Code No: **R193205C** **R19** **SET - 1**

III B. Tech II Semester Regular Examinations, June-2022

SOCIAL NETWORK ANALYSIS

(Computer Science and Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Come up with an example of a directed connected graph in which eigenvector centrality becomes zero for some nodes. Describe when this happens. [8M]
   b) How is homophily measured in a network? [7M]

(OR)

2. a) Explain how to characterize the structure of balanced networks. [8M]
   b) Describe Erdos Number Project. [7M]

UNIT-II

3. a) Give an overview of positional and role analysis. [8M]
   b) Describe the properties of random graphs. [7M]

(OR)

4. a) Explain how navigation is done in social networks. [8M]
   b) Explain how cohesive subgroups are made based on reachability and diameter. [7M]

UNIT-III

5. a) Give a brief note of applications of percolation. [8M]
   b) Explain modeling diffusion through a network. [7M]

(OR)

6. a) Explain social contagion with an example? [8M]
   b) Explain navigation model in social networks. [7M]

UNIT-IV

7. a) Explain how to model a real-world networks with the small-world model. [8M]
   b) How do you determine if a distribution is heavy tailed in social networks? [7M]

(OR)

8. a) Show that in a regular lattice the number of connections between neighbors is given by (3/8) * c * (c − 2), where c is the average degree. [8M]
   b) Explain how to determine the diameter of small-world networks. [7M]

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UNIT-V

9. a) Describe the process of voting for group decision making. [8M]

   b) Explain coloring and consensus, biased voting in networked games with an example. [7M]

(OR)

10. a) Explain the page rank algorithm with an example. [8M]

    b) Describe the objectives of network formation games. [7M]

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Code No: **R193205C** **R19** **SET - 2**

III B. Tech II Semester Regular Examinations, June-2022

SOCIAL NETWORK ANALYSIS

(Computer Science and Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. a) Does β have any effect on the order of centralities? In other words, if for one value of β the centrality value of node v_i is greater than that of v_j, is it possible to change β in a way such that v_j's centrality becomes larger than that of v_i's? [8M]
   b) Give a brief note on applications of structural balance. [7M]

(OR)

2. a) Describe various notations used for social network data. [8M]
   b) Describe an example of a graph where the diameter is more than three times as large as the average distance. [7M]

UNIT-II

3. a) Describe how correlation can be a measure of structural equivalence. [8M]
   b) Explain how to model real-world networks with random graphs. [7M]

(OR)

4. a) Describe various levels of role analysis in social networks. [8M]
   b) Explain how cohesive subgroups are made based on nodal degree. [7M]

UNIT-III

5. a) Explain different models of percolation theory. [8M]
   b) Discuss how different information diffusion modeling techniques differ. Name applications on social media that can make use of methods in each area. [7M]

(OR)

6. a) How can you safely navigate the world of social networking? [8M]
   b) What is network topology and types of topology? [7M]

UNIT-IV

7. a) Write small-world generation algorithm. [8M]
   b) Describe the heavy tailed degree distribution of social networks. [7M]

(OR)

8. a) What are the differences between random graphs, regular lattices, and small-world models? [8M]
   b) Explain a clustering model in social networks. [7M]

UNIT-V

9. a) Explain in detail Voting Systems: Majority Rule. [8M]
   b) Describe the equilibrium properties in social networks. [7M]

(OR)

10. a) Explain the process of creating a network structure with an example. [8M]
    b) Describe how modelling of dynamic networks is done. [7M]

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Code No: **R193205C** **R19** **SET - 3**

III B. Tech II Semester Regular Examinations, June-2022

SOCIAL NETWORK ANALYSIS

(Computer Science and Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Consider a full n-tree. This is a tree in which every node other than the leaves has n children. Calculate the betweenness centrality for the root node, internal nodes, and leaves. [8M]
   b) Explain Erdos Number Project in detail. [7M]

(OR)

2. a) Describe principles behind Social Network Analysis. [8M]
   b) Give an example of a graph in which every node is pivotal for at least one pair of nodes. [7M]

UNIT-II

3. a) When does phase transition happen in the evolution of random graphs? What happens in terms of changes in network properties at that time? [8M]
   b) Explain how to measure structural equivalence. [7M]

(OR)

4. a) Describe a random graph model. [8M]
   b) Explain how multidimensional scaling techniques can be used to represent proximities among actors. [7M]

UNIT-III

5. a) Why network analysis is important for diffusion of innovations? [8M]
   b) Describe different types of percolation. [7M]

(OR)

6. a) Explain the characteristics of network topology? [8M]
   b) Describe properties of complex contagion in social networks. [7M]

UNIT-IV

7. a) Show how the clustering coefficient can be computed in a regular lattice of degree k. [8M]
   b) Describe the properties of small world networks. [7M]

(OR)

8. a) Explain ErdosRenyiModel for random graphs. [8M]
   b) Describe the characteristics of clustering of connectivity. [7M]

UNIT-V

9. a) Explain a spatial model in social networks. [8M]
   b) Consider the "commenting under a blog post" behavior in social media. Follow the four steps of behavior analysis to analyze this behavior. [7M]

(OR)

10. a) Explain various sociological factors that affect voting behavior. [8M]
    b) Describe the relationship between Evolutionary and Nash equilibria in game theory. [7M]

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Code No: **R193205C** **R19** **SET - 4**

III B. Tech II Semester Regular Examinations, June-2022

SOCIAL NETWORK ANALYSIS

(Computer Science and Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. a) Show an example where the eigenvector centrality of all nodes in the graph is the same while betweenness centrality gives different values for different nodes. [8M]
   b) Design a measure for homophily that takes into account assortativity changes due to influence. [7M]

(OR)

2. a) Explain how to characterize weakly balanced networks. [8M]
   b) Give an example of a graph having at least four nodes in which there exists a single node X that is pivotal for every pair of nodes (not counting pairs that include X). [7M]

UNIT-II

3. a) Assuming that we are interested in a sparse random graph, what should we choose as our p value? [8M]
   b) Explain how local role dissimilarity is measured. [7M]

(OR)

4. a) Describe how cohesive subgroups are formed based on complete mutuality. [8M]
   b) Describe a model of network growth in social networks. [7M]

UNIT-III

5. a) Provide a simple example of diffusion of innovations and suggest a specific way of intervention to expedite the diffusion. [8M]
   b) Give a brief note on percolation problems. [7M]

(OR)

6. a) Describe Watts threshold model for social contagion. [8M]
   b) Explain how navigation happens in social networks. [7M]

UNIT-IV

7. a) What is the significance of small-world effect in social network analysis? [8M]
   b) Explain a clustering model in social networks. [7M]

(OR)

8. a) Describe the characteristics of heavy tailed out-degree and in-degree distribution. [8M]
   b) Write a brief description of ErdosRenyiModel. [7M]

UNIT-V

9. a) Explain an agent-based model in social networks. [8M]
   b) Discuss the problem of coloring and consensus in networked games. [7M]

(OR)

10. a) Discuss a methodology to verify if the selected features carry enough information with respect to the behavior being analyzed. [8M]
    b) Explain behavior experiment on a Network Formation Game. [7M]

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