



'সমানো মন্ত্র: সমিতি: সমানী'

UNIVERSITY OF NORTH BENGAL
BCA Honours 3rd Semester Examination, 2021

CC7-BACHELOR OF COMPUTER APPLICATION (33)

DISCRETE STRUCTURES

Time Allotted: 2 Hours

Full Marks: 60

*The figures in the margin indicate full marks.
Answer all questions with internal choices.*

GROUP-A

Answer any four questions from the following

3×4 = 12

1. Explain relations.
2. Evaluate: $(q \wedge p) \vee (q \vee (r \wedge p))$
3. Give truth tables for: $(p \leftrightarrow \neg q) \rightarrow p$
4. In general, when are two sets D, E such that $D \cap E = D \cup E$?
5. Define a partial order relation. Give an example.
6. Differentiate between directed and undirected graphs.

GROUP-B

Answer any four questions from the following

6×4 = 24

7. Determine the number of edges in a graph with 6 nodes, 2 nodes of degree 4 and 4 nodes of degree 2. Draw two such graphs.
8. Solve the following recurrence relation: $a_n - 5a_{n-1} + 6a_{n-2} = 2^n$ with initial conditions $a_0 = -1$ and $a_1 = 1$.
9. Show that $(\neg q \wedge (p \Rightarrow q)) \Rightarrow \neg p(\neg q \wedge (p \Rightarrow q)) \Rightarrow \neg p$ is a tautology.

10. Prove that: $\sum_{i=1}^n (2i - 1) = n^2$
11. Prove that a tree with n vertices has $n - 1$ edges.
12. Write short note on planar graphs.

GROUP-C

Answer any two questions from the following

12×2 = 24

13. Discuss Master Theorem. Solve the following recurrence relation using Master's theorem: $T(n) = 2T(n/2) + n \log n$
14. Discuss the properties of binary relations with suitable examples.
15. Describe different logical connectives with examples.
16. What do you understand by "Growth of Functions"? Explain with example. Further write short note on Asymptotic Notations.

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