

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  $f: A \rightarrow B$  (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.**