Reg.No :												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]

Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 60002

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025

Third Semester

Computer Science and Engineering

P23ITE03 – SOCIAL NETWORK ANALYSIS

(Regulation 2023)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Define graph density and highlight its significance in social network analysis.	2	K1	CO1
2.	Differentiate between strong ties and weak ties in social networks.	2	K2	CO1
3.	What is Nash Equilibrium? Provide an example in the context of network games.	2	K2	CO2
4.	Outline the role of coordination games in modeling social behavior.	2	K2	CO2
5.	Define hyperlink-induced topic search (HITS) algorithm.	2	K1	CO3
6.	How is the PageRank algorithm used for ranking web pages?	2	K2	CO3
7.	What is the "epidemic threshold" in network diffusion models?	2	K1	CO4
8.	Differentiate between cascade and threshold models in information spreading.	2	K2	CO4
9.	Define the term "structural balance" and highlight its implications in social networks.	2	K1	CO5
10.	What are the main factors affecting synchronization in dynamic networks?	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Discuss how degree distribution and clustering coefficient characterize real-world social networks.	13	K2	CO1
		(OR)			
	b)	Explain the concept of structural balance theory. How can it be used to predict social relationships in a network?	13	K2	CO1
12.	a)	Analyze the role of mixed-strategy equilibria and Paretooptimality in network games.	13	K2	CO2
		(OR)			
	b)	Examine the best-response dynamics in social networks with an example of coordination or matching markets.	13	K2	CO2
13.	a)	Compare and contrast the HITS and PageRank algorithms. Discuss their relative strengths and limitations in websearch analysis.	13	K2	CO3
		(OR)			
	b)	Explain how hyperlink structure influences information visibility in the World Wide Web.	13	K2	CO3
14.	a)	Derive and discuss the SIS epidemic model. How can it be used to analyze the spread of information or disease in a network?	13	K3	CO4
		(OR)			
	b)	Evaluate how threshold-based diffusion models explain the phenomenon of viral marketing.	13	K3	CO4
15.	a)	Illustrate the use of network resilience and highlight the effect of random and targeted node removal on network connectivity.	13	K2	CO5
		(OR)			
	b)	Explain cascading behavior and the danger of concurrency in dynamic networks with a real-world example.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Online recommendation systems like Amazon, Netflix and Spotify use user interactions and behavioral data to predict Preferences and personalize content. Social network theory offers an effective framework to model the systems by analyzing how users are connected and influenced within a network. Explain how users and items can be represented as nodes in a graph, where links reflect interactions or trust. Discuss how graph centrality measures help identify influential users, structural balance theory captures trust and consistent relationships, and diffusion models.	15	K2	CO5
		(OR)			
	b)	Consider a scenario of an epidemic spreading through a city's contact network. i. Model the spread using an SIS epidemic model. ii. Determine how different network structures (e.g., random vs. scale-free) influence infection rate. iii. Suggest strategies to mitigate the spread based on network interventions.	15	K2	CO5