

C 33337

(Pages : 2)

Name.....

Reg. No.....

FIRST SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2017

(CUCBCSS—UG)

Complementary Course

BCA 1C 02—DISCRETE MATHEMATICS

Time : Three Hours

Maximum : 80 Marks

Part A (Objective Type)

Answer all the ten questions.

Each question carries 1 mark.

1. What do you mean by a proposition ?
2. Write the negation of the statement 'all people are intelligent'.
3. If  $|A| = 10$  then  $|P(A)| = \text{_____}$ .
4. Draw the graph  $K_{3,2}$ .
5. A closed path is called a \_\_\_\_\_.
6. State Euler's formula for plane graph.
7. Assign a truth value for the statement  $6 + 4 = 10 \wedge 0 < 2$ .
8. Give an example of a 2 regular graph.
9. What do you mean by a cut vertex ?
10. What can you say about sets A and B if  $A \cap B = B$

(10 × 1 = 10 marks)

Part B (Short Answer Type)

Answer all five questions.

Each question carries 2 marks.

11. Construct a truth table for  $\sim p \wedge \sim q$ .
12. Give an example of a relation which is reflexive and transitive but not symmetric.
13. Define isomorphism of two graphs.

Turn over

14. Define bipartite graph.  
 15. What do you mean by a self complimentary graph ? Give an example.

(5 × 2 = 10 marks)

**Part C (Short Essay)**

*Answer any five questions.  
 Each question carries 4 marks.*

16. Define a boolean algebra.  
 17. Show that  $[(p \vee q) \Rightarrow r] \wedge (\sim p) \Rightarrow (q \Rightarrow r)$  is a tautology without using truth tables.  
 18. Prove that in a tree every vertex of degree greater than one is a cut vertex.  
 19. Prove that every connected graph contains a spanning tree.  
 20. Let G be a graph in which the degree of every vertex is at least 2. Show that G contains a circuit.  
 21. Find the power set of each of these sets:  
 (a)  $\phi$ ; (b)  $\{\phi\}$ ;  
 (c)  $\{\phi, \{\phi\}\}$ ; (d)  $\{a, b\}$ .  
 22. Show that in any group of two or more people, there are always two with exactly same number of friends inside the group.  
 23. Prove that a connected graph G is a tree if and only if every edge of G is a cut edge of G.

(5 × 4 = 20 marks)

**Part D**

*Answer any five questions.  
 Each question carries 8 marks.*

24. (a) Write the disjunctive normal form of :  $p \Rightarrow ((p \Rightarrow q) \wedge \sim (\sim q \vee \sim p))$ .  
 (b) Write the conjunctive normal form of :  $(q \vee (p \vee r)) \wedge \sim ((p \vee r) \wedge q)$ .  
 25. Give a short note on traveling salesman problem.  
 26. Prove that a connected graph G with at least two vertices contains at least two vertices that are not cut vertices.  
 27. Prove that a graph has a dual if and only if it is planar.  
 28. Show that G is Euler if and only if every vertex of G is even.  
 29. Write short notes on (a) network; (b) Max-flow min-cut theorem.  
 30. Prove that a graph is bipartite if and only if it contains no odd cycles.  
 31. If G in a simple graph such that  $d(v) \geq \frac{n}{2}$  for all vertices v of G, then show that G is Hamiltonian.

(5 × 8 = 40 marks)