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# Manipal Institute of Technology
**MANIPAL**

Constituent Institute of Manipal University

**VII SEMESTER B.TECH COMPUTER SCIENCE & ENGG.**
**END SEMESTER EXAMINATIONS, NOV 2017**
**SUBJECT : SOCIAL NETWORK ANALYSIS(CSE 4012)**
**REVISED CREDIT SYSTEM**
**DATE: 28-11-2017**

TIME:03 HOURS MAX.MARKS : 50

**Instructions to Candidates:**

- Answer **ALL** questions.
- Missing data, if any, may be suitably assumed.

**1A.** Explain the following social network analysis softwares in detail. **3M**

**i.** Gephi

**ii.** NodeXL

**1B.** Differentiate between strongly connected and weakly connected graphs. Also, compare a clique with a cluster. **3M**

**1C.** **i.** In the graph Figure 1.C, find the minimum value of x for which x-degree egocentric network of A and B are same. **2M**

**ii.** Write an algorithm(not pseudocode) for finding betweenness centrality of a node given an undirected graph G=(V,E). Analyze the time and space complexity of the algorithm. **2M**

**2A.** A politician Mr.XYZ has only a few friends in his facebook account. He realized that most people of his constituency are also in Facebook. He plans to post periodically of his work, achievements. Assuming you being consultant who Mr. XYZ has approached for increasing reachability of his posts to his constituency people. Design atleast 6 strategies. **3M**

**2B.** **i.** If the degree distribution of a graph is as in Figure 2.B.1, draw the graph. Determine the density of the graph. **2M**

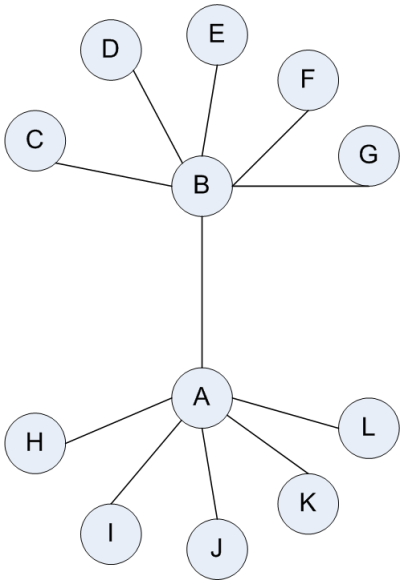


Figure : 1.C

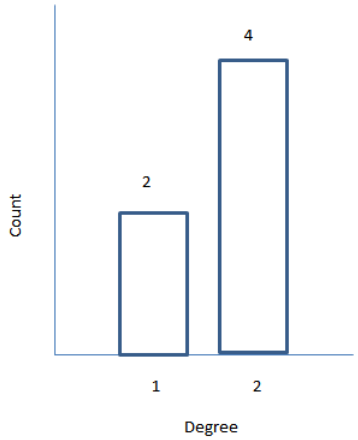


Figure : 2.B.1

**ii.** Determine the triangle count of the graph in Figure 2.B.2, by finding eigenvalue method. **2M**

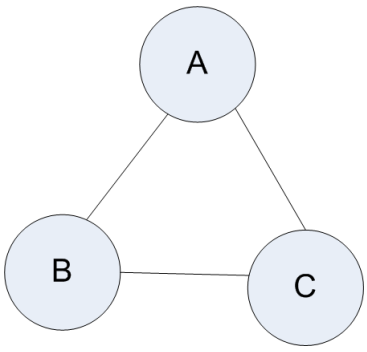


Figure : 2.B.2

**2C.** Explain the following network visualization techniques with appropriate diagrams. **3M**

**i.** Random Layout

**ii.** Grid Layout

**3A.** Explain the relation between tie strength and network structure with appropriate diagram. Also, explain tie strength and network propagation. **3M**

**3B.** List all the factors which affect tie strength. **3M**

**3C.** A bank database contains details of three customers, namely A, B and C. The bank would like to associate the customer with corresponding Facebook accounts. The set of possible details for each customer is as follows. **4M**

| Customer | First Name | Last Name | Location | Gender |
|---|---|---|---|---|
| Customer A | Suresh | Kumar | Bengaluru | M |
| | Kumar | Suresh | Bengaluru | M |
| Customer B | Tharun | Nayak | Hyderabad | M |
| | Tharun | N | Hyderabad | M |
| Customer C | Uday | Manchandani | Delhi | M |
| | Manchandani | Uday | Delhi | M |

Assuming weight for First Name = 0.5, Last Name=0.2, Location=0.2, Gender=0.1, determine which of the above customer records have highest similarity score using attribute matching method. Show each step.

**4A.** Given a graph G=(V,E) and a vertex pair (a,b)$\in$V, write an algorithm for determining similarity score of (a,b) based on Adamic Adar method. Analyze the time and space complexity of the algorithm. **3M**

**4B.** Explain Kernighan-Lin Algorithm. Draw the flowchart representation of the algorithm. **4M**

**4C.** Explain multi-level graph partitioning technique. **3M**

**5A.** Explain Community Discovery via Shingling. **3M**

**5B.** Define influence and selection. Quantify influence and selection through appropriate equation. Explain each term in the equation. **3M**

**5C.** Explain the Diffusion influence model for social influence maximization. **4M**