

Dr. Babasaheb Ambedkar Open University

Term End Examination January – 2026

Course : BSCCS
Subject Code : BSCCS-104
Subject Name : Discrete Mathematics

Date : 19/02/2026
Time : 11:30am to 01:45pm
Duration : 02.15 Hours
Max. Marks : 70

Section A

Answer the following (Attempt any three)

(30)

1. Explain the concept of sets in detail. Discuss types of sets, set operations and illustrate each using suitable examples.
2. Define relations and explain different types of relations with suitable examples.
3. Define permutation and combination. Explain their formulas and applications with suitable examples.
4. Define matrices and explain different types of matrices. Discuss matrix operations with suitable examples.
5. Explain the solution of system of linear equations using matrix method and Cramer's rule with examples.

Section B

Answer the following (Attempt any four)

(20)

1. What is a compound proposition? Construct a truth table for it.
2. Explain the concept of functions.
3. Explain the fundamental principles of counting.
4. Explain semigroup with one example each.
5. What is a commutative ring? Give an example.
6. State any four properties of determinants.

Section C

Part – A (Multiple Choice Questions)

(10)

- 1 Which of the following operations gives elements common to two sets A and B?
A Complement
B Intersection
C Difference
D Union
- 2 A relation R on a set A is called reflexive if:
A $(a, a) \in R$ for all $a \in A$
B $(a, b) \in R$ implies $(b, a) \in R$
C No element is related to itself
D $(a, b) \in R$ and $(b, c) \in R$ implies $(a, c) \in R$
- 3 A function $f: A \rightarrow B$ is called bijective if it is:
A One-to-one only
B Onto only
C Both one-to-one and onto
D Neither one-to-one nor onto
- 4 A compound proposition that is always true for all truth values of its components is called:
A Negation
B Contradiction
C Contingency
D Tautology
- 5 Which of the following is a contradiction?
A $p \vee \neg p$
B $p \rightarrow q$
C $p \wedge \neg p$
D $p \leftrightarrow q$

- 6 The principle used when one task can be done in m ways and another in n ways is:
A Multiplication principle B Permutation principle
C Addition principle D Inclusion principle
- 7 Which of the following considers order of arrangement?
A Combination B Permutation
C Subset D Selection
- 8 A ring in which multiplication is commutative is called:
A Integral domain B Field
C Boolean ring D Commutative ring
- 9 A matrix having equal number of rows and columns is called:
A Row matrix B Column matrix
C Rectangular matrix D Square matrix
- 10 Which of the following is true for a field?
A Zero divisors exist B Multiplication is not associative
C Addition is not commutative D Every non-zero element has a
multiplicative inverse

Part – B (Do as Directed)

(10)

State whether the following statements are true or false

- 1 A system of linear equations has a unique solution if the determinant of the coefficient matrix is non-zero.
- 2 Interchanging two rows of a determinant does not change its value.
- 3 If two rows of a determinant are identical, the value of the determinant is zero.
- 4 Matrix multiplication is always commutative.
- 5 Every field is an integral domain, but every integral domain is not a field.
- 6 In a ring, multiplication must always have an identity element.
- 7 Every group is a semigroup, but every semigroup is not necessarily a group.
- 8 In combinations, the order of selection does not affect the result.
- 9 The addition principle is used when tasks cannot occur simultaneously.
- 10 Every onto (surjective) function must also be one-to-one (injective).
