

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: 5018

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE / JULY 2024

Second Semester

Computer Science and Engineering

P23CS207 – ADVANCED NETWORKS

(Regulation 2023)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

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

PART – A

(10 x 2 = 20 Marks)

| Q.No. | Questions | Marks | KL | CO |
|-------|---|-------|----|-----|
| 1. | Define Technological Networks. | 2 | K2 | CO1 |
| 2. | How do Social Networks differ from other types of technological networks? | 2 | K2 | CO1 |
| 3. | What is the small world effect in network theory? | 2 | K2 | CO2 |
| 4. | Explain the concept of degree distribution in network theory. | 2 | K2 | CO2 |
| 5. | Define computational complexity in the context of network algorithms. | 2 | K3 | CO3 |
| 6. | What are adjacency matrices and how are they used in storing network data? | 2 | K3 | CO3 |
| 7. | Discuss the concept of random graphs and their significance in network modeling. | 2 | K2 | CO4 |
| 8. | What is the small world model of networks and how does it relate to real-world phenomena? | 2 | K2 | CO4 |
| 9. | Explain the concept of network resilience in the context of percolation theory. | 2 | K2 | CO5 |
| 10. | How do dynamical systems operate on networks, and what are their applications? | 2 | K2 | CO5 |

PART – B

(5 x 13 = 65 Marks)

| Q.No. | Questions | Marks | KL | CO |
|-------|--|-------|----|-----|
| 11. | a) Is the Internet primarily a communication network or an information network? Discuss its role in both aspects and provide examples. | 13 | K4 | CO1 |
| | (OR) | | | |
| | b) When comparing transportation networks and delivery networks, which is more crucial for ensuring timely delivery of goods? Justify your answer by examining their operational mechanisms. | 13 | K4 | CO1 |
| 12. | a) Which is more important for determining the robustness of a network: its shortest path structure or degree distribution? Explain your reasoning and provide examples. | 13 | K4 | CO2 |
| | (OR) | | | |
| | b) Compare and contrast clustering coefficients and assortative mixing in network analysis. Highlight their significance in understanding network structures. | 13 | K5 | CO2 |
| 13. | a) When analyzing network algorithms, which is more advantageous: storing network data using an adjacency matrix or an adjacency list? Justify your answer by considering factors such as computational efficiency and memory usage. | 13 | K5 | CO3 |
| | (OR) | | | |
| | b) In what scenarios would you prefer using tree-based algorithms over heap-based algorithms for network-related tasks? Provide examples illustrating the suitability of each data structure. | 13 | K5 | CO3 |
| 14. | a) Compare the applicability of random graphs and exponent random graphs in modeling real-world networks. Consider the factors such as degree distribution and clustering. Provide examples of networks where each model may be more suitable. | 13 | K5 | CO4 |
| | (OR) | | | |
| | b) Which network model, the small world model or random graphs with general degree distributions, better represents the interconnectedness of online social networks? Justify your choice by analyzing their ability to capture key network characteristics. | 13 | K5 | CO4 |

15. a) When analyzing network resilience, which removal strategy is more effective: uniform random removal of vertices or non-uniform removal based on centrality measures? Provide reasons for your choice and discuss real-world implications.

13 K4 CO5

(OR)

b) Compare the spread of epidemics on networks to the propagation of information in social networks, examining the role of network structure and dynamics in both processes. Provide examples illustrating similarities and differences between the two phenomena.

13 K4 CO5

PART – C

(1 x 15 = 15 Marks)

| Q.No. | Questions | Marks | KL | CO |
|--------|--|-------|----|-----|
| 16. a) | Consider a scenario where a major cyberattack disrupts both the internet and the telephone network in a metropolitan area. Analyze the cascading effects of this disruption on various sectors such as communication, transportation, healthcare, and emergency services. Propose strategic measures that could be implemented to mitigate the impact of such an event and enhance the resilience of critical infrastructure networks. Additionally, discuss the role of governmental agencies, private sector organizations, and community initiatives in managing and recovering from such a crisis. | 15 | K6 | CO5 |
| | (OR) | | | |
| b) | Imagine a scenario where a city heavily relies on its transportation network for the daily commute of its residents. Due to a sudden and severe weather event, such as a hurricane or blizzard, the transportation infrastructure becomes severely disrupted, leading to widespread chaos and gridlock on the roads. Analyze the challenges faced by emergency responders, public transportation agencies, and commuters in managing and navigating through the crisis. Discuss potential strategies for coordinating rescue efforts, rerouting traffic, and providing essential services to affected areas. Furthermore, evaluate the role of advanced technologies, such as real-time traffic monitoring systems and communication networks, in mitigating the impact of natural disasters on urban mobility. Finally, propose long-term resilience measures that could be implemented to enhance the city's preparedness for future extreme weather events and ensure the continuity of critical transportation services. | 15 | K6 | CO5 |