

SOCIAL NETWORK ANALYSIS

Paper Code: ETIT-408
Paper: Social Network Analysis

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To introduce the students about knowledge of social network analysis and framework for network analysis.

UNIT-I

Social network analysis: network definition, manipulation, calculation, visualization. Graph terminology and definitions. Representing networks: Adjacency matrix and properties. Weighted, directed, bipartite networks. Trees. Some sample networks.

[T1, R1][No. of Hrs. 10]

UNIT-II

Linear Algebra / Graph Properties: Eigenvectors and eigenvalues. Graph Laplacian. Markov matrices. Paths, walks, cycles. Degree, density. Degree distribution. Diameter, average path length. Average and local clustering. Centrality measures: degree, betweenness, closeness, Katz, Bonacich. Review of Poisson random graphs. Growing random networks. Preferential attachment. Properties and phase transitions. Degree distributions. Fitting networks to data. Exponential random graph models.

[T1][No. of Hrs. 11]

UNIT-III

Frameworks for evaluating results in network analysis: autocorrelation, matching techniques, QAP regression, exponential random graphs, and other models. Computational considerations. Lab: Applying ERGM analysis. Graph partitioning. Spectral partitioning. Modularity and modularity maximization. Betweenness clustering. Lab: Calculating and comparing clustering approaches.

[T1][No. of Hrs. 11]

UNIT-IV

Game theory basics: players, moves, payoffs. Nash equilibrium. Efficiency and optimality. Examples. Network formation as a game. Pairwise stability. Positive and negative externalities. Processes on Networks: Diffusion on networks. SIS and SIR infection models and predictions. Search on networks. Networked adoption games.

[T1][No. of Hrs. 10]

Text Books:

[T1] Jackson, M. O. Social and Economic Networks. Princeton U. Press, 2008. ISBN: 978-0-691-14820-5.

Reference Books:

[R1] Social Network Analysis (Google eBook), John Scott, SAGE, 2012