Total Pages : 4 **Roll No. ....**

BCA (N)-204

Discrete Mathematics

Examination February, 2026

Time : 2:00 Hrs. Max. Marks : 70

Note **:–** This paper is of Seventy (70) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these Sections according to the detailed instructions given therein. ***Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.***

Section–A

Long Answer Type Questions (2×19=38)

Note **:–** Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any *two* (02) questions only.

1. (a) If A = {1 ,4}, B = [2, 3, 6], C = (2, 3, 7), find A × (B – C) = (A × B) – (A × C).

   (b) Prove that number of vertices of odd degree in a graph is always even.

2. (a) Let R and S are equivalence relation on X. Show that RAS also equivalent ? Whether R ∪ S is also an equivalent relation.

   (b) Solve the recurrence relation S(n) – S(n – 1) + 2(n – 1), with 5(o) = 3, S(1) = 1 by finding its generating functions.

3. If H and K be a two subgroup of a group G then prove that HK is a subgroup of G if and only if HK = KH.

4. If R is a ring, then prove that the following results hold for all x, y, z ∈ R.

5. (a) Show that every finite partial ordered set has a maximal and minimal element.

   (b) Find the generating function of a_r the number of ways to select r balls from a pile of 3 green, 3 white and 3 blue balls.

Section–B

Short Answer Type Questions (4×8=32)

***Note* :–** Section 'B' contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. (a) How many Bytes either start with a 1 bit or terminated with the two bits 00 ?

   (b) Prove that :

   $$A \cup (B \cap C) = (A \cup B) \cup (A \cap C).$$

2. (a) Let R and S are transitive relations on a set A. Show that $R \cap S$ is transitive.

   (b) Determine whether the function $f(x) = x + 1$ is one to one.

3. Find the conjunctive normal form of the following :

   (a) $p \wedge (p \Leftrightarrow q)$

   (b) $[q \vee (p \wedge r)] \wedge [(p \vee r) \wedge q]$

4. Prove that every field is an integral domain.

5. Prove that if $p + q \geq 93$, then $p \geq 47$ or $q \geq 47$, p and q being positive integers.

6. Prove that :

$$P(n, r) = \frac{n!}{(n-r)!}$$

7. (a) Define the Sum Rule in combinatorics with suitable examples.

(b) Show that identity element in a group G is unique.

8. (a) Define Tree Traversal and also explain preorder and post order traversal of a binary tree.

(b) What is the difference between a tree and a graph ? Give an example of each.

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