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.

$(8 \times 3 = 24 \text{ marks})$

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 —> (Q —> R) $\Leftrightarrow$ (P $\wedge$ Q) —> R using laws of logic.

Turn over

15. Let X = {1, 2, 3, 4} If R = {<x, y>/ x > y, x & y ∈ X}.

    (a) Write the elements of R and its matrix.

    (b) Draw the digraph represents the relation.

16. Define equivalence class. Also write the equivalence classes modulo 3 generated by the elements of Z.

17. Show that the < P(X), ⊆ > is a 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.
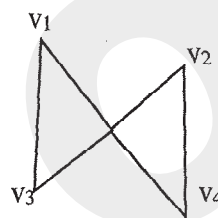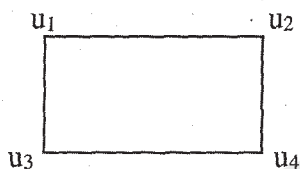
19. Show that in a complete binary tree the total number of edges is given by $2(n_i - 1)$. Where n_i is the number of terminal nodes.

(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)