Final Assessment Test – November 2018

VIT
Vellore Institute of Technology

Course: CSE3021 - Social and Information Networks
Class NBR(s): 6143 / 6145 / 6147 / 6149 / 6153 / 6155 / 6160
Slot: A2+TA2
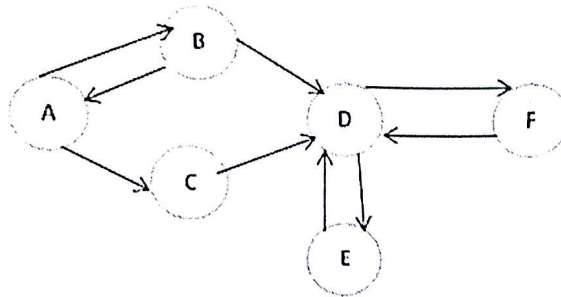Time: Three Hours
Max. Marks: 100

Answer any TEN Questions

(10 X 10 = 100 Marks)

1. a) Establish the relationship between a sociogram and a sociomatrix with an example. [5]

    b) For the following graph (Fig 1), find out the reciprocity by applying the trace properties after transforming the sociomatrix. [5]


Fig 1

2. a) The following affiliation matrix demonstrates the association of six persons (Pa,Pb,Pc,Pd, Pe,Pf) with four social groups (Ga, Gb, Gc, Gd). From this matrix, compute the 1-mode matrix between the persons AND the 1 mode matrix between the social groups. [7]

	Pa	Pb	Pc	Pd	Pe	Pf
Ga	1	0	1	0	1	1
Gb	0	0	1	0	1	0
Gc	0	1	1	0	0	1
Gd	1	1	0	1	0	1

   b) Represent the above affiliation matrix in the form of a bipartite graph. [3]

3. The following graph (Fig 2) shows three kinds of voters, A, B, C, D and E belonging to one party; H, I, J, K, L belong to the other party, while F and G are independent. We are required to find a grouping of six people, where maximum members belong to the same party and the group has the most number of connections between them. For the chosen group, find

   a) Density (group)   b) Global Clustering Coefficient (group)   c) Betweenness (node)
   d) Local Clustering Coeffiient (node)
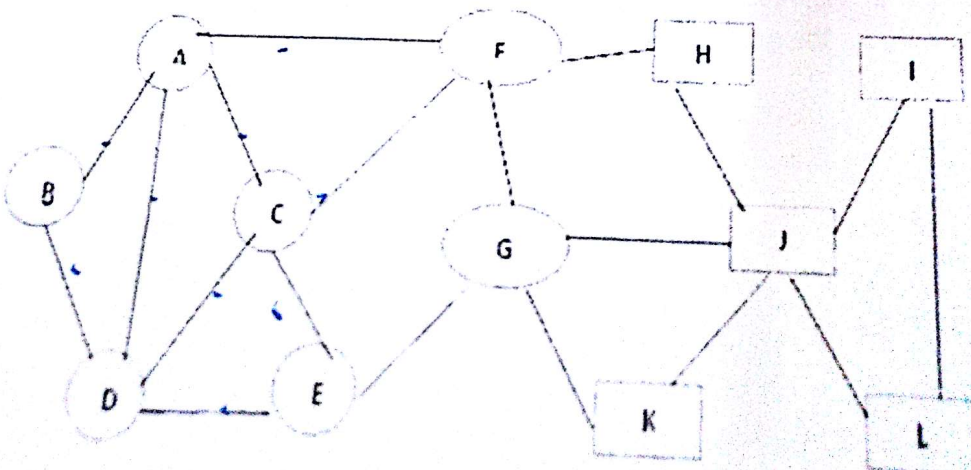
Fig 2

4. Describe the special features and development of semantic web. Write short notes on RDF and web 2.0 [6+2+2]

5. . The following graph (Fig 3) shows a network of shady bankers where the nodes represent the bankers and an edge represents a money transfer link. The aim is to remove the money transfer links which are more crucial for connecting the bankers/nodes, and subsequently isolate the bankers into relevant groups / communities by a step by step top down divisive manner. Repeat this isolation process three times, removing a link at each step, and show the resultant groups after these three divisions.
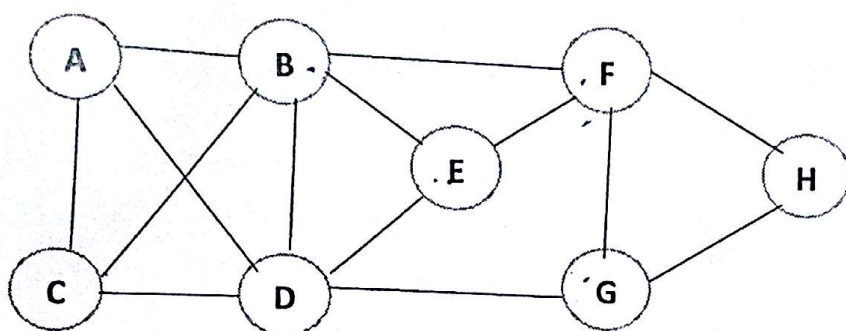
Fig 3

6. The following figure (Fig 4) shows the assignment of four kinds of actors in a total of three blocks. Ideally each block should have the same kind of actors occupying it. Find out the TN and the F measure for this particular assignment from the social network perspective.
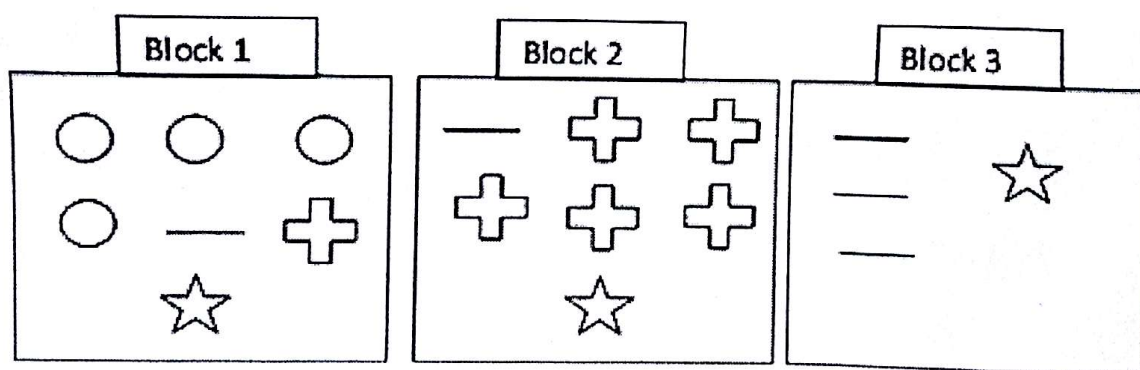
Fig 4

7. The aim is to find cohesive subgroups, which might not be perfectly connected like a clique, but still has strong connections and reachability among them. In this context, find out the k-clique, k-club, k-clan, k-plex and k-core for the graph shown in Fig 2, where k=2.

8. The following figure (Fig 5) shows three graphs. The aim is to find out the similarity of these graphs to a popular network model, to be more specific, giant network in a random graph model. Find out the average degree, the diameter size, the size of the largest component and the average path length for each of these graphs and deduce which one is closest to a situation where the giant network has just started to appear. Mention also, whether edges need to be added or removed for the chosen graph.
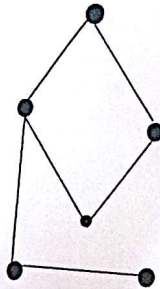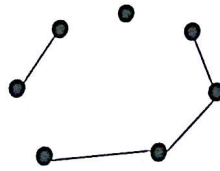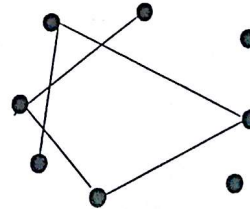
Graph 1   Graph 2   Graph 3

Fig 5

9. a) Assume within and across association between top 5 research topics in computer science field. Each topic is connected inside with 5 to 10 subtopics. Among the 5, two topics are components. The subtopics of other three topics are connected with 3 across associations. The diameter of each topic is ≤ 2. Show the visualization of the described research network.   **[6]**

b) Write an R function to do the following tasks.
i) include library for graphs ii) create an empty graph iii) add two ring network with 5 nodes each.   **[4]**
Iv) change node color to red and blue for ring 1 and ring 2 respectively.

10. Discuss three layouts used to visualize sociograms with neat sketch and compare their pros and cons.

11. The following text gives the sequence of four sentences and the corresponding output group/classifier. Use Multinomial Naive Bayes classification to find out which group the test query belongs to. Only the underlined words are to be considered for text classification.

i) VIT, Vellore is in South India.   CLASS – 1
ii) Vellore and Arakkonam are in Tamilnadu.   CLASS -1
iii) Arakkonam is near Chennai, Tamilnadu, and located in South India.   CLASS -1
iv) VIT, Bhopal is in Madhya Pradesh, Central India.   CLASS -2
Query) VIT, Vellore is near VIT, Chennai.   CLASS - ?

12. Elaborate how Bayesian reputation systems with subjective logic can be seamlessly integrated with trust networks/ systems.

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