UG 1ˢᵗ Semester Examination 2021

Computer Science (Honours)

Paper DC-1
Discrete Mathematics
[CBCS]

The figures in the margin indicate full marks.

Full Marks: 32   **Time: 2 hours**

Group -A   (2 × 6 = 12)

Answer any six questions.

1. (a) Show that $p \rightarrow q$ and $\neg p \vee q$ are logically equivalent.

(b) State Pigeonhole Principle.

(c) What is tautology?

(d) Let n be a positive integer. Then *prove that* $\sum_{k=0}^{n}(-1)^k \binom{n}{k} = 0$.

(e) What is Bi-partite graph?

(f) What is Minimum Spanning Tree?

(g) A person deposits Rs 10,000.00 in a savings account at a bank yielding 9% per year with interest compounded annually. Find the recurrence relation for the problem.

(h) What is Euler graph?

Group -B   (10 × 2 = 20)

Answer any two questions.

2. a. Solve the following recurrence relation

$a_n = 2a_{n-1} - a_{n-2} + 1$, where $a_0 = 0$ and $a_1 = 1$.

b. How many different words can be formed using the word "MISSISIPPI".

c. A coin is tossed five times and the outputs are recorded in order. How many different outcomes are possible?   6+2+2 = 10

3. a. Briefly describe Big-O, Big-Θ, Big-Ω.

b. Find the complexity for the following recurrence relation:

$T(n) = 2T(^n/_2) + cn$, where $T(1) = 0$.   (2+2+2) + 4 = 10

4. a. What is center of a tree? Explain with example.

b. Find the minimum spanning tree of the following graph using Kruskal's algorithm (step-wise implementation).   (2+2) + 6 = 10