U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

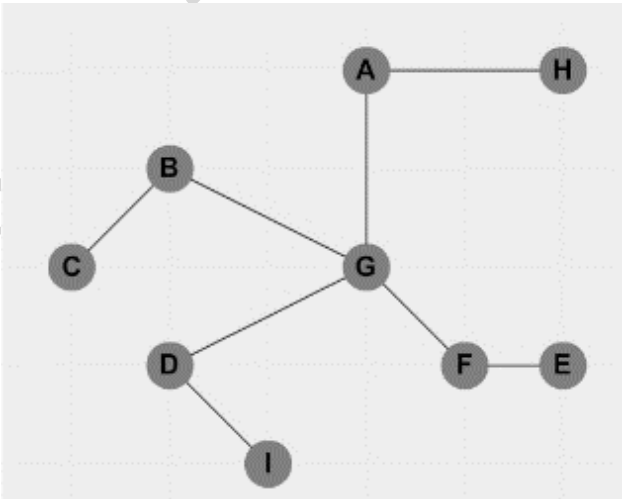
Autonomous Institute Affiliated to VTU

July 2023 Semester End Main Examinations

Programme: B.E. **Semester: VI**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 20IS6PESNA **Max Marks: 100**
Course: Social Network Analysis **Date: 17.07.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Construct the graph, given the line set {A->B, B->C, C->E, E->D, D->B, E->F}. Give an example of the following terms for the constructed graph: i) Directed Walk ii) Semi Walk iii) Directed Trial iv) Cycle v) Semi Cycle vi) Directed Path	*CO2*	*PO1*	**08**
	b)	Discuss the different types of connectivity in a Directed Graph.	*CO1*		**08**
	c)	Network of telephone lines between nine cities are [A,B,C,D,E,F,G,H,I] as given in the figure. Find the city/cities which would incur the greatest network blockage if telephone line/s get damaged. Justify your answer. 	*CO2*	*PO1*	**04**
		UNIT - II			
2	a)	Construct a friendship network among the following edge set [AK,AB,AC,BC,BK,CE,CF,DE,EF,EH,FG,IJ]. Compute the Clustering Coefficient of all the nodes and highlight the importance of Clustering Coefficient.	*CO2*	*PO1*	**08**

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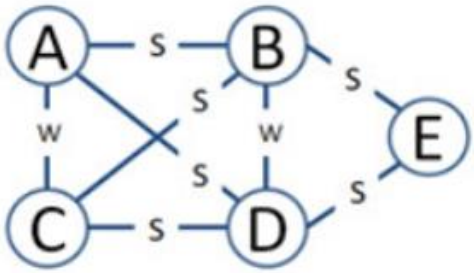
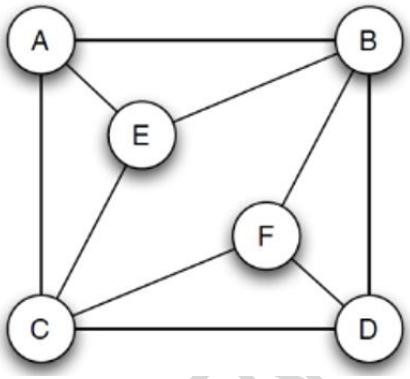
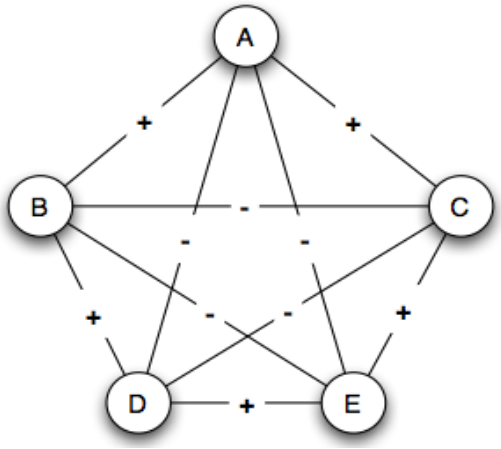
		b)	Given a friendship network, identify the nodes that satisfies and violates the Triadic Closure Property. Provide a solution incase of violation in the network. 	*CO3*	*PO2*	**07**
		c)	Given the Projected Network with six people, Draw an Affiliation Network to depict their Foci. 	*CO2*	*PO1*	**05**
			UNIT - III			
	3	a)	Consider the given Network, there is an edge between each pair of nodes, with five of the edges corresponding to positive relationships, and the other five of the edges corresponding to negative relationships. For each node, how many of the triangles it participates in are balanced, and how many are unbalanced. 	*CO3*	*PO2*	**08**
		b)	Tom is a cat. Tom caught a bird. Tom is owned by John. Tom is ginger in color. Cats like cream. The cat sat on the mat. A cat is a mammal. A bird is an animal. All mammals are animals. Mammals have fur. For the above statements represent a Semantic Network and discuss the same.	*CO2*	*PO1*	**06**

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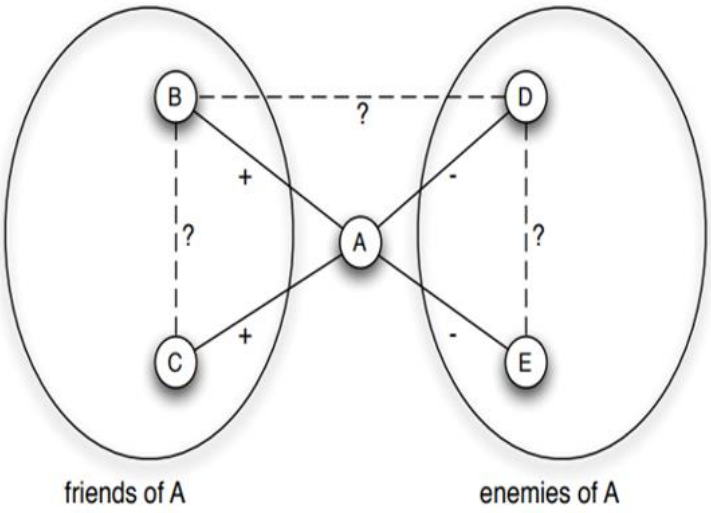
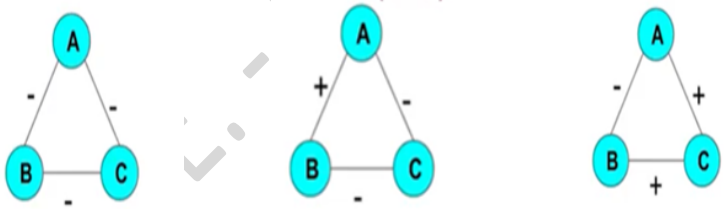
		c)	Given the graph below, annotate the edges and prove the Balance Theorem.  	*CO2*	*PO1*	**06**
			OR			
	4	a)	Prepare a network for the following edges: [0->1, 0->5,1->2,1->3,1->8, 2->0, 3->2, 3->4, 3->7, 4->6, 5->4, 6->4, 7->8, 7->10, 7->12, 8->11, 9->7, 10->11,10->14, 11->15, 12->13, 12->14, 13->15, 14->12, 15->14]. Identify if the network is Strongly Connected or not. Name the different components and provide justification for your answers.	*CO3*	*PO2*	**10**
		b)	Identify whether the given triangles are Balanced or UnBalanced with suitable validations.  	*CO3*	*PO2*	**06**
		c)	Differentiate between Social Network and Information Network.	*CO1*		**04**
			UNIT - IV			
	5	a)	Prepare a network for the following edges, [A->B, A->D, B->C, B->E, C->F, D->H, E->A, E->H, F->I, G->D, H->G, H->I, H->F, I->H]. Compute Hub and Authority scores for two iterations. Provide the rules to be followed.	*CO2*	*PO1*	**08**
		b)	Company ABC's Innovation failed to spread through a population even though it had a significant advantage. Investigate the reasons for failure and solutions to overcome.	*CO3*	*PO2*	**06**
		c)	Analyze the need for Scaled Pagerank Updation and illustrate with an example.	*CO3*	*PO2*	**06**

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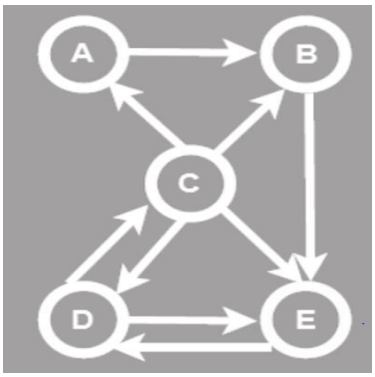
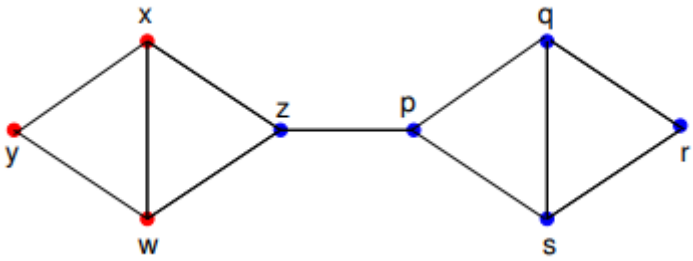
			OR			
	6	a)	Apply PageRank Algorithm with two iterations for the given Information Network with five web pages A, B, C, D and E. Provide the rules to be followed. 	*CO2*	*PO1*	**08**
		b)	For the given graph consider Payoffs: a = 3, b = 2. Each node accepts behavior B and requires a threshold to switch to behavior A. Consider x, y and w as initial adopters of behavior A. Find the nodes which switch to A and whether the cascade is complete or partial. 	*CO4*	*PO2*	**06**
		c)	Analyze and prove the statement "Clusters are Obstacles to Cascades" with an example.	*CO4*	*PO2*	**06**
			UNIT - V			
	7	a)	Illustrate with example The Watts-Strogatz model.	*CO1*		**08**
		b)	Draw a Core-periphery network with n = 8 players of which k = 3 are in the core. The players are connected with at least three other players. Elaborate the core-periphery network.	*CO4*	*PO2*	**07**
		c)	Explain how Triadic Cosure reduces the growth rate with an example.	*CO1*		**05**

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