

D 12609

(Pages : 2)

Name.....

Reg. No.....

FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION, NOVEMBER 2021

B.C.A.

BCA 1C 02—DISCRETE MATHEMATICS

(2021 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A (Short Answer Type Questions)*Answer at least **eight** questions.**Each question carries 3 marks.**All questions can be attended.**Overall Ceiling 24.*

1. Define contradiction.
2. Define dual of proposition. Write the dual of $(P \wedge Q) \vee T$
3. Show that $\neg P \wedge P$ is a tautology.
4. Explain universal quantifier.
5. Define transitive relation. Show whether the relation $R = \{<1, 2>, <2, 3>, <1, 3>, <2, 1>\}$ is transitive.
6. Define Boolean algebra.
7. Define minterm.
8. Define partially ordered set.
9. Define subgraph of a graph with an example.
10. Define Euler Graph.
11. Define isolated vertex of a graph. Give an example.
12. Define an m-ary tree.

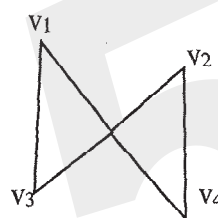
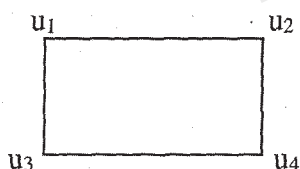
(8 × 3 = 24 marks)

Section B (Short Answer Essay Questions)*Answer at least **five** questions.**Each question carries 5 marks.**All questions can be attended.**Overall Ceiling 25.*

13. Prove distributive law in logic using truth table.
14. Show that $P \rightarrow (Q \rightarrow R) \Leftrightarrow (P \wedge Q) \rightarrow R$ using laws of logic.

Turn over

15. Let $X = \{1, 2, 3, 4\}$ If $R = \{ \langle x, y \rangle / x > y, x \text{ \& } y \in X \}$.
- Write the elements of R and its matrix.
 - Draw the digraph represents the relation.
16. Define equivalence class. Also write the equivalence classes modulo 3 generated by the elements of \mathbb{Z} .
17. Show that the $\langle P(X), \subseteq \rangle$ is a partially ordered set, where X is any set and $P(X)$ is the power set of A .
18. Define isomorphism between two graphs. Show that the following graphs are isomorphic.



19. Show that in a complete binary tree the total number of edges is given by $2(n_i - 1)$. Where n_i is the number of terminal nodes.

(5 × 5 = 25 marks)

Section C (Essay Type Questions)

*Answer any **one** question.
The question carries 11 marks.*

20. Explain relation on a set. Also explain different types of relation on a set. Give examples for each relation.
21. (a) Explain Travelling Salesman Problem.
- (b) Explain Breadth-first search algorithm for spanning tree.

(1 × 11 = 11 marks)