UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Web Social Analytics Semester: VII

Programme: B.Tech (CSE with BAO)   CSIB477

Time: 03 hrs. **Max. Marks: 100**

Instructions:

SECTION A

S. No.		Marks	CO
Q 1	What is the difference between a clique and a circuit? Support your answers with examples.	**4**	**CO1**
Q 2	What do you mean by centrality of a node? Explain with an example.	**4**	**CO1**
Q 3	What is clustering coefficient of a graph? Explain with an example.	**4**	**CO2**
Q 4	Is path graph a highly centralized graph? Support your justification with an example.	**4**	**CO1**
Q 5	What is the temporal network? Explain with an example.	**4**	**CO5**

SECTION B

Q 6	Differentiate between the G(N,m) and G(n,p) models of generating the random networks with sufficient examples.	**8**	**CO4**
Q 7	Explain the generation methodology of the Erdos-Renyi graphs with sufficient examples.	**8**	**CO5**
Q 8	Differentiate between the configuration model and the hidden parameter model.	**8**	**CO1**
Q 9	List all of the non-isomorphic motifs of size two, three and four of a graph. Differentiate between a motif and a sub-graph of a graph. Or Explain the Watts-Strogatz model with an example.	**8**	**CO2**
Q 10	What is an adjacency matrix of a graph? How can we determine the number of triangles in a graph with the help of a matrix of a graph? Explain with the help of an example. Or Suppose that there are two sets of nodes such that one of the set has five nodes while the other set has four nodes. Construct a bipartite networks for them and further construct the different type of one mode projections for them. List at least eight real world networks which can be modelled as the bipartite networks.	**8**	**CO3**

	SECTION-C		
Q 11	Explain the Barabasi-Albert model of the graph generation.	**20**	**CO5**
Q 12	Describe any four centrality measures of a network. Explain with sufficient examples. Or Explain the Xalvi-Brunet and Sokolov algorithm. What is the primary usage of this algorithm?	**20**	**CO4**

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SECTION A

S. No.		Marks	CO
Q 1	Let V and E be the set of nodes and edges in an undirected graph G = (V, E). Justify that $E \subseteq V \times V$ with examples.	4	CO1
Q 2	Is star network a highly centralized network? Support your justification with an example.	4	CO1
Q 3	How can we measure the transitivity of a graph?	4	CO2
Q 4	What is the node betweenness centrality?	4	CO2
Q 5	What is the degree distribution of a network? Explain with an example.	4	C03
SECTION B			
Q 6	Differentiate between Eigenvector centrality and Katz centrality.	8	CO4
Q 7	Suppose that we have to generate two graphs $G_1=(V_1,E_1)$ and $G_2=(V_2,E_2)$ by following ER graph generation methodology such that $|V_1|>>>|V_2|$ and $|V_2|$ may represent few hundred nodes. Now, G_1 will show Binomial degree distribution while G_2 will Poisson degree distribution. Why are we observing contradiction in the degree distribution for both of the graphs? Justify your answer analytically.	8	CO1
Q 8	Explain the Watts-Strogatz model with an example.	8	CO2
Q 9	Differentiate between closeness and node betweenness centrality with sufficient examples. Or Suppose that there are two sets of nodes such that one of the set has five nodes while the other set has four nodes. Construct a bipartite networks for them and further construct the different type of one mode projections for them. List at least eight real world networks which can be modelled as the bipartite networks.	8	CO4
Q 10	Give an analytical derivation to determine the number of edges in a clique. Also, give an analytical derivation to determine the sum of shortest paths of a circuit. Or What is a random walk? Explain with sufficient examples.	8	CO5

	SECTION-C		
Q 11	Explain the Girvan Newman algorithm with sufficient examples.	**20**	**CO5**
Q 12	Describe the Ravasz algorithm of the graph generation with sufficient examples. Briefly explain the deterministic and stochastic versions of the Ravsz algorithm. Or Describe any four centrality measures of a network. Explain with sufficient examples.	**20**	**CO3**