Graphic Era HILL UNIVERSITY
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Mid Term (Odd) Semester Examination October 2024

Roll no. 24992525

Name of the Course and semester: BCA AI&DS / BCA (I Semester)
Name of the Paper: Mathematical Foundation of Computer Science
Paper Code: TBD 103 / TBC 103

Time: 1.5 hour Maximum Marks: 50

Note:

(i) Answer all the questions by choosing any one of the sub questions
(ii) Each question carries 10 marks.
(iii) Please specify COs against each question.

Q1. (10 Marks)

a. Explain Finite set, Proper subset, Universal set and Equal set with suitable examples. (CO 1)

OR

b. Prove that

$A - B = A \cap B'$ (CO 1)

Q2. (10 Marks)

a. Proof the both distributive laws of algebra on the basis of set theory. (CO 1)

OR

b. Prove that (CO 1)

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

Q3. (10 Marks)

a. If A = {4, 5, 7, 8, 10}, B = {4, 5, 9} and C = {1, 4, 6, 9}, then verify that

$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ (CO 1)

OR

b. Explain Asymmetric relation, Antisymmetric relation and Transitive relation, with suitable examples. (CO 2)

Q4. (10 Marks)

a. Let A = {2, 3, 5} and B = {6, 8, 10} and define a binary relation R from A to B as R = {(a, b) : a ∈ A, b ∈ B and a divides b}. Write each R and R^{-1} as a set of ordered pairs. Then find the domain and range for each R and R^{-1}. (CO 2)

OR

b. If R be a relation in the set of integers Z defined by

$R = \{(x, y) : x \in Z, y \in Z, (x - y) \text{ is divisible by } 6\}$

Then prove that R is an equivalence relation.

Q5. (10 Marks)

a. If the function f : R → R defined by (CO 2)

$$f(x) = \begin{cases} 3x - 4, & \text{where } x > 0 \\ -3x + 2, & \text{where } x \leq 0 \end{cases}$$

Determine

(i) f (0), f (2/3) (ii) f^{-1} (o), f^{-1} (-7).

OR

b. Let f and g ne functions from the positive integers to the positive integers defined by $f(n) = n^2$, $g(n) = 2^n$. Find fof, gog, fog, gof (CO 2)