A–0787

Total Pages : 3 **Roll No. ....**

BCA-05

Bachelor of Computer Application (BCA)

(Discrete Mathematics)

Examination, June 2025

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. Prove that Every finite integral domain is a field.

2. Explain Cramer's Rule for solving linear systems of equations.

3. If A = {*a*, *b*] and B = {1, 2}, C = {2,3}, find

   (a) $A \times (B \cup C)$

   (b) $A \times (B \cap C)$

   (c) $(A \times B) \cup (A \times C)$

   (d) $(A \times B) \cap (A \times C)$

4. (a) Obtain CNF of $(P \rightarrow Q) \wedge\sim Q) \rightarrow \sim P$.

   (b) Obtain DNF of $(P \rightarrow Q) \wedge (\sim P \rightarrow Q)$.

5. Show that H = {0, 2, 4} is subgroup of the group $(G, +_6)$ where G = {0, 1, 2, 3, 4, 5}.

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. Show that cancellation laws hold in a ring R if and only if R has no zero divisors.

2. Let A = {1, 2, 3, 4} and let R = {(1, 1), (1, 2), (2, 1), (2, 2), (3, 4), (4, 3), (3, 3), (4, 4)} be an equivalence relation on R ? determine A/R.

3. State and prove Division algorithm theorem using well ordering principle.

4. Show that $A \cup (B \cap C) = (A \cup B\} \cap (A \cup C)$.

5. Explain conjuction and disjuction with suitable Examples.

6. Define the following :

   (a) recursive function

   (b) Total function

   (c) Partial function

7. Prove that in a group its identity element, inverse element is unique.

8. Prove that if A and B are ideals of a commutative ring R, then $A \cap B$ is an ideal of R.

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