Coding Assignment on Graph : Set 1

Q1. Provide a C program that will generate a random undirected weighted graph. The program will take as command line arguments four parameters in the following order :

no. of nodes (n), a probability (p), maximum weight ($w > 0$), and a file name (f).

The program will generate an undirected weighted graph with n nodes numbered from 1 to n, with an edge between each pair of nodes i and j generated with probability p, and the weight of an edge being a positive integer value randomly chosen between 1 and w. The generated graph will be written in the file named f in exactly the following format:

line 1 - <no. of nodes>
line 2 - <edge probability used>
line 3 - <max. weight used>

Followed by all the edges, with each edge in a separate line written as the two node ids followed by the weight (i.e., a sequence of 3 integers in each line)

Name the file <your roll no>_graph_gen.c (for example, IIT2019002_graph_gen.c).

Q2. In this part, you will implement an ADT called GRAPH that can store a graph of arbitrary number of nodes and edges. The GRAPH ADT will support the following operations:
   1. *int CreateGraph(GRAPH *G, char *inp_file)* – reads in a graph from the file named *inp_file* in the graph G. The file *inp_file* should have a graph in the format mentioned in Q1.
      Returns 0 if graph is read successfully, -1 otherwise (for ex., file not present)
   2. *int NoOfConnComp(GRAPH G)* – returns the number of connected components of *G*
   3. *int SizeOfLargestComp(GRAPH G)* – returns the size (number of nodes) of the largest connected component of *G*
   4. *int IsConnected(GRAPH G)* – returns 1 if *G* is connected, 0 otherwise