D 92873 (Pages : 2) Name..................................

Reg. No..............................

FIRST SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2015

(CUCBCSS—UG)

Complementary Course

BCA 1C 02—DISCRETE MATHEMATICS

Time : Three Hours Maximum : 80 Marks

Part A (Objective Type)

Answer all **ten** *questions.*

1. Find the negation of the statement 'Jane is rich and happy'.
2. State DeMorgan's laws in Boolean Algebra.
3. Draw a simple graph on 4 vertices.
4. A walk in which no vertex is repeated is called ————
5. State Euler's formula for plane graph.
6. Find B-A if A = {1, 2, 3, 4, 5} and B = {0, 3, 6}.
7. Number of subsets of a set with n elements is ————
8. Give an example for a 3-regular graph.
9. Give an example for a graph which is Eulerian, but not Hamiltonian.
10. What can we say about sets A and B if $A \cup B = A$?

(10 x 1 = 10 marks)

Part B ((Short Answer Type)

Answer all **five** *questions.*

11. What can we say about the relation R on a set A if R is both a partial order and an equivalence relation ?
12. Use truth tables to verify that p Α T = p.
13. Define isomorphism of two graphs.
14. Define a binary tree.
15. Show that K_4 is planar.

(5 x 2 = 10 marks)

Part C (Short Essay Type)

Answer any **five** *questions.*

16. Discuss different types of quantifiers and give examples.
17. Define a Boolean Algebra.

Turn over

18. Define (a) graph ; (b) regular graph ; (c) multigraph ; and (d) degree of a vertex.

19. Let G be a graph in which the degree of every vertex is at least 2. Then show that G contains circuit.

20. Prove that in a tree every vertex of degree greater than one is a cutvertex.

21. Find the power set of each of these sets:

(a) 4) ; (b) {4)} ; (c) {4), {ϕ}} ; and (d) {x, y}.

22. Explain the concepts of binary tree with an example.

23. Show that in any group of two or more people, there are always two with exactly same number of friends inside the group.

(5 x 4 = 20 marks)

Part D (Essay Type)

Answer any five *questions.*

24. Using truth tables, show that *p v (q* A *r)* and *(p v q) n (p v r)* are logically equivalent 1. Prove

(a) Involution law ; (b) Uniqueness of zero element and unit element ; and (c) Absorption Laws ;

(d) 0' =1 and = 0 for a Boolean Algebra.

25. (a) Show that every cubic graph has an even number of vertices.

(b) Give a short note on Travelling salesman problem.

26. Show that a tree with n vertices has exactly n-1 edges.

27. Show that a graph has a dual if anf only if it is planar.

28. Determine whether the relation R on a set of all people is reflexive, symmetric, anti symmetric and/or transitive where xRy iff :

(a) x is taller than y ; (b) x and y were born on the same day.

29. Write short notes on (a) network ; (b) Max-flow min-cut theorem.

30. (a) Define walk, trail and path ; (b) Show that every walk in a graph contains a path.

31. Show that G is Euler if and only if every vertex of G is even.

(5 x 8 = 40 marks)