

Roll No.

Total No. of Pages : 02

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B.Tech. (AI&ML)(AI&DS)(CSE)(CS)(IT)(DS)(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 : 03-01-2026

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) Define an equivalence relation.
- b) State Schroeder-Bernstein theorem.
- c) State fundamental theorem on Arithmetic.
- d) State and Prove Idempotent Laws of Logic of Proposition.
- e) Of any 26 points with in rectangle 20 cm by 15 cm, show that at least two are within 5 cm of each other.
- f) Find k, if a regular graph with 8 vertices has 12 edges.
- g) Define planar graph.
- h) Give an example of a connected graph that has both Euler circuit and Hamiltonian cycle.
- i) Give an example of a relation which is reflexive, symmetric but not transitive.
- j) Define POSET.

SECTION - B

2. Show that the intersection of two left ideals of a ring is again a left ideal of the ring.
3. State and prove Lagrange's theorem.
4. Prove that $(p \wedge q) \wedge r = p \wedge (q \wedge r)$.
5. **Let $A = \{1, 2, 3, 4, 5\}$. Define functions $f: A \rightarrow B$ (if possible) such that :**
 - a) f is onto but not one to one.
 - b) f is neither one to one nor onto.
6. Let R be a relation defined on set of real numbers by $a R b$ is $a \leq b$ where a, b are real number. Then R is a partial order relation.

SECTION - C

7. For any positive integer n , the ring Z_n of all integers modulo n is an integral domain if and only if n is prime integer.
8. **Suppose the preorder and inorder traversals of a binary tree T yields the following sequences of nodes when the following is given :**

PREORDER : G, B, Q, A, C, K, F, P, D, E, R, H

INORDER : Q, B, K, C, F, A, G, P, E, D, H, R
 - a) Draw the diagram of T .
 - b) Find the depth d of T .
9. **Find the number of positive integers from 1 to 500 which are :**
 - a) Divisible by at least one of 3, 5 and 7.
 - b) Divisible by 3 and 5 but not by 7.
 - c) Divisible by 3 but not by 5 and 7.

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.