Roll No. | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

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 → 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 ≤ 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 f 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.