Hall Ticket Number :										

R-15

Code: 5G522

IV B.Tech. I Semester Supplementary Examinations April 2019

Social Networks

(Computer Science and Engineering)

Max. Marks: 75 Time: 3 Hours

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Choose the correct Answer.

Question Numbers from 1 to 25 carries 1 MARK each

1. At is the correct syntx for adding an edge in the graph *G* using NetworkX?
   (Assume NetworkX is imported as *nx)*

   a) G = add_edge(1,2) b) G.add_edge(1,2) c) nx = G.add.edge(1,2) d) nx.add_edge(1,2)

2. What is the output of the following:
   L=[1, 2, 3, 4, 5, 6, 7, 8]
   print(L[3:]);

   a) [4] b) 4 : c) [3, 4, 5, 6, 7, 8] d) [4, 5, 6, 7, 8]

3. What is the correct syntax for drawing a graph *G* using NetworkX?
   (Assume NetworkX is imported as *nx)*

   a) G.draw( ) b) nx.draw(G) c) G.show( ) d) nx.show(G)

4. Which of the following formats was created as a part of Gephi project?

   a) GML b) GEXF c) GraphML d) Pajek

5. Diameter of a network is defined as?

   a) The number of nodes on the longest path between the two most distant nodes in the network

   b) The number of nodes on the shortest path between the two most distant nodes in the network

   c) The number of edges on the longest path between the two most distant nodes in the network

   d) The number of edges on the shortest path between the two most distant nodes in the network

6. Computing betweenness Centrality of a given node involves computing which of the following?

   a) All the shortest paths between the given node and the highest degree node.

   b) All the longest paths between the given node and the highest degree node.

   c) All the shortest paths that pass through the given node.

   d) All the longest paths that pass through the given node.

7. What is rare in a real world social network?

   a) Bridges b) Local Bridges c) Triadic Closures d) Triangles

8. Which term defines the following concept? Two people having a common friend have more probability of becoming friends with each other.

   a) Triadic Closure b) Membership Closure c) Foci Closure d) Homophily

9. Two friends Amit and Ravi like different set of food items. The set of food items Amit like contains 8 elements and the set of food items Ravi like contains 12 elements. There are 6 elements common between these sets. What will be the *similarity measure*?

   a) 2/3 b) 3/2 c) 3/10 d) 3/7

10. If we plot the number of common *social foci* on the X axis and the probability of link formation on the Y axis, then what can you say about this plot?

a) The probability will increase as the number of social foci increases linearly throughout.

b) The probability will increase as the number of social foci increases exponentially throughout.

c) The probability will increase as the number of social foci increases upto a point and then decreases.

d) None of the above.

11. Given that a node *v* in a network is part of exactly 3 cliques (induced complete subgraph) of order 3, 4 and 6. Then the core number of *v* cannot be

a) greater than 3 b) less than 7 c) less than 6 d) less than 5

12. Choose the one that is False out of the following:

a) GML stands for Graph Modeling Language.

b) GML stores the data in the form of tags just like XML.

c) GML and GraphML are different formats.

d) Both GML and GraphML can store details of attributes of nodes and edges.

13. Can we read a network dataset available in csv format in Networkx?

a) No; Networkx does not allow use of csv as network data format

b) Yes; Using networkx.read csv(csv file)

c) Yes; Using networkx.read edges(csv file)

d) Yes; Using networkx.read edgelist(csv file, delimeter=',')

14. Which of the following is the key idea behind Girvan-Newman algorithm used for the detection of communities in a network.

a) Edges which connect two communities have higher betweenness values.

b) Nodes which connect two communities have higher betweenness values.

c) Edges which connect two communities have lower betweenness values.

d) Nodes which connect two communities have lower betweenness values.

15. Which of the following is True in context of tie formation on Twitter?

a) Number of strong ties a node has with other nodes increases with an increase in the number of followers of this node.

b) Number of strong ties a node has with other nodes decreases with an increase in the number of followers of this node.

c) Number of strong ties a node has with other nodes remains constant irrespective of the number of followers of this node.

d) No strong ties were observed in Twitter follower network.

16. How many members were there in the Zachary's Karate Club?

a) 28 b) 34 c) 75 d) 53

17. As per the study by Wayne W. Zachary, in the end, the Karate Club network got divided into how many communities?

a) 1 b) 2 c) 3 d) 4

18. In Girvan Newman Algorithm, we keep removing the .....

a) edges with lowest betweenness b) edges with highest betweenness

c) nodes with highest degree d) nodes with lowest degree

19. Which of the following is True in context of tie formation on Twitter?

a) Number of strong ties a node has with other nodes increases with an increase in the number of followers of this node.

b) Number of strong ties a node has with other nodes decreases with an increase in the number of followers of this node.

c) Number of strong ties a node has with other nodes remains constant irrespective of the number of followers of this node.

d) No strong ties were observed in Twitter follower network.

20. Homophily is defined as $1-\frac{\text{Actualnumberoffriendship}}{\text{Expectednumberoffriendship}}$. This term represents *Heterogeneity* if it becomes

a) 1 b) 0 c) Less than 0 d) More than 0

21. Suppose Ravi and Amit have 6 common friends. Given that each common friend gives Ravi and Amit an independent probability of 0.3 of forming a link, what is the probability that there will exist a link between Ravi and Amit?

a) 0.12 b) 0.36 c) 0.88 d) 0.32

22. Affiliation networks are

a) Complete and bipartite b) Bipartite and not complete

c) Complete and not bipartite d) Neither complete nor bipartite

23. Which of the following is not used as an extension for a network data set?

a) .net b) .txt c) .nitf d) .gdf

24. Degree distribution of most real-world networks follows which law?

a) Zipf's Law b) Benford's Law c) Power Law d) Difficult to say; can follow any distribution

25. A friend's friend tends to become a friend, and so does an enemy's enemy. The reasons for the same are

a) Social influence and clustering respectively

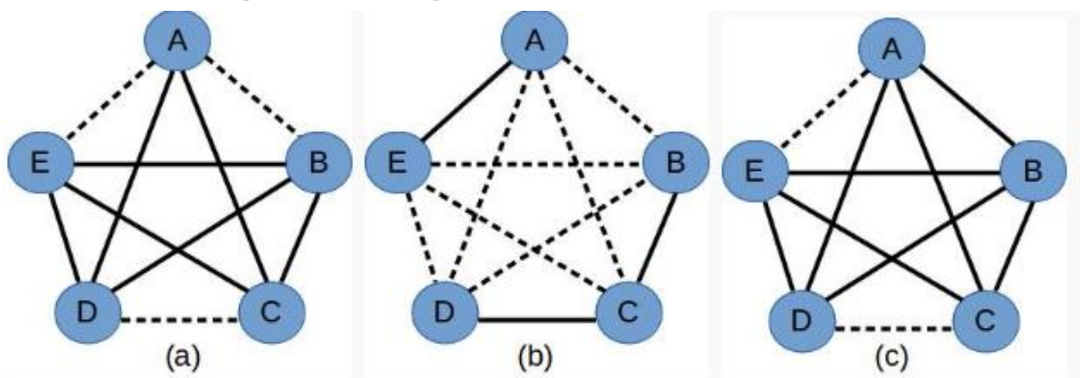
b) Social influence and structural balance respectively

c) Triadic closure and structural balance respectively

d) Triadic closure and clustering respectively

Question Numbers from 25 to 50 carries 2 MARKS each

26. Count the number of unstable triangles in the graphs shown below, where solid edges indicate positive ties and dotted edges indicate negative ties.



a) 8, 5, 6 b) 8, 4, 6 c) 7, 3,7 d) 7, 3, 6

27. Can we have a complete signed graph on 4 nodes (K4) and 5 nodes (K5) respectively, each having exactly one unstable triangle?

a) K4 - Yes, K5 - Yes b) K4 - Yes, K5 - No c) K4 - No, K5 - Yes d) K4 - No, K5 – No

28. Consider the following statements:

a) Google PageRank works by hiring experts from different domains who maintain a database of the rankings of all web pages.

b) Google PageRank works by using web graph and random walk algorithm. Which of the following options are correct?

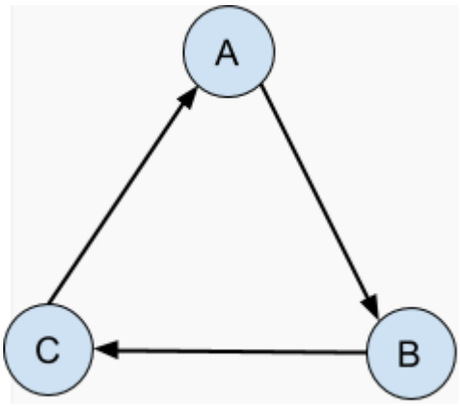
a) Only statement a) is correct.

b) Only statement b) is correct.

c) Both the statements are correct.

d) None of the statements are correct.

29. In the graph shown below, assume that the current PageRank values of A, B and C are 0.2, 0.4 and 0.4, respectively. What will be their PageRank values after one iteration?



a) A = 0.2, B = 0.4, C = 0.4

b) A = 0.4, B = 0.2, C = 0.4

c) A = 0.4, B = 0.4, C = 0.2

d) A = 0, B = 0, C = 1

30. Which of the following correctly depicts teleportation?

a) Jumping from the current node to its neighbour's neighbour.

b) Going back to the previous node which was explored.

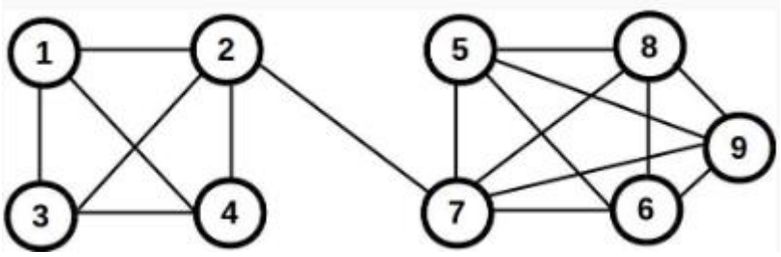
c) Jumping to any random node in the network.

d) Jumping to the node in the network which has maximum outdegree.

31. Consider two actions A and B. The payoff associated with the action A is 40 while the payoff associated with action B is 20. In such a case, what is the threshold fraction of neighbors that should have adopted A, in order for a node to adopt the action A?

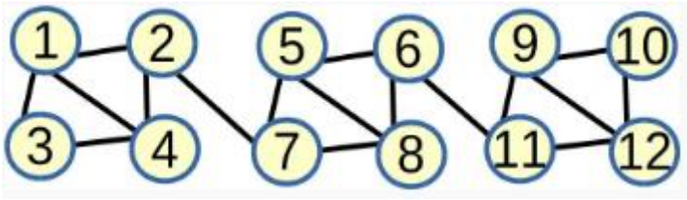
a) 1/3 b) 2/3 c) 1/4 d) 2/4

32. Given a network as shown in the figure below. Assume that initially every node in this network has adopted behavior A. Next, a new behavior B is introduced in the network and the nodes 1 and 3 are the initial adopters of this behavior B as rest of the nodes have adopted behavior A. The payoff associated with A is a = 1 and the payoff associated with B is b =3. After the introduction of this new behavior B in the network, all the nodes will start weighing their options and might change their behavior. This leads to a cascade in the network. When the cascade ends, which all are the nodes who have adopted the behavior B.



a) 1, 3, 2 b) 1, 3, 2, 4 c) 1, 3, 2, 4, 7 d) 1, 3, 2, 4, 7, 5, 6, 7, 8

33. In the network shown in the figure below, what is the density of the cluster comprised by the set of nodes {1,2,3,4}?



a) 1/2 b) 1/3 c) 3/2 d) 2/3

34. Let CC be the unit circle with (0,0) as its origin in the XYXY - plane. Then AA, the point at which the vector (6,8) intersects CC, is

a) (0,0) b) (6, 8) c) (0.6, 0.8) d) (0.06, 0.08)

35. Given two linearly independent vectors, v1v1 and v2v2, which of the following is true?

a) Any other vector can be written as the linear combination of v1v1 and v2v2, that is z=αv1+βv2z=αv1+βv2

b) Any other vector can be written as a sum of v1v1 and v2v2, that is z=v1+v2z=v1+v2

c) Any other vector can written as a difference of v1v1 and v2v2, that is z=v1−v2z=v1−v2

d) Any other vector can be written as a product of v1v1 and v2v2, that is z=v1×v2z=v1×v2

36. According to Watts and Strogatz, which of the following two phenomena give rise to small world networks?

a) Triadic closure and weak ties b) Triadic closure and community structure

c) Homophily and weak ties d) Homophily and foci closure

37. In G(500,0.3)G(500,0.3) random network, each edge will be placed with probability

a) 0.3 b) 0.7 c) 500 d) 0.5

38. Consider the following two cases:

Case 1 - Basic reproductive number is less than 1.

Case 2 - Basic reproductive number is greater than 1.

Choose the correct statement from the following:

a) In case 1, the disease dies away with a probability 1; while in case 2, the disease persists in the population with a probability greater than 0.

b) In case 1, the disease dies away with a probability greater than 0; while in case 2, the disease persists in the population with a probability equal to 1.

c) In case 1, the disease persists in the population with a probability greater than 0; while in case 2, the disease dies away with a probability equal to 1.

d) In case 1, the disease persists in the population with a probability 1; while in case 2, the disease dies away with a probability greater than 0.

39.
```
import random
def sumup():
  a=random.random()
  b=random.random()
  return a+b
print(sumup())
```

What is the range of this output?

a) (0,2) b) [0,2] c) (0,2] d) [0,2)

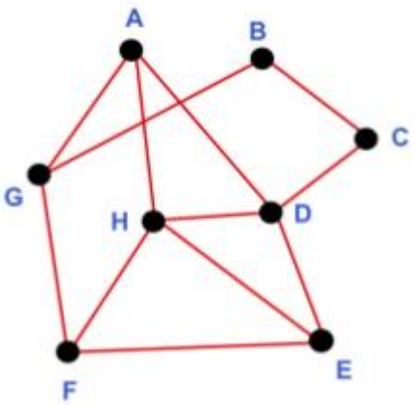
40. What is the output of the following program?

```
my_dict = dict()
my_dict['Social'] = {'Social' : 6, 'Networks' : 8}
my_dict['Networks'] = {6, 8}
for (key, values) in my_dict.items():
print(values, end=' ')
```

(Please note that the *end=' '* is used to avoid a new line after printing the corresponding text. In Python 2.x, it is just '', "(comma) at the end of the print statement.)

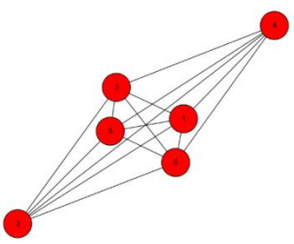
a) Compilation error b) Runtime error c) {'Social' : 6, 'Networks' : 8} {8, 6} d) {8, 6}

41. What is the clustering coefficient of the node H in the given graph?



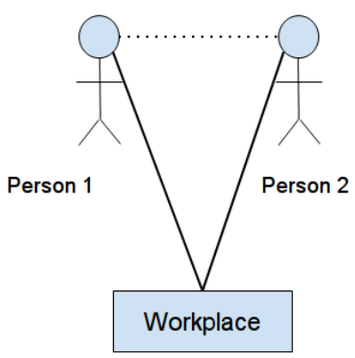
a) 1/2 b) 3 c) 4 d) 4/6

42. Compute the average clustering coefficient for the graph shown in Figure 1.



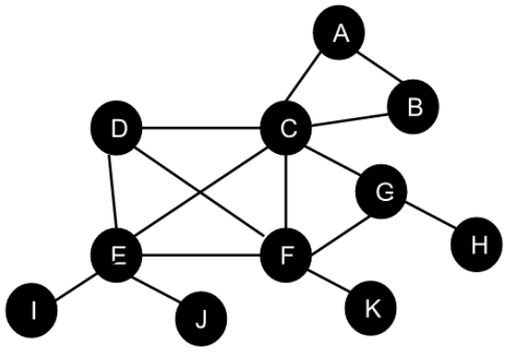
a) 0.25 b) 0.5 c) 0.75 d) 1

43. Choose the correct statement regarding the above figure (note that the solid line represents the existing friendship and the dotted line represents the new friendship)



a) Membership Closure b) Foci Closure c) Triadic Closure d) Homophily

44. Identify the 1-core, 2-core and 3-core from the given graph (based on the definition of k-core)



.

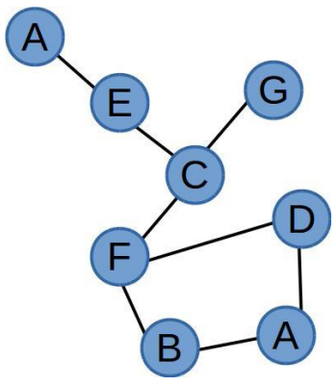
a) 1-core: A, B, C, D, E, F, G ,H, I, J, K; 2-core: A, B, C, D, E, F, G; 3-core: C, D, E, F

b) 1-core: H, I, J, K; 2-core: A, B, G; 3-core: C, D, E, F

c) 1-core: C, D, E, F; 2-core: A, B, C, D, E, F, G; 3-core: A, B, C, D, E, F, G, H, I, J, K

d) 1-core: A, B, C, D, E, F, G, H, I, J, K; 2-core: Empty; 3-core: Empty

45. Which of the following nodes, from the given graph, will be removed in the first iteration of k-shell decomposition algorithm?



a) A and G b) A, E and G c) A, E, G and C d) A, E, G, C and F.

46. For reading a network file where the data is in the following form, which function should be used?:

node1 node2

node2 node3

node2 node5

.

.

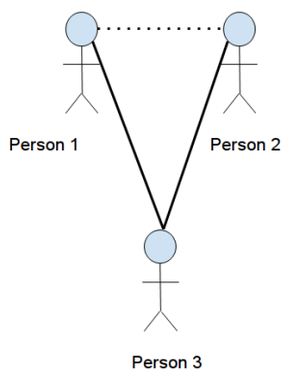
.

where node1, node2, node3, node5 etc are ids of the nodes and node1 node2 indicates that there is an undirected edge between node1 and node2 and so on.

a) nx.read_nodelist() b) nx.read_edgelist() c) nx.read_adjlist()

d) Both nx.read_edgelist() and nx.read_adjlist() can be used.

47. Which phenomenon is described by the above figure. (note that the solid line represents the existing friendship and the dotted line represents the new friendship)



a) Homophily b) Foci Closure c) Triadic Closure d) Membership Closure

48. What is the output of the following code snippet? mode="python"

```
x = True
y = False
z = False
if (x or y and z):
print('IIT Ropar')
else:
print('IIT ROPAR')
```

a) IIT Ropar b) IIT ROPAR c) Error d) None of the above

49. What is the output of the following:

```
for x in range(3, 8, 2):
print(x, end=' ')
```

(Please note that the *end=' '* is used to avoid a new line after printing the corresponding text. In Python 2.x, it is just '', "(comma) at the end of the print statement.)

a) 3 5 b) 3 4 5 6 7 8 2 c) 3 5 7 d) 4 6 8

50. What will be the output of the following:

```
d1 = {"Twenty":20}
d2 = {"Thirty":30}
d1 < d2
```

a) True b) False c) Error d) None