

Code No: 154AQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, July/August - 2021

DISCRETE MATHEMATICS

(Common to CSE, IT)

Time: 3 Hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

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- 1.a) Give a direct proof and an indirect proof, "If n is an odd integer, then (n + 9) is an even integer".
b) Show the following statement is a tautology.
¬P ∧ (¬P ∧ Q) → ¬Q [7+8]
2.a) Let X = {1,2,3,4,5,6,7} and R = {x, y | x - y is divisible by 3} in X. Show that R is an equivalence relation.
b) Let the function f: N → N and g: Z → N be defined as follows
f(x) = 3x + 2 and g(x) = x^2 + 1 specify the functions.
i) f o g ii) g o f.
If they exist, and give a valid argument if one/some of them do not exist. [7+8]
3. Check whether proposition ~A ↔ B ∧ C ∨ ~A → B is well-formed, providing step-by-step tracing of the algorithm. [15]
4.a) Explain the principle of strong induction with example.
b) Using induction principles prove that n^3 + 2n is divisible by 3. [7+8]
5. Find the general solution for the recurrence relation.
T(n) - T(n - 1) = 4(n + n^3), where n ≥ 1, and T(0) = 5. [15]
6.a) How many solutions does x1 + x2 + x3 = 11 have, where x1, x2, and x3 are nonnegative integers with x1 ≤ 3, x2 ≤ 4, and x3 ≤ 6?
b) How many bits of string of length 10 contain
i) Exactly four 1's ii) At most four 1's. [7+8]
7. Define Graph. Graph „G“ is represented by the following adjacency matrix.
0 1 1 1 0 1 0 1 0 1 1 1 0 0 1 1 0 0 0 1 0 1 1 1 0
a) Draw the Graph.
b) Determine whether G is a tree. Justify your answer?
c) Determine whether G is Eulerian graph. Justify your answer?
d) Determine whether G is Hamiltonian graph. If it is so, provide a Hamiltonian cycle on G. [3+4+4+4]
8. Show, step by step kruskal's algorithm on the following connected weighted graph and also calculate sum of the weights of the minimal spanning tree? [15]

