



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  $F = ++A + AB$ .
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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