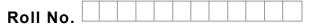
FirstRanker.com

www.FirstRanker.com

www.FirstRanker.com



Total No. of Pages : 02

Total No. of Questions : 08

M.Tech. (CSE Engg.) (2018 Batch) (Sem.-1) MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE Subject Code : MTCS-101-18 Paper ID : [75153]

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES : 1. Attempt any FIVE questions out of EIGHT questions. 2.Each question carries TWELVE marks.

- 1. Define the following concepts from Graph theory, with an example for each :
 - a. Spanning subgraph of a graph.
 - b. Eccentricity of a vertex of a graph.
 - c. A full binary tree.
 - d. A Hamiltonian Path in a graph.
- Her.com 2. a. The adjacency matrix of a graph G is

LIIST	0	0	1	1	0	
NN.	0	0	1	1	1	
A =	1	1	0	0	1	
	1	1	0	0	0	
	0	1	1	0	0	

Find $A + A^2 + A^3 + A^4$. Is G connected? Check your answer by drawing the graph G.

b. Draw a graph with vertex set $V = \{v_1, v_2, v_3, v_4, v_5\}$ and such that $d(v_1) = 2$, $d(v_2) = 2$. $d(v_3) = 4$, $d(v_4) = 1$, and $d(v_5) = 1$. Is there a tree with given vertex set v and given degrees? Justify your answer.



www.FirstRanker.com

- 3. a. Show that if every component of a graph is bipartite, then the graph is bipartite.
 - b. Prove that if u is a vertex of odd degree in a graph, then there exists a path from u to another vertex v of the graph where v also has odd degree.
- 4. Two fair dice are thrown. If the scores are unequal, the larger of the two scores is recorded. If the scores are equal then that score is recorded. Let X denote the number recorded.
 - a. Show that P(X = 2) = 1/12 and draw up a table showing the probability distribution of X.
 - b. Find the mean and variance of this distribution.
- 5. a. Suppose you draw 21 samples a population with mean of 78 and a standard deviation of 8.8. What is the probability of obtaining a mean of 78.2 or more?
 - b. Why does a small sample size cause problems? When is the Central Limit Theorem needed? How big does the sample have to be for the Central Limit Theorem?
- 6. a. Suppose that we wanted to estimate the true average number of eggs a queen bee lays with 95% confidence. The margin of error we are willing to accept is 0.5. Suppose we also know that s is about 10. What sample size should we use?
 - b. Suppose 20 donors come to a blood drive. Assume that the blood donors are not related in any way, so that we can consider them independent. The probability that the donor has type-O blood is 0.06, which is constant from donor to donor. Let X = the number of donors that have type-O blood.

For a sample of 100 donors, what is the sampling distribution of the sample proportion?

- 7. What are the recent trends in various distributions functions in mathematical field of computer science in Computer Vision?
- 8. Write short notes on
 - a. Mathematical applications in Network Protocol.
 - b. Number theory applications in Cryptography.