



**K22U 1509**

Reg. No. : .....

Name : .....

**IV Semester B.C.A. Degree CBCSS (OBE) Regular/Supplementary/  
Improvement Examination, April 2022  
(2019 Admission Onwards)  
GENERAL AWARENESS COURSE  
4A14BCA : Discrete Mathematical Structures**

Time : 3 Hours

Max. Marks : 40

**PART – A  
(Short Answer)**

Answer **all** questions. **(6×1=6)**

1. Define set.
2. Define Tautology.
3. Distinct elements of A are mapped into distinct elements of B is called
4. Pictorial representation of a finite partial order on a set is called
5. A graph which allows more than one edge to join a pair of vertices is called a
6. A path of graph G, that includes each edge of G exactly once and intersects each vertex of G at least once is called

**PART – B  
(Short Essay)**

Answer **any 6** questions. **(6×2=12)**

7. Determine the truth table of  $\sim p (q p)$ .
8. Let p be "He is tall" and q be "He is handsome". Write each of the following statements in symbolic form using p and q :
  - a) He is tall and handsome.
  - b) He is neither tall nor handsome.

P.T.O.



9. Find conjunctive normal form of  $p \vee (p \wedge q)$ .
10. Brief note on disjunctive normal form.
11. Prove that  $\forall a \in B, a \cdot a = a$ .
12. Simplify  $z(y + z)(x + y + z)$ .
13. Define Tree with example.
14. What is Hamiltonian graph ?

**PART – C**  
**(Essay)**

Answer **any 4** questions.

**(4×3=12)**

15. Illustrate the following identities by means of Venn diagrams.
  - a)  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
  - b)  $(A \cup B) \cap C = (A \cap C) \cup (B \cap C)$
16. Write down any three properties of complementation of sets.
17. Define inverse mapping with example.
18. Explain Pigeonhole principle.
19. Explain Travelling salesman's problem.
20. Define BFS for a graph and explain with example.

**PART – D**  
**(Long Essay)**

Answer **any 2** questions.

**(2×5=10)**

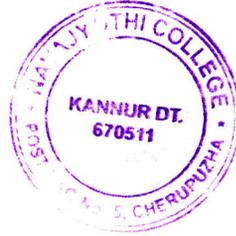
21. Prove that a graph is connected if and only if it has a spanning tree.
  22. Show that  $(p \wedge r) \vee (q \wedge r)$  and  $(p \vee q) \wedge r$  are not logically equivalent.
  23. Let A, B, C are the sets. Prove that  $A - (B \cap C) = (A - B) \cup (A - C)$  if and only if  $A \cap C = \phi$ .
  24. If  $f : A \rightarrow B$  and  $g : B \rightarrow C$  are bijections, then prove that  $g \circ f : A \rightarrow C$  is also a bijection.
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**K21U 1073**

Reg. No. : .....

Name : .....



**IV Semester B.C.A. Degree CBCSS (OBE) Regular Examination, April 2021  
(2019 Admission Only)  
General Awareness Course  
4A 14 BCA : DISCRETE MATHEMATICAL STRUCTURES**

Time : 3 Hours

Max. Marks : 40

**PART – A  
(Short Answer)**

Answer **all** questions.

**(6×1=6)**

1. A set with no elements is called \_\_\_\_\_
2. Define proposition.
3. a.  $a = ?$
4. Define onto mapping.
5. Let  $G = (V, E)$  be a graph. If the elements of  $E$  are ordered pairs of vertices, then the graph  $G$  is called \_\_\_\_\_
6. What is planar graph ?

**PART – B  
(Short Essay)**

Answer **any 6** questions.

**(6×2=12)**

7. Determine the truth table of  $\sim p (q \vee p)$ .
8. Let  $p$  be "it is cold" and  $q$  be "it is raining". Give a simple verbal sentence which describes each of the following :
  - a.  $\sim p$
  - b.  $\sim p \wedge \sim q$
9. Define Hasse diagram.
10. Define relation from  $A$  to  $B$  with example.
11. Describe laws of Boolean Algebra.
12. Simplify  $F = A + A + AB$ .
13. Define complete graph with example.
14. What is graph coloring ?

P.T.O.



PART – C  
(Essay)

Answer any 4 questions.

(4×3=12)

15. Prove that  $(p \wedge q) \vee p$  is tautology.
16.  $A = \{1, 2\}$ ,  $B = \{1, 2, 4, 5\}$ ,  $C = \{5, 7, 9, 10\}$ . Find the following :
  - a)  $(A \cup B) \cup C$
  - b)  $(A \cap B) \cap C$
  - c)  $(A \cup B) \cap C$ .
17. Prove that the theorem : Let  $f : A \rightarrow B$  then  $g : B \rightarrow C$  be both one-one and onto functions, then  $g \circ f : A \rightarrow C$  is also one-one and onto.
18. Simplify  $Y = (P + Q) (P + Q') (P' + Q)$ .
19. Prove that  $K_5$  is non planar graph.
20. The adjacency structure of a graph  $G$  is given as  $G = [A : B, E; B : A, E, F, G; C : D, G, H; D : C, H; E : A, B; F : G; G : B, C, F; H : C, D]$ .

PART – D  
(Long Essay)

Answer any 2 questions.

(2×5=10)

21. Compare DFS and BFS graph.
  22. Describe shortest paths in weighted graphs.
  23. Without using truth tables prove that  $(\sim p \vee q) \wedge (p \wedge (p \wedge q)) = p \wedge q$ .
  24. Write down the properties of Union operations in sets.
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