

43026-43082

Library
Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125



BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Tech.(CSE)-2024/B.Tech.(CSE)-DS-2024

Course Name – Discrete Mathematics

Course Code - BBS00008

(Semester IV)

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

(i) Select the correct option. The relation $\{ (1,2), (1,3), (3,1), (1,1), (3,3), (3,2) \}$ is

- a) Reflexive
c) Transitive

- b) Symmetric
d) Asymmetric

(ii) Memorize the total number of symmetric relations possible on a set with n elements and it is

- a) $2^{n(n+1)/2}$
c) 2^n

- b) $2^{n(n-1)}$
d) 2^{n+2}

(iii) Observe and find out the singleton set from the following.

a) $A = \{ x : 3x^2 - 27 = 0, x \in \mathbb{Q} \}$

b) $B = \{ x : x^2 - 1 = 0, x \in \mathbb{R} \}$

c) $C = \{ x : 30x - 59 = 0, x \in \mathbb{N} \}$

d) $D = \{ x : x^2 - 1 = 0, x \in \mathbb{N} \}$

(iv) If A and B are sets and $A \cup B = A \cap B$, then select the correct option.

a) $A = \Phi$

b) $B = \Phi$

c) $A = B$

d) none of these

(v) If set A is an empty set then illustrate the value of $n [P[P[P(A)]]]$.

a) 6

b) 16

3. Identify two integers u and v satisfying $54u + 24v = 30$. (3)

4. Show that the following compound proposition is a Tautology (using truth table) $((p \rightarrow q) \wedge (q \rightarrow r)) \rightarrow (p \rightarrow r)$. (3)

5. Show that the set of even integers is a group under addition. (3)

6. Justify that the set $\{\bar{1}, \bar{2}, \bar{3}, \bar{4}, \bar{5}\}$ is not a group under addition modulo 6. (3)

OR

Let $G = \{1, -1, i, -i\}$ be a multiplicative group, evaluate the order of every element of the group. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Identify the solution of the linear congruence $4x \equiv 8 \pmod{8}$. (5)

8. Deduce that $(p \rightarrow q) \rightarrow (r \rightarrow s)$ and $(p \rightarrow r) \rightarrow (q \rightarrow s)$ are not logically equivalent. (5)

9. Explain that every connected graph G has a spanning tree. (5)

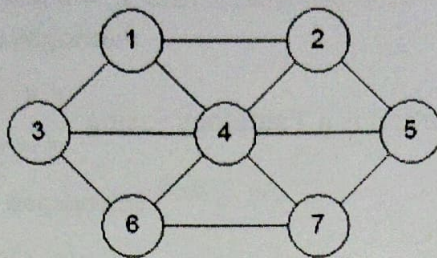
10. Deduce the Euler's handshaking lemma. (5)

11. Let $(G, \circ)$ be a group and H be the subset of G defined by $H = \{x \in G : x \circ g = g \circ x \text{ for all } g \in G\}$. Show that $(H, \circ)$ is a subgroup of $(G, \circ)$. (5)

Library
Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125

12. Explain adjacency matrix for a non-directed graph. Hence illustrate the adjacency matrix for the following graph.

(5)



OR

Let G be a connected graph with n vertices. Then deduce that G is a tree if and only if $e(G) = n - 1$.

(5)

Library
Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125
