



BRAINWARE UNIVERSITY

Course – B.Sc. (HN)

Mathematics - I (BHN103)

(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) A graph is a collection of
 - a. Row and columns
 - b. Vertices and edges
 - c. Equations
 - d. None of these
 - (ii) The relation $\{ (1,2), (1,3), (3,1), (1,1), (3,3), (3,2), (1,4), (4,2), (3,4) \}$ is
 - a. Reflexive
 - b. Transitive
 - c. Symmetric
 - d. Asymmetric
 - (iii) An undirected graph possesses an Eulerian circuit if and only if it is connected and its vertices are
 - a. all of even degree
 - b. all of odd degree
 - c. of any degree
 - d. even in number
 - (iv) A partial ordered relation is transitive, reflexive and
 - a. Antisymmetric
 - b. Transitive
 - c. Symmetric
 - d. Asymmetric
 - (v) How many onto (or surjective) functions are there from an n-element ($n \geq 2$) set to a 2-element set?
 - a. 2^n
 - b. $2^n - 1$
 - c. $2^n - 2$
 - d. $2(2^n - 2)$

Group – C

(Long Answer Type Question)

(Answer any *three* from the following)

3 x 15 = 45

7. (a) Define Tautology and Contradiction. [5]
 (b) Explain partial order relation with an example. [10]
8. (a) Define the following -
 (i) Null Set
 (ii) Equal Set
 (iii) Universal Set
 (iv) Symmetric Difference
 (v) Venn Diagram [5]
 (b) Construct the truth table for the following - [5]
 $(A \wedge B) \vee (\neg A \wedge B) \vee (A \wedge \neg B) \vee (\neg A \wedge \neg B)$
 (c) Write the negation of each of the following statements -
 (i) He swims if and only if the water is warm
 (ii) This program is correct iff it is written by X. [5]
9. (a) Find the first four terms for the following recurrence relation -
 $a_k = a_{k-1} + 3a_{k-2}$ for all integers $k \geq 2$, $a_0 = 1$ and $a_1 = 2$ [7]
 (b) Construct the truth table for the following -
 $(\neg A \wedge (\neg B \wedge C)) \rightarrow (\neg A \wedge B) \Leftrightarrow (A \wedge \neg B) \vee (\neg A \wedge \neg B)$ [5]
 (c) State the truth table of biconditional statement. [3]
10. (a) Construct the truth table for the following -
 $(\neg A \wedge (\neg B \wedge C)) \vee (\neg A \wedge B) \vee (A \wedge \neg B) \vee (\neg A \wedge \neg B)$ [3]
 (b) Prove that a countable union of sets is countable. [8]
 (c) Find the power set of $\{1, \phi, \{\phi\}\}$ [4]
11. (a) What do you mean by complement of a graph? Derive the formulation for the same. [7]
 (b) What is Regular Graph? [3]
 (c) Construct the truth table for the following -
 $(\neg A \wedge (\neg B \wedge C)) \rightarrow (\neg A \wedge B) \rightarrow (A \wedge \neg B) \vee (\neg A \wedge \neg B)$ [5]