

# **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.]

# Croup A

10

		oup –A				
	(Multiple Cho	ice Type Question) 10 x 1				
1. (i)	Choose the correct alternative from the following 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 Euler vertices are	rian circuit if and only if it is connected and its	<b>;</b>			
	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		reflexive and				
	a. Antisymmetric	b. Transitive				
	c. Symmetric	d. Asymmetric				
(v)	How many onto (or surjective) functions are there from an n-element $(n \Rightarrow 2)$ set to a 2 element set?					
	a. 2 <sup>n</sup>	b. 2 <sup>n</sup> - 1				

d.  $2(2^n - 2)$ 

c. 2<sup>n</sup> - 2

(vi) Suppose v is an isolated vertex in a graph, then the degree of v is					
	a. 0	b.	1		
	c. 2	d.	3		
(vii)	Let $A_i = \{i, i+1, i+2,\}$ . Then set $A_i$ .	{n, n+1, n-	+2, n+3,} is the	of the set	
	a. Union	b.	Intersection		
	c. Set Difference	d.	Disjoint		
(viii)	A statement that is either true or fals	e, but not b	ooth is called as		
	a. Distributive	b.	Associative		
	c. Closed	d.	Divisible		
(ix)	The word is called the univer	sal quantifi	er and is denoted by (x).		
	a. and	b.	for all		
	c. all	d.	if then		
(x)	A of one variable is d symbol and an individual variable.	efined to b	e an expression consistir	ng of a predicate	
	a. function	b.	simple function		
	c. simple statement function	d.	statement function		
		Group – I	₹		
		swer Type			
	(Answer any t	hree from	the following)		
2.	Define the following -			$3 \times 5 = 15$	
	(a) Cyclic Graph				
	(b) Acyclic Graph				
	(c) Pancyclic Graph				
				[1 + 2 + 2]	
3.	Define Graph. Can a point be termed a	is a Graph?	Explain briefly.	[5]	
4.	State and prove distributive law.			[5]	
5.	Let $A = \{1, 2, 3, 4\}, B = \{0, 1, 3, 5, 7\}$	and $C = \{$	2, 4, 6, 8}. Find A U B,		
	$B \cup C, A \cap B, B \cap C.$			[5]	
6.	Let $A = \{-3, 0, 1, 2\}, B = \{1, 2, 3, 4\}.$	Find A - B,	Β - Α, ΑΔΒ.	[5]	
		ĺ			

**Group – C**(Long Answer Type Question)
(Answer any *three* from the following)

	(Answer any three from the following)	
(a)	Define Tautology and Contradiction	$3 \times 15 = 45$ [5]
(b)	Explain partial order relation with an example.	[10]
(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 -	[-1
	$(A \land B) \lor (\neg A \land B) \lor (A \land \neg B) \lor (\neg A \land \neg B)$	[5]
(c)	Write the negation of each of the following statements -	
		[5]
(a)	Find the first four terms for the following recurrence relation -	£- 1
	$a_k = a_{k-1} + 3a_{k-2}$ for all integers $k > 2$ , $a_0 = 1$ and $a_1 = 2$	[7]
(b)	Construct the truth table for the following -	[,]
	$(\neg A \land (\neg B \land C)) \rightarrow (\neg A \land B) \Leftrightarrow (A \land \neg B) \lor (\neg A \land \neg B)$	[5]
(c)	State the truth table of biconditional statement.	[3]
(a)	Construct the truth table for the following -	
	$(\neg A \land (\neg B \land C)) \lor (\neg A \land B) \lor (A \land \neg B) \lor (\neg A \land \neg B)$	[3]
(b)	Prove that a countable union of sets is countable.	[8]
(c)	Find the power set of $\{1, \varphi, \{\varphi\}\}\$	[4]
(a)		[7]
(b)		[3]
(c)	Construct the truth table for the following -	
	$(\neg A \land (\neg B \land C)) \rightarrow (\neg A \land B) \rightarrow (A \land \neg B) \lor (\neg A \land \neg B)$	[5]
	(a) (b) (c) (a) (b) (c) (a) (b) (c) (d)	<ul> <li>(a) Define Tautology and Contradiction.</li> <li>(b) Explain partial order relation with an example.</li> <li>(a) Define the following -  (i) Null Set  (ii) Equal Set  (iii) Universal Set  (iv) Symmetric Difference  (v) Venn Diagram</li> <li>(b) Construct the truth table for the following -  (A Λ B) V (¬A Λ B) V (A Λ ¬ B) V (¬A Λ ¬ B)</li> <li>(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.</li> <li>(a) Find the first four terms for the following recurrence relation -  a<sub>k</sub> = a<sub>k-1</sub> + 3a<sub>k-2</sub> for all integers k&gt;= 2, a<sub>0</sub> = 1 and a<sub>1</sub> = 2</li> <li>(b) Construct the truth table for the following -  (¬A Λ (¬B Λ C)) → (¬A Λ B) ⇔ (A Λ ¬B) V (¬A Λ ¬B)</li> <li>(c) State the truth table of biconditional statement.</li> <li>(a) Construct the truth table for the following -  (¬A Λ (¬B Λ C)) V (¬A Λ B) V (A Λ ¬B) V (¬A Λ ¬B)</li> <li>(b) Prove that a countable union of sets is countable.</li> <li>(c) Find the power set of {1, Φ, {Φ}}</li> <li>(a) What do you mean by complement of a graph? Derive the formulation for the same.</li> <li>(b) What is Regular Graph?</li> <li>(c) Construct the truth table for the following -</li> </ul>