BRAINWARE UNIVERSITY

Course – BSc. (HN)

Discrete Mathematics (BHNC102)

(Semester – 1)

Time allotted: 3 Hours **Full Marks: 70**

[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)

10 x 1 = 10

1. *Choose the correct alternative from the following*

(i) If A={{1},{2},{3}} then Cardinality number of power set of A is

a. 7 b. 6

c. 8 d. None of these.

(ii) If A= {a, i, e, l, t} and B = {a, t, u, e} then the set (A - B) ∩ (B - A) is

a. {i, t, e} b. {i, e, u}

c. {} d. None of these

(iii) What is the Cartesian product of A = {1, 2} and B = {a, b}?

a. {(1, a), (1, b), (2, a), (b, b)} b. {(1, 1), (2, 2), (a, a), (b, b)}

c. {(1, a), (2, a), (1, b), (2, b)} d. {(1, 1), (a, a), (2, a), (1, b)}

(iv) If A and B are two matrix then $(AB)^T$ is

a. A^TB^T b. B^TA^T

c. AB d. None of these.

(v) A circuit less connected graph is called

a. Multi graph b. Tree

c. Pseudo graph d. None of these.

(vi) A graph is a collection of

a. Row and columns
b. Vertices and Edges
c. Equations
d. None of these.

(vii) If A={x: x ∈ N and x<4 } then Cardinality number of power set of A is

a. 1
b. 2
c. 4
d. 3

(viii) If $a_n = a_{n-1} + 5$ and $a_4 = 8$ then what is the value of a_3 ?

a. 9
b. 4
c. 1
d. 3

(ix) If p : "It is raining" and q : "She will go to college" then "It is raining and she will not go to college" will be denoted by

a. ~(~p v q)
b. p v ~q
c. p v q
d. None of these.

(x) Cardinality of the set of odd positive integers less than 10 is

a. 9
b. 4
c. 1
d. None of these.

Group – B

(Short Answer Type Question)
(Answer any *three* from the following)

3 x 5 = 15

2. At a breakfast buffet, 20 people chose coffee and 17 chose juice. 10 people chose both coffee and juice. If each person chose at least one of these beverages, how many people visited the buffet? [5]
3. Prove that A∩ (B∪C) = (A ∩ B) ∪ (A ∩ C). [5]
4. Draw the truth table for the proposition (p→q) →(~p ∨ r). [5]
5. Define null set and universal set. [2.5 + 2.5]
6. Prove that a function f : R→ R define by f(x) = 3x + 1 is a bijective mapping. [5]

Group – C

(Long Answer Type Question)

(Answer any *three* from the following)

3 x 15 = 45

7. (a) Find CNF and DNF of the following proposition

$(p \rightarrow \sim q) \vee (\sim p \vee r)$ [8]

(b) Solve the recurrence relation $f_n - 5f_{n-1} + 6f_{n-2} = 0$ given that $f_0 = 1$, $f_1 = 3$ [7]

8. (a) Solve the following system of equation by Gauss elimination method

$2x + y + z = 4$

$x + y - z = 1$

$x + 2y + 3z = 6$ [8]

(b) If A= {a, b, c, d, e} and B = {c, d, e, f, g}

compute $(A \times B) - (B \times A)$ [7]

9. (a) Prove the following using mathematical induction:

$1+2+3+4+5+...+ n = (1+n)n/2$ for all non negative integer n. [9]

(b) What is Bipartite Graph? How it differs from Complete Bipartite Graph? [6]

10 (a) Draw the graph from the following adjacency matrix

	A	B	C	D
A	1	1	0	0
B	1	0	1	1
C	0	1	1	1
D	0	1	1	0

[8]

(b) Define minimal spanning tree and complete graph [3.5 + 3.5]