

(Please write your Exam Roll No.)

Exam Roll No. 03321402023

END TERM EXAMINATION

FIRST SEMESTER [BCA] JANUARY 2024

Paper Code: BCA-101

Subject: Discrete Mathematics

Time: 3 Hours

Maximum Marks: 60

Note: Attempt five questions in all including Q.no.1 which is compulsory. Select one question from each unit.

- Q1 Answer the following questions. (4x5=20)
- a) $A = \{2, 3, 7, 8\}$, $B = \{1, 3, 5\}$, $C = \{3, 5, 9, 11\}$. Find (i) $B \oplus C$ (ii) $(A-B)$ (iii) $A \times B$ (iv) $A \cap B$ (v) A'
 - b) Show that the function $f: R \rightarrow R$ given by $f(x) = 3x - 4$ is a bijection.
 - c) Let D_{36} denote the set of all divisors of 36 ordered by divisibility. Draw the Hasse diagram of D_{36} . Find all the complements of D_{36} .
 - d) In how many ways can the letters of the word "RANDOM" be arranged so that (i) M is always next to D (ii) A and N are always together
 - e) Define Euler graph and Hamiltonian graph with example.

UNIT-I

- Q2 a) In a group of athletic teams in a school, 21 are in Basketball team, 26 are in Hockey Team and 29 in Football Team. If 14 play Hockey and Basketball, 12 play Football and Basketball, 15 play Hockey and Football and 8 play all the three games, Find:
- i) How many players are there in all?
 - ii) How many play Football only.
 - iii) How many play Basketball only. (5)
- b) If $A = \{1, 2, 3, 4\}$; $B = \{1, 2, 3, 4, 5, 6\}$; and $R = \{(a, b): a \in A, b \in B \text{ and } b = a+1\}$, then Find:
- i) Write R as a set of ordered pairs.
 - ii) Find Domain and Range of R.
 - iii) Find R^{-1} (5)

OR

- Q3 a) Let the functions f and g be defined by $f(x) = x^2 - 2$, $g(x) = 2x + 1$ and $h(x) = (x+1)^2$.
- i) Find the formula defining the composition function $f \circ g$ and $g \circ h$.
 - ii) Find $g \circ f(5)$ (3)
 - b) Show that $p \leftrightarrow q$ logically implies $p \rightarrow q$. (3)
 - c) With the help of truth table, prove that $(p \vee q) = \sim(\sim p \wedge \sim q)$ (4)

P.T.O.

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