



B.Tech - Odd Sem : End Semester Exam
Academic Year:2020-2021
17CS2103 - Discrete Mathematics
Set No: 2

Time:		Max.Marks: 100			
S.NO	Answer All Questions	Choice	Options	Marks	CO
1.	Illustrate that there are infinitely many primes.	choice Q-2		10Marks	CO1
2.	Obtain the PDNF of $(P \wedge Q) \vee (\sim P \wedge R) \vee (Q \wedge R)$			10Marks	CO1
3.	Determine whether each of the following inference patterns is valid or invalid i) If I like applied mathematics, then I will study Either I study or I fail. If I fail, then I do not like applied Mathematics. ii) If today is Sunday, then yesterday was Saturday , yesterday was Saturday today is Sunday.	choice Q-4		15Marks	CO1
4.	Write each of the following in symbolic form: a) All men are good b) No men are good c) Some men are good d) Some men are not good.			15Marks	CO1
5.	How many different strings can be made from the letters in ABRACADABRA using all the letters.	choice Q-6		10Marks	CO2
6.	Show that any subset of 55 distinct positive numbers less than 101 must contain two numbers which differ by exactly 9.			10Marks	CO2
7.	How many bit strings of length 8 contain i) Exactly five 1's ii) An equal number of 0's and 1's iii) Atleast four 1's iv) Atleast three 1's and atleast three 0's.	choice Q-8		15Marks	CO2
8.	Let's count ternary digit strings, that is, strings in which each digit can be 0, 1, or 2. a. How many ternary digit strings contain exactly n digits? b. How many ternary digit strings contain exactly n digits and 2's. c. How many ternary digit strings contain exactly n digits and n-1 2's. (Hint: where can you put the non-2 digit, and then what could it be?)			15Marks	CO2
9.	Draw the Hasse diagram for the partial ordering $\{ \{2,4,5,10,12,20,25\}, / \}$ and which element of the poset are maximal and which are minimal.	choice Q-10		10Marks	CO3
10.	Solve the recurrence relation $a_n - 2a_{n-1} + a_{n-2} = 2, n \geq 2 \text{ with } a_0 = 25 \quad a_1 = 16$			10Marks	CO3
11.	The number of bacteria in a colony doubles every hour. If a colony begins with 4 bacteria. How many will be present in n hours and hence solve the recurrence relation.	choice Q-12		15Marks	CO3
12.	Use generating functions to solve the recurrence relation $a_n = 3a_{n-1} + 2, n \geq 1 \text{ with } a_0 = 1.$			15Marks	CO3
13.	If G is a connected plane graph, then verify that $ V - E + R = 2$	choice Q-14		10Marks	CO4
14.	Show that a complete bipartite graph $k(m,n)$ is planar if and only if $m \leq 2$ or $n \leq 2$			10Marks	CO4
15.	Verify that a graph G is a tree if and only if G has no cycles and $ E = V - 1$	choice Q-16		15Marks	CO4
16.	Apply BFS algorithm to find a spanning tree for the graph 			15Marks	CO4