Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (COMPUTER SCIENCE & ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2018

SUBJECT: SOCIAL NETWORK ANALYSIS [CSE 4012]

REVISED CREDIT SYSTEM
(01/12/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. For the graph in Fig 1A answer the following: (5M)
i) Give the degree distribution for the graph and graphically represent the same.
ii) Calculate the closeness centrality with respect to nodes A, B, H, M clearly explain the steps.
iii) With respect to question 1A. (ii) Which node is more central? Justify. Considering the most central node as ego node, give 1.5 diameter egocentric network (exclude the ego node).

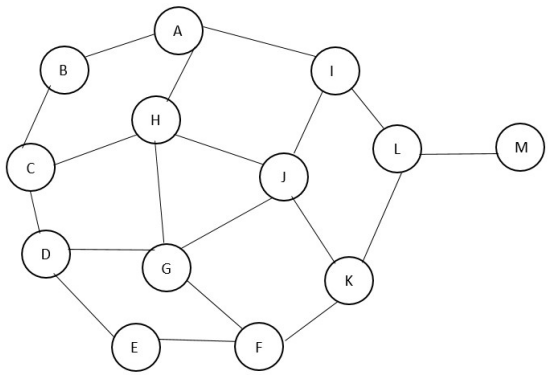

Fig. 1A

1B. Define density and calculate the same for the graph in Fig 1B. Explain small world concept with an appropriate example. (3M)

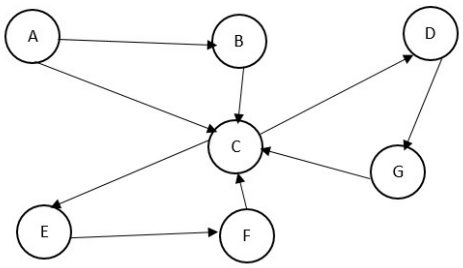

Fig. 1B

1C. Explain proximity of nodes and layout algorithms; give the significance of each. (2M)

2A. For the graph in Fig 2A give the formula for Jaccard Index, Preferential Attachment and Adamic Adar and compute the same for all possible edges. (5M)

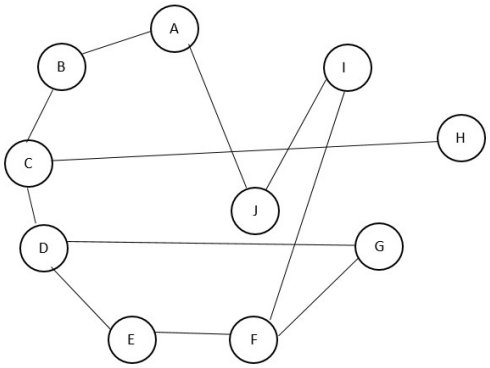

Fig. 2A

2B. Explain the guidelines for better network visualization. Explain Force directed layout algorithm. (3M)

2C. Write a note on : (2M)
i)Social networking platforms and state their importance
ii)Regular Network

3A. With suitable examples explain the following: (3M)
i)Six degrees of separation
ii)Subnetworks and its types

3B. Define connectedness and hub. Explain each with a suitable example. (2M)

3C. Explain Feature based link prediction with a case study. (5M)
The graph in Fig. 3C shows two groups and their communication ties:
i) Which group is more likely to stay together?
ii) Which group is more likely to perform better?
iii) Which network characteristics best capture the difference between the networks of these two groups?

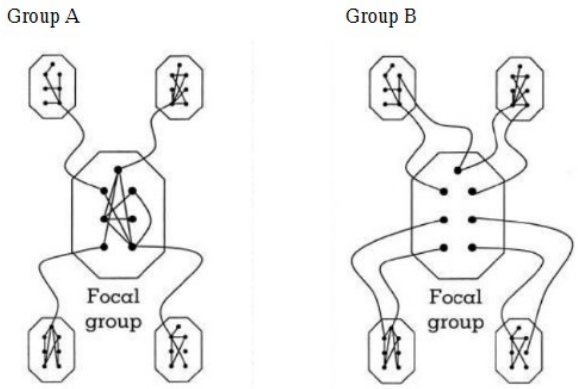

Fig. 3C

4A. We have an ordered list L of node pairs (v_i,w_i), where i = 1,…,p. To output the sets A and B, first find the smallest index k ε {0,…,p } such that $\sum_{i=1 \text{ to } k} (g(v_i,w_i))$ is maximum. Which algorithm has the ability to climb out of local minima to an extent in which the sets A and B are created? Explain in detail the algorithm and also give the time complexity. (5M)

4B. Write a note on: (3M)

i) Difference between clustering and partitioning in terms of purpose, number of blocks, size of blocks, criteria and constraints

ii) Significance of community discovery in Social Network Analysis

iii) How web communities differ from community of people?

4C. Explain Social influence in healthcare. Discuss the Business Application of Social Network analysis. (2M)

5A. Explain the following: (3M)

i) Phenomenon from which homophily can originate.

ii) Heterogeneous Social network.

5B. i) Who are opinion leaders? Explain any 3 properties to tackle the problem caused by them. (4M)

ii)For the graph in Fig. 5B determine the number of shortest paths between nodes A and B:

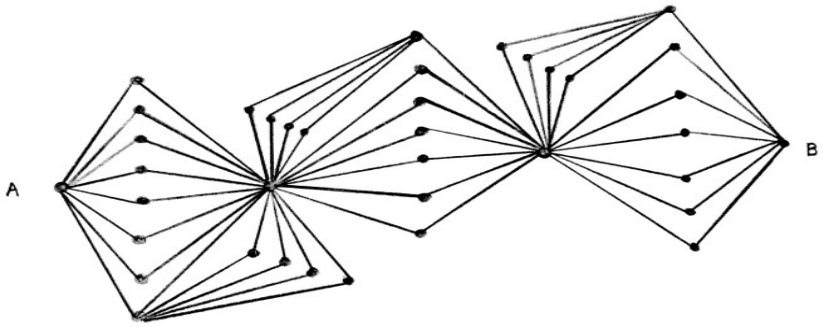

Fig. 5B

5C. For the data shown in Table 5C, compute the score (for all possible pairs) giving all the necessary formulas, assume no partial match. Assume that m value is 0.99 for all attributes and u value for Name = 0.5, Ticket number = 0.3, From = 0.5, To = 0.45 and Ticket price =0.78. (3M)

In addition to this calculate the score for Shaw and Smith by considering partial match of p = 0.45 for Ticket number, 0.25 for From, 0.3 for To and 0.37 for Ticket Price.

Table 5C

Name	Ticket Number	From	To	Ticket Price
Shaw	7005	Manipal	Bengaluru	1000
Smith	7111	Manipal	Bellary	700
Jhunjhunwala	8975	Manipal	Bellary	700