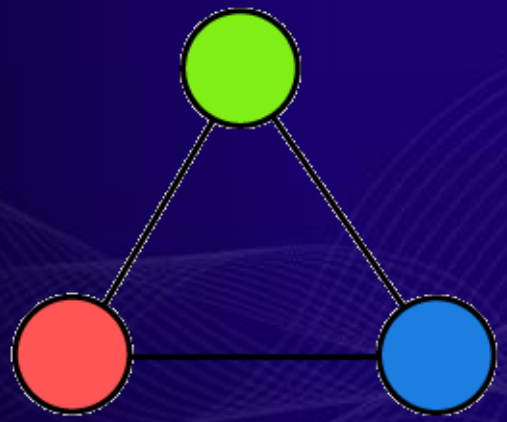
Example: The chromatic number of the graph on the right is 3



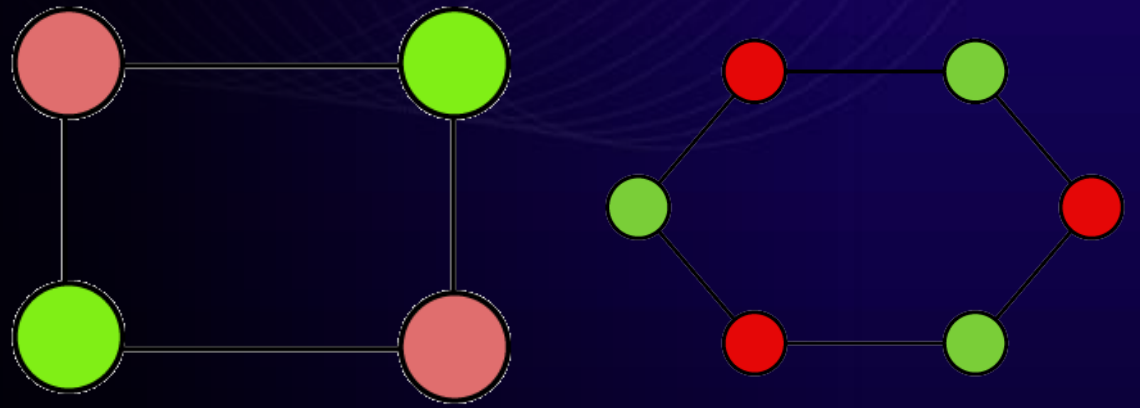
CHROMATIC NUMBER FOR VARIOUS TYPE OF GRAPHS

CYCLIC GRAPH

- 2, if the graph has even number of vertices
- 3, otherwise



Odd number of vertices
Chromatic Number = 3

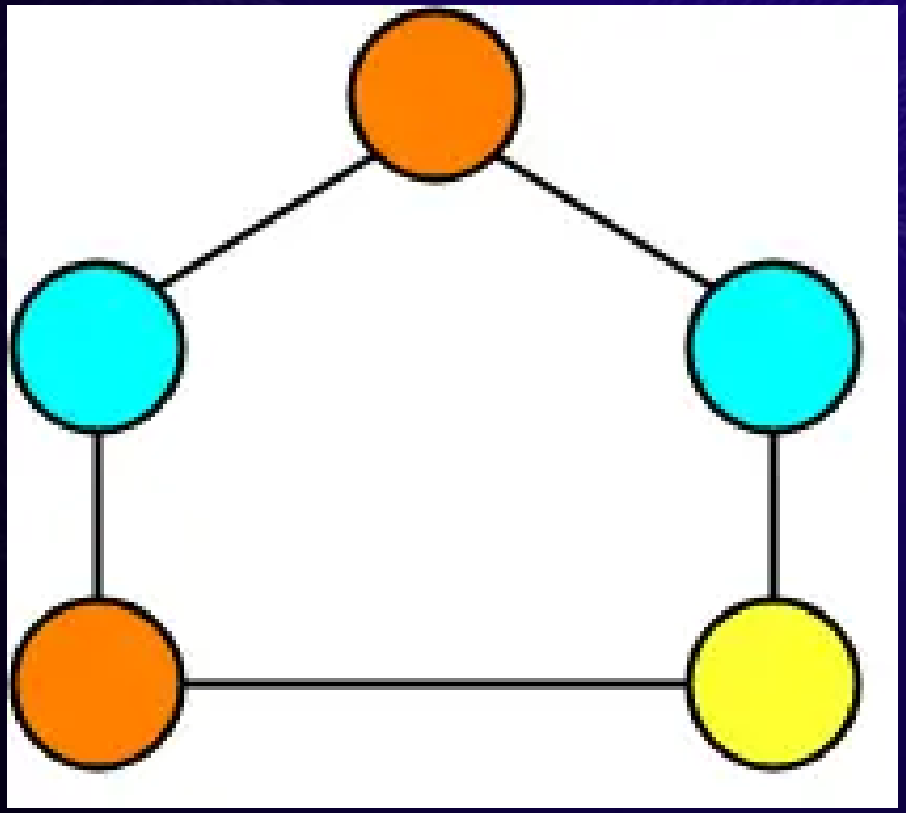


Even number of vertices
Chromatic Number = 2

CHROMATIC NUMBER FOR VARIOUS TYPE OF GRAPHS

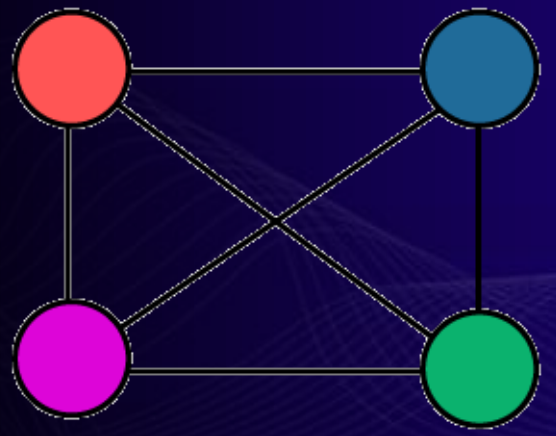
PLANAR GRAPH

Always less than or equal to 4



Chromatic Number = 3

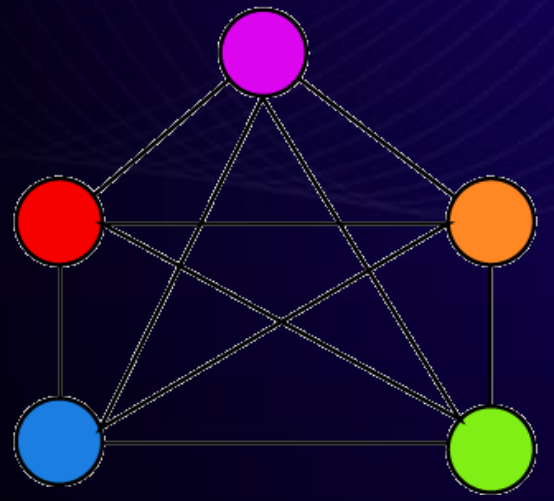
CHROMATIC NUMBER FOR VARIOUS TYPE OF GRAPHS



No. of vertices = 4
Chromatic Number = 4

COMPLETE GRAPH

Equal to the number of vertices of the graph

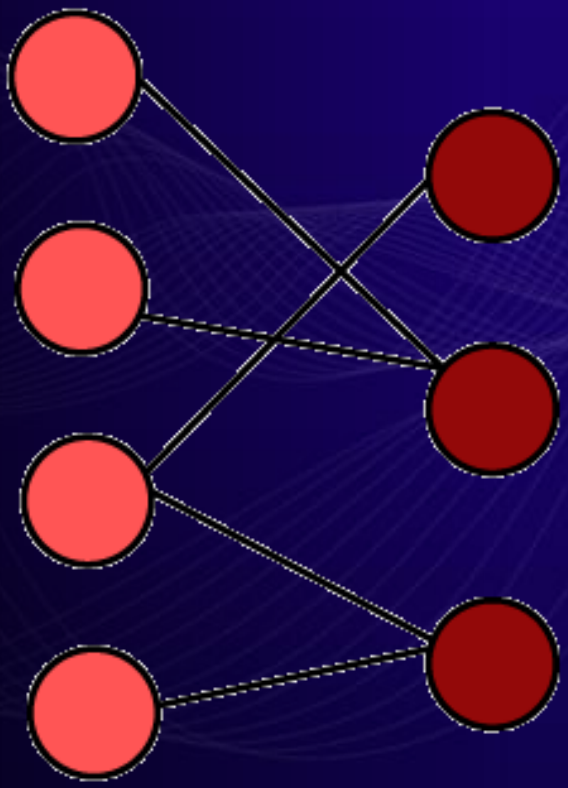


No. of vertices = 5
Chromatic Number = 5

CHROMATIC NUMBER FOR VARIOUS TYPE OF GRAPHS

BIPARTITE GRAPH

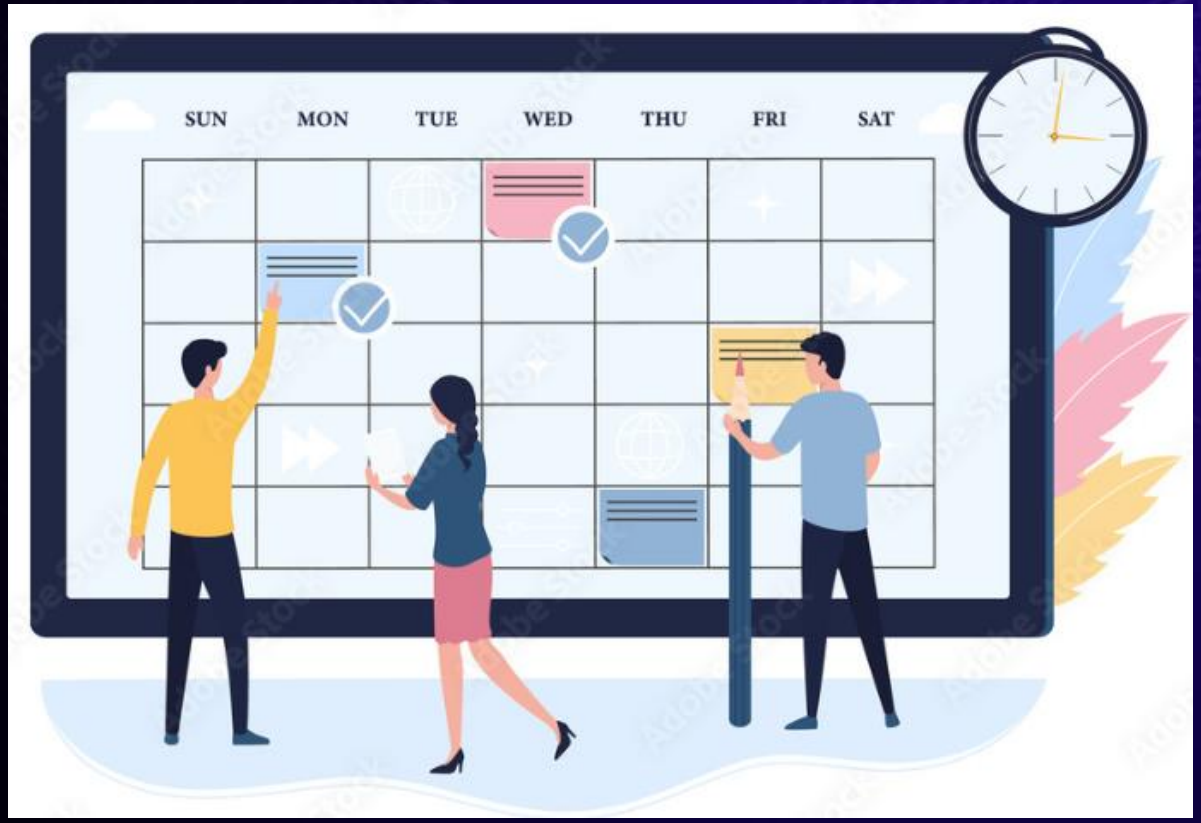
Always equal to 2



Chromatic Number = 2

OPEN JOB SCHEDULING

- Open job scheduling is an optimization problem in computer science and operations research.
- The input to the open job scheduling problem consists of a set of n jobs, another set of m workstations, and a two-dimensional table of the amount of time each job should spend at each workstation (possibly zero).
- The goal is to assign a time for each job to be processed by each workstation, so that no two jobs are assigned to the same workstation at the same time, no job is assigned to two workstations at the same time, and every job is assigned to each workstation for the desired amount of time.



OPEN JOB SCHEDULING USING GRAPH COLOURING

METHODOLOGY

- In this project, we are going to solve the open job scheduling problem, by using Graph Coloring, in other words, Vertex Coloring.
- Here, we take all the jobs as the vertices of a graph. Each vertex represents a job.
- There are 2 types of jobs
  1. Dependent Jobs
  2. Independent Jobs
- The idea is that we will introduce an edge between 2 vertices, if the jobs associated with the vertices are dependent on each other.
- Once this is done, we will start to color the graph according to the constraints of the graph coloring algorithm.
- The chromatic number of the graph will determine the minimum number of distinct time slots we need to have in order to complete all the jobs.
- We can also say that the jobs associated with the vertices of the graph which have the same color can be scheduled at the same time, meaning they can be done simultaneously (as they are independent of each other)


THANK YOU