

P-834

Total Pages : 4

Roll No.

BCA-05

Discrete Mathematics

Bachelor of Computer Application (BCA)

2nd Semester Examination, 2023 (June)

Time : 2 Hours]

[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 answer to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

SECTION–A

(Long Answer Type Questions)

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.

(2×19=38)

1. (a) Let $X = \{1, 2, 3, 4\}$, and $Y = \{3, 4, 5, 6\}$ then find the following : (10)
- (i) $P(X)$, where $P(X)$ denotes the power set of X .
 - (ii) $X \cup Y$
 - (iii) $X \cap Y$
 - (iv) $X - Y$
 - (v) $Y - X$
- (b) Define the following relations with the help of suitable examples: (9)
- (i) Reflexive
 - (ii) Symmetric.
2. (a) Define composition of two functions. Let $f : \mathbb{R} \rightarrow \mathbb{R}$ defined as $f = 2x + 1$ and $g : \mathbb{R} \rightarrow \mathbb{R}$ defined as $g = x^2 + 2$. Find $f \circ g(x)$ and $g \circ f(x)$. (10)
- (b) Define a ring with the help of a suitable example. (9)
3. (a) Write the truth table of the following propositions : (10)
- (i) $P \vee Q \vee \sim R$
 - (ii) $\sim(P \vee Q) \vee \sim R$
- (b) Define Tautology and Contradiction with the help of suitable examples. (9)

4. (a) What do you mean by permutation? In how many ways 5 students can be arranged in a row if (i) no restriction is there for any student (ii) one particular student is always in middle position. (10)
- (b) Prove that the set of integers is a group with respect to addition. (9)
5. (a) Define a ring with the help of suitable example. (10)
- (b) Differentiate Ring, Integral domain and Field. (9)

SECTION-B

(Short Answer Type Questions)

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. (4×8=32)

1. Draw the Venn diagrams of $(X \cup Y)$, $(X \cap Y)$, $X \cup Y \cup Z$, $X \cap Y \cap Z$.
2. Let $X = \{1, 2, 3, 4\}$ and $R = \{(x, y) : x \mid y, \forall x, y \in X\}$, where ' \mid ' shows the relation of 'divides'. Find (i) R (ii) R^{-1} (iii) Domain and Range of R (iv) $R \circ R$.
3. Define Domain and Range of a function with the help of suitable examples.

4. Let P : I go to market and Q : I buy a pen. Write the sentences for the following :
- (i) $P \rightarrow Q$
 - (ii) $\sim P \rightarrow \sim Q$
 - (iii) $P \wedge \sim Q$
 - (iv) $\sim P \wedge \sim Q$.
5. Define logical equivalence with the help of suitable example.
6. Explain Pigeonhole principle. Find the minimum number of students in a class so that at least two students have same month of birth.
7. Prove that the set $X = \{0, 1, 2, 3\}$ is a group under the composition addition modulo 4.
8. Solve the following linear system of equations using Gauss elimination method.

$$x + y + z = 3$$

$$x + 2y - z = 2$$

$$2x - y + z = 2.$$
