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Total No. of Pages :02

Total No. of Questions : 09

B.Tech. (AI&ML/AI&DS/IT/CS/DS/IOT/CSE (Internet of Things and Cyber Security including Block Chain Technology)) (Sem.-4)

DISCRETE MATHEMATICS

Subject Code : BTCS-401-18

M.Code : 77626

Date of Examination : 02-06-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY** consisting of TEN questions carrying TWO marks each.
2. **SECTION-B** contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. **SECTION-C** contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION - A

1. Answer briefly :

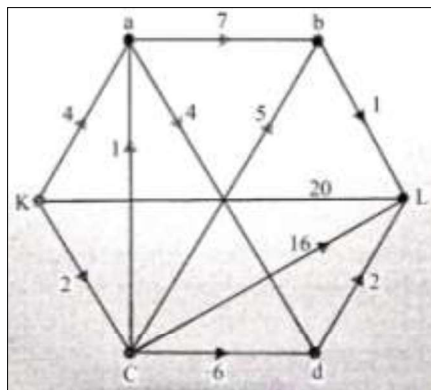
- a) Prove that the inverse of a bijective function is unique.
- b) Find GCD (119, 884) using Euclid Algorithm.
- c) In a group of 150 people how many friends are there who have an identical number of friends in that group?
- d) A and B are two sets such that $n(A - B) = 14 + x$, $n(B - A) = 3x$ and $n(A \cap B) = x$. Find X such that $n(A) = n(B)$.
- e) Make the truth table of $p \wedge (\neg q)$ of two statements p and q .
- f) Prove that $\neg(\neg p) \equiv p$.
- g) In a Boolean algebra B, simplify the Boolean expression $x.(x' + y)$.
- h) Prove that the group $\{1, -1, i, -i\}$ under multiplication is a cyclic group.
- i) Prove that the maximum degree of any vertex in a simple graph having n vertices is $n - 1$.
- j) Give an example of a perfect graph.

SECTION - B

2. Suppose R and S are symmetric relations on a set A. Show that $R \cap S$ is also symmetric.
3. In a group of 50 persons, 14 drink tea but not coffee and 30 drink tea. Find
 - a) How many drink tea and coffee both?
 - b) How many drink coffee but not tea?
4. Prove that $p \rightarrow q \equiv (\neg p) \vee q$.
5. Prove that finite integral domain is a field.
6. Prove that in any non-trivial tree, there are at least two vertices of degree 1.

SECTION - C

7. Find the Boolean expression that defines the function f by $f(0, 0, 0) = 0$; $f(0, 0, 1) = 0$; $f(1, 0, 0) = 1$; $f(1, 1, 0) = 0$; $f(0, 1, 0) = 1$; $f(0, 1, 1) = 0$; $f(1, 0, 1) = 1$; $f(1, 1, 1) = 1$.
8.
 - a) If S is a set containing finite number of elements and f is a function from S into S, then prove that f is one-one, then f is onto.
 - b) Show that $p \wedge q$ logically implies $p \leftrightarrow q$.
9.
 - a) Find n if nC_4 , nC_5 and nC_6 are in AP.
 - b) Find the shortest distance between K and L in the following graph :



NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.