Register No:

Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam – 603 110

(An Autonomous Institution, Affiliated to Anna University, Chennai)

B.E. / B.Tech. End Semester Theory Examinations, Nov / Dec 2021

Seventh Semester

Computer Science and Engineering

UCS1722 SOCIAL NETWORK ANALYSIS

(Regulations 2018)

Time: **Three Hours**   **Answer ALL Questions**   Maximum:**100 Marks**

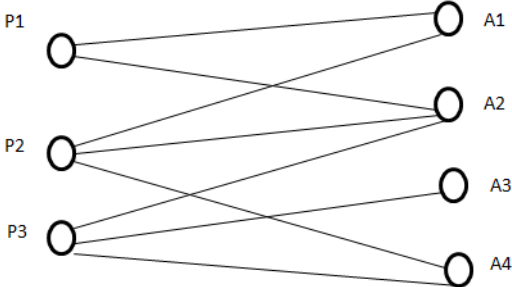K1: Remembering   K2: Understanding   K3: Applying   K4 :Analyzing   K5: Evaluating

PART – A (10 × 2 = 20 Marks)

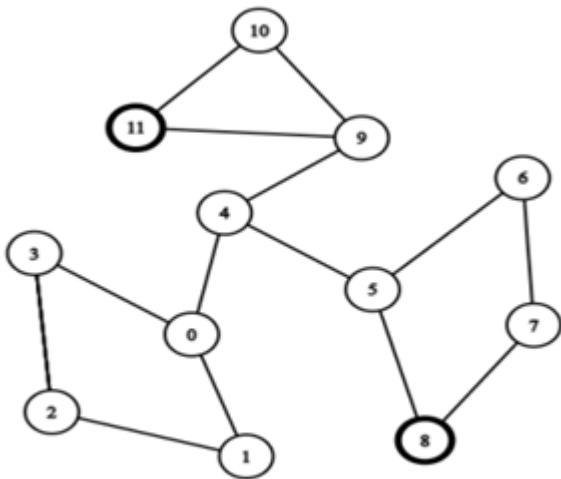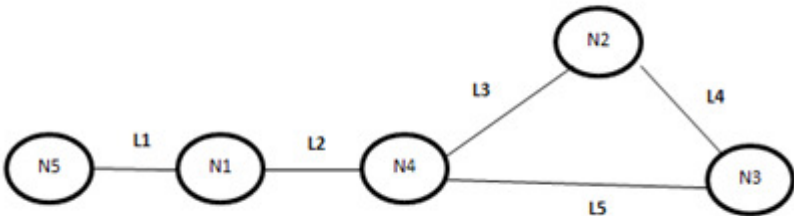| 01.	K1	Define Social Network Analysis?	CO1
02.	K2	Find the characteristic path length of a network with 12 nodes using 2D lattice model.	CO1
03.	K1	Define Betweenness Centrality in a Social Network	CO2
04.	K1	Find the number of links in network which with 10 actors and non-directional relations.	CO2
05.	K3	Identify the reasons for detecting communities in social network.	CO3
06.	K1	What is the formula for modularity given by Newman and Girivan in the rewritten form? Indicate what each parameter refers to?	CO3
07.	K3	Develop NetworkX code to find the number of degrees in a network and display the same.	CO4
08.	K1	What is Triadic Census and why it is important in Social Network?	CO4
09.	K4	List any five real life applications where social network analysis can be used.	CO5
10.	K1	What is the significance of visualization in Social Network analysis?	CO5

PART – B (5 × 6 = 30 Marks)

11.	K2	Summarize the different dimensions of Social Capital by Nahapiet and Ghoshal	CO1

12.	K3	Fig. 1 Develop a matrix format for the two mode affiliation network given in Fig. 1 and transform it to a one-mode network considering the overlaps as the strength of the tie.	CO2
13.	K2	Explain the heuristic based methods for Community Detection.	CO3
14.	K3	Develop NetworkX code to trim the nodes with degree 3 in a large network in order to obtain the core of the network for analysis	CO4
15.	K4	Survey the various kinds of node-edge diagrams that could be used for Visualization.	CO5

PART – C (5 × 10 = 50 Marks)

16.	K2	Explain the global structure of Social Network and its various graph models.	CO1
		OR	
17.	K2	Explain the issues concerning the measurement and collection of social network data and particular design considerations that can arise in network studies.	CO1

18.	K3	Apply graph theory concepts for social network in Fig. 2 and find the following measures: **Fig. 2** 1. Eccentricity of Node 10 2. Bridges and Tour in the graph 3. Nodal degrees of all nodes 4. Variance of degree 5. Density of the graph	CO2
		OR	
19.	K3	**Fig. 3** Apply graph theory concepts and find the following graph measures for the network in Fig. 3 a) Walk from N1 to N4 b) Trail from N4 to N1 c) Path from N1 to N2 d) Tour from N5 e) Cycle	CO2
20.	K2	Outline various spectral algorithms to detect communities in social network	CO3
		OR	

21.	K2	Summarize the functionalities of various local search algorithms to solve the network community mining problems.	CO3
22.	K3	Develop Python code using Networkx to perform the following a) To create a friendship network b) To find and displaythe person with high Betweenness Centrality score c) To find and display the person with Closeness Centrality score d) To find and display the person with Degree Centrality score e) To find and display the person with PageRank Centrality score	CO4
		OR	
23.	K3	Develop Python code using Networkx to extract the core of the network using the following methods: a) The Island method b) Trimming edges and nodes method	CO4
24.	K4	Assume there is a visualization tool which is designed in a way that can use the Benefits of both matrix and node-link representations. Analyze the various processes that must be incorporated at different stages to achieve the best of both representations.	CO5
		OR	
25.	K4	Assume there is a criminal network. Based on your knowledge what are the different social network analysis measures and algorithms you could use to analyze the network? Justify your answer with proper explanation.	CO5

Course Outcomes:

1. Explain Social network concepts, measures and data (K2)
2. Represent social networks mathematically (K2)
3. Understand the working of community detection algorithms for online Social networks(K2)
4. Use SNA tools for analyzing social networks (K3)
5. Apply Visualization to social networks (K3)