Lab 4

Ali Imran and his partner Black Zero (of the Imran Series fame) are working on deciphering relationships between different political parties of the country. They are interested in working out affiliations within and between parties. For this, they have uncovered call logs between party members for the past three months. Unfortunately, despite Ali Imran's PhD from Oxford University, he is not good with data. Here is where your role comes in. You are to analyze these call logs for the detectives and answer all their questions.

The excel sheet you have contains the name of each political party member they are interested in investigating and their political affiliation on Sheet 1. Sheet two contains the details of the caller and receivers of the phone calls and how many times they interacted with each other these past three months.

Disclaimer: These call logs are randomly generated and are not meant to depict reality in any way.

Submission requirements: Please submit the Rscript file used to generate these answers. In places where I have asked a question specifically, just mention it in your Rscript file using the #. There is no need to submit your plots.

Q1- Draw a simple undirected network, using all the nodes and edges in the data file. Use different colors to represent the different parties. The size of the nodes should represent the betweenness centrality. **[3 marks]**

Q2- Draw three separate directed networks for each party. **[5 marks for each network]**
Hint: You may use the subset function to subset the dataset according to political parties.
Hint 2: You can adjust the size of the arrows in the network using edge.arrow.size within the plot function.

Q3- In the PTI network, which member interacts (receives calls and calls) with other members of its party the most? **[2 marks]**
Please answer this question by displaying the network, where the size of the node corresponds to how many times each member interacts with other members of its own party.
Hint: This can be done by using the degree centrality. However, the degree function we used in class, does not take 'weights' into consideration. Since weights are important to answer this question, use the function "strength". It has the same syntax as the degree function.

Q4- In the PMLN network, which member calls other members of its party the most? **[2 marks]**
Please answer this question by displaying the network, where the size of the node corresponds to how many times each member calls other members of its own party.
Hint: Use the strength function to answer this question as well.

Q5- In the PPP network, which member receives calls from other members of its party the most? **[2 marks]**
Please answer this question by displaying the network, where the size of the node corresponds to how many times each member receives calls from other members of its own party.
Hint: Use the strength function to answer this question as well.

Q6-Who has the highest eigenvector centrality in the PTI network?
(Just write the answer – no graph required) [**1 mark]**
You do not need to make a graph for this question.

Q7- Construct a network in which each node represents one party. You should have a three node network. Which party receives the most communication from other parties? Which parties connect the most with other parties? Which party is the most interconnected [both incoming and outgoing connections]?
You do not need to draw a graph for this, just write the answers along with the code. **[3 marks]**
Hint: There are multiple ways of doing this. I would recommend using the strength function.
You will also need to manipulate your dataset for this question.
Also remember to remove those edges that are within party (for e.g. PTI – PTI). We are studying between party affiliation, not within.