King Fahd University of Petroleum & Minerals
College of Computer Science and Engineering
Information and Computer Science Department
ICS 202 – Data Structures

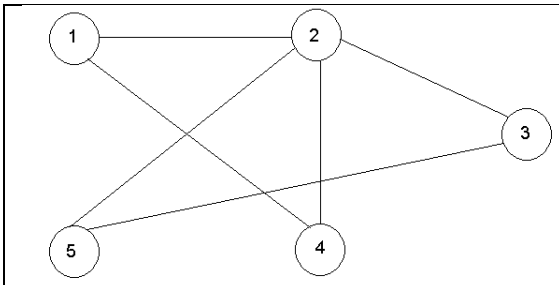
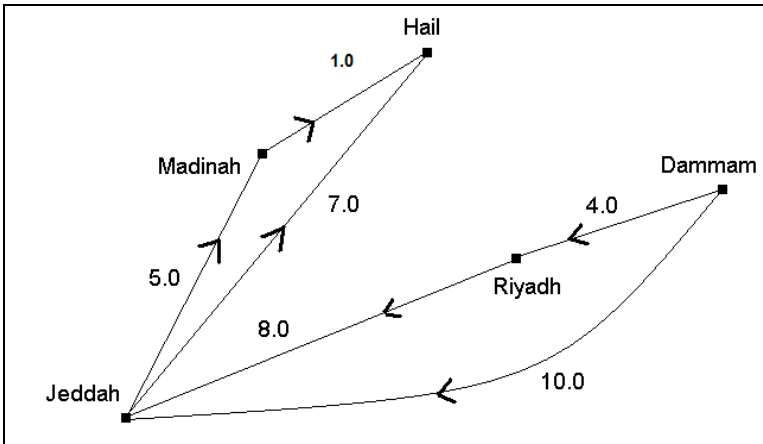
Graphs

Objectives
The objective of this lab is to study graphs, graph traversals and topological sort, and to study graph algorithms.

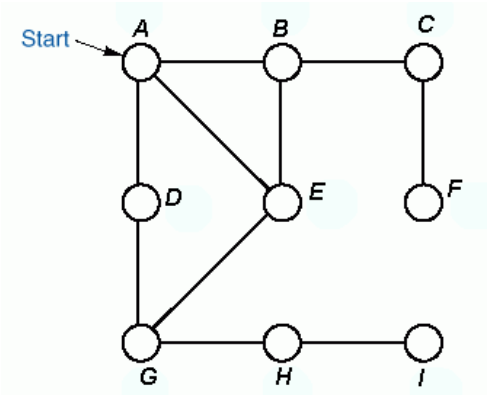
Outcomes
After completing this Lab, students are expected to:
Be familiar with the implementation of graphs (directed and undirected) and be familiar with graph algorithms using JGraphT library

Notes
For the purpose of this lab, download the JGraphT package from blackboard or from **www.jgrapht.org/**

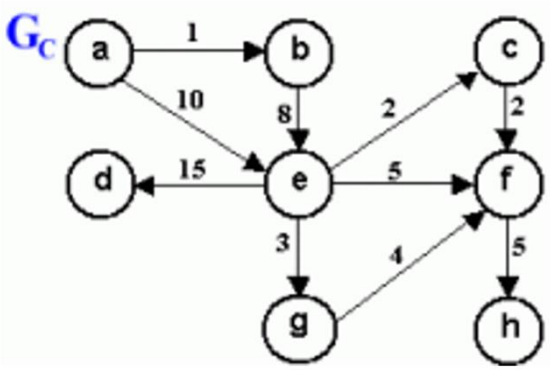
Lab Exercises

	For the following graph download and run the associated program GraphsExample01.java. Verify the result.
	For the following graph download and run the program GraphsExample02.java. Verify the result.

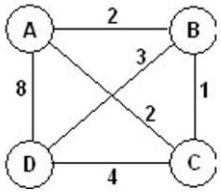
1. Create the graph depicted in the below figure and perform Breadth First traversal and Depth First Traversal.



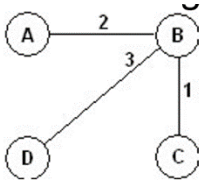
2. For the graphs in your lecture slides, verify the result(s). for
   a. Dijkstra's all pairs shortest path problem (Slide 23)



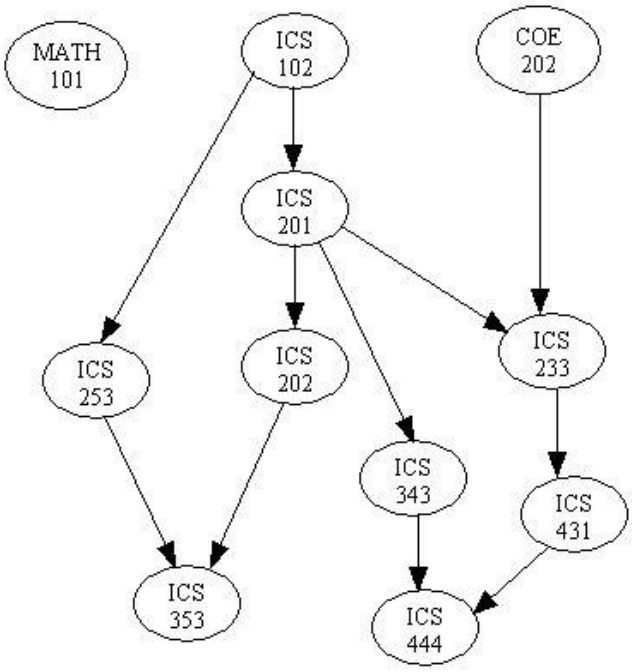
   b. Kruskal's algorithm (Slide 34)



Spanning tree is:



3. Given the following graph of courses (So the vertex class is a Course class having course code and number), find and print a topological order.



4. Print the topological sort for the above example such that all the courses from a level are printed first (keeping the topological sort still valid) before printing the courses from the next higher level.
   Hint: You can use the course sequence provided by topological sorting and insert them in a priority queue whose priority is the course level (1, 2, 3, or 4).

Note:
You will mainly need following classes from JGraphT library:

SimpleGraph
SimpleDirectedGraph
SimpleWeightedGraph
SimpleDirectedWeightedGraph

BreadthFirstIterator
DepthFirstIterator
TopologicalOrderIterator

DijkstraShortestPath
GraphPath
KruskalMinimumSpanningTree
SpanningTree

For Javadoc documentation about classes search for JGraphT docs