

**Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026**  
**Social Network Analysis**

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
 2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	What is Social Network Analysis? Discuss on applications of social network analysis.	14	L2	CO1
	b.	Discuss on three levels of Social Network Analysis.	6	L2	CO1
OR					
Q.2	a.	Calculate the eigen vector, Katz centrality and page rank scores of all nodes as shown in Fig.Q2(a) keeping $\alpha = 0.1$ , $d = 0.85$ and maximum number of iterations 100.	10	L3	CO1
<p style="text-align: center;">Fig.Q2(a)</p>					
	b.	Discuss the similarity measures and degeneracy of network.	10	L2	CO1
Module - 2					
Q.3	a.	Explain the properties of real world networks.	10	L2	CO2
	b.	Differentiate between Random Network and Real World Network.	4	L2	CO2
	c.	Discuss on Ring Lattice Network Model.	6	L2	CO2
OR					
Q.4	a.	Explain any two real-world properties captured by Barabasi-Albert model and state some of assumptions/open ended questions regarding basic Barabasi-Albert Model.	10	L2	CO2
	b.	Explain local World Network Growth Model.	10	L2	CO2

Module - 3

Q.5	a.	For the network shown in Fig.Q5(a) determine the first iteration of ranks, assuming damping factor $d = 0.8$ , where initial rank of each node is same. $R_0 = [1/5, 1/5, 1/5, 1/5, 1/5]$ . Also each node will be randomly insisted. $E = [1/5, 1/5, 1/5, 1/5, 1/5]$ . Consider iterative page fault also.	10	L3	CO3
<p style="text-align: center;">Fig.Q5(a)</p>					
	b.	Discuss DivRank algorithm is a network.	10	L2	CO3
OR					
Q.6	a.	Calculate the similarity between 2 user A and B in Heterogeneous Bipartite Network.	10	L2	CO3
<p style="text-align: center;">Fig.Q6(a)</p>					
	b.	Given a bibliophy network containing the following object type find out the metapaths to determine author similarity valid object types includes {Author (A), Paper (P), Venue(V), Terms T}.	10	L3	CO3
Module - 4					
Q.7	a.	Discuss on various places where community detection algorithm can be applied.	10	L2	CO4
	b.	Considering a unique subgraph contrast on problems, reachability of members and degree of a mode.	10	L3	CO4
OR					
Q.8	a.	Discuss Lovuian method for community detection.	10	L2	CO5
	b.	How the Bigclam algorithm find a model that fits the network.	10	L3	CO5

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Module - 5

Q.9	a.	Discuss link prediction applications and various cases when nodes are added and removed from network.	10	L2	CO5
	b.	Consider applying link prediction model applied to a network the samples are actual and predicted sets : $AL_p = \text{Actual positive links} = \{(a, b), (b, c), (c, d)\}$ $AL_n = \text{Actual negative links} = \{(a, d), (a, c), (b, d)\}$ $PL_p = \text{Predicted Positive links} = \{(a, b), (b, c), (b, d)\}$ $PL_n = \text{Predicted negative links} = \{(a, d), (a, c), (c, d)\}$ Calculate confusion matrix based Score for the link prediction model.	10	L3	CO5

OR

Q.10	a.	In a face book friendship network, explain various node level and edge - level attributes that can be extracted.	10	L2	CO5
	b.	Consider the Fig.Q10(b) find the probabilities $P_r$ based on maximum -likelihood formula. Given graph and Den diagram.	10	L3	CO5

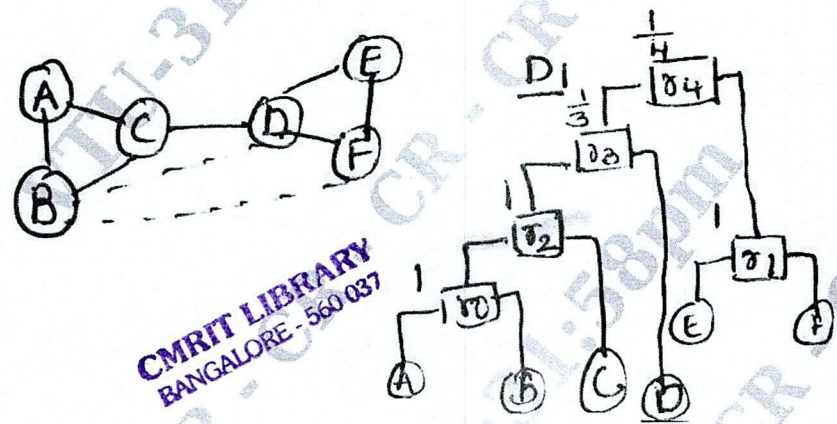


Fig.Q10(b)

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