BACHELOR OF COMPUTER APPLICATION
Second Semester
DISCRETE MATHEMATICS
(BCA - 09)

Duration: 3Hrs. **Full Marks: 70**

PART A (Objective) =20
PART-B (Descriptive)=50

PART-B (Descriptive)

Duration: 2 hrs. 40 mins. **Marks: 50**

1. Answer the following questions (any *five*): **2×5=10**

a) State associative laws in set theory.

b) Show that in any group, a subgroup of index two is normal.

c) What is bipartite graph? How many types are there? Explain with an example. (Draw graph).

d) Define proposition with the help of an example.

e) Let a be any element of a Boolean algebra B. Prove the following:

i) Uniqueness of complement: if $a + x = 1$and $a * x = 0$, then $x = a'$.

ii) Involution law: $(a')' = a$.

f) Define Isomorphic and Homeomorphic and Hamiltonian graphs with proper diagrams.

g) Consider a set A={a, b, c} and the Relation on A defined by

R={(a,a),(a,b),(b,c),(c,c)}

Find - a) Reflexive(R) b) Symmetric

2. Answer the following questions (any *five*): **3×5=15**

a) Show by mathematical induction 1+2+3+.....n= (k(k+1))/2.

b) There are 12 chairs in a row, and 9 people sitting (so that 9 chairs are occupied, and 3 chairs are free). Prove that there are 3 consecutive chairs occupied. (Use Piegon Hole concept)

c) Prove P v (P → Q) v {~ (P v Q)} is tautology.

d) Define the logical connective 'conjunction'. Write down the truth table for conjunction of two statement variables.

e) Define sum rule. If there are 14 boys and 12 girls in a class, then find the number of ways of selecting one student as a class representative.

f) Show that in any room of people who have been doing handshaking there will always be atleast two people who have shaken hands the same number of times.

g) Using a graph show that the sum of the degrees of the vertices of a graph G is equal to twice the number of edges in G.

3. Answer the following questions (any *five*): **5×5=25**

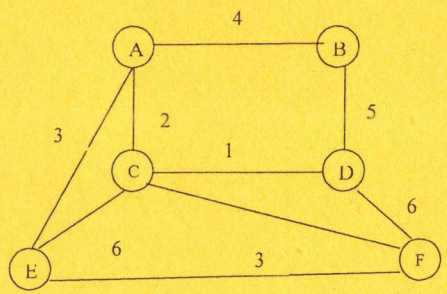
a) Prove De Morgan's theorem using Boolean algebra.

b) In a survey of people, it was found that:

25 read Newsweek Magazine
26 read Time
26 read Fortune
9 read both Newsweek and Fortune
11 read both Newsweek and Time
8 read both Time and Fortune
3 read all three magazines.

i) Find the number of people who read at least one of the three magazines.
ii) Show the above values through Venn diagram.
iii) Find the number of people who read exactly one magazine.

c) Use Prim's algorithm to find out the Minimal Spanning Tree of the given graph.



d) Let A={1,2,3,4}, give an example of mapping which is:

(a) neither symmetric nor anti-symmetric.
(b) anti-symmetric and reflexive but not transitive.
(c) transitive and reflexive but not anti-symmetric.

e) State distributive law used in set theory. Illustrate the law with Venn diagram

f) Define lattices. What is Principle of Extension in Set Theory?

g) Symbolically represent the following statement: "All birds are beautiful."

*****

REV-00
BCA/05/10 2017/08

BACHELOR OF COMPUTER APPLICATION
Second Semester
DISCRETE MATHEMATICS
(BCA - 09)

Duration: 20 minutes **Marks – 20**

PART-A (Objective)

Time: 20 mins **Total Marks: 20**

I. Choose the correct option: **1×20=20**

1. If A and B are sets, then B∩(B-A) is equal to
   A) B-A B) A-B C) B D) A

2. Which of the following is true?
   A) (R,°) is a group but not commutative.
   B) (R,°) is a commutative group.
   C) (R,°) is not a semigroup
   D) (R,°) is not monoid.

3. The number of binary operation in a lattice is,
   A) 1 B)<=2 C)2 D)>2

4. P→Q is false when
   A) Both P and Q are true.
   B) Both P and Q are false
   C) P is true and Q is false
   D) P is false and Q is true

5. Find the negation of: There exists a dog that is 25 years old.
   A) Some dog is not 25 years old.
   B) All dog is 25 years old.
   C) Every dog is 25 years old.
   D) Every dog is not 25 years old.

6. The number of spanning trees for a complete graph with 5 vertices is:
   A) 125 B)25 C)625 D) none of these

7. Which of the following is true?
   A) Every infinite lattice is bounded
   B) Every finite lattice is bounded
   C) Every finite lattice is not lower bounded.
   D) All of these.

8. Which of the following is true?
   A) a+a=1, a.a=0 B) a+a=a,a.a=a
   C) a+a'=0, a.a'=1 D) none of these

9. Which of the following is the correct match?

LIST 1	LIST 2
1) Multi-graph	A) Weights assigned to every edge
2) Weighted graph	B) Contains some parallel edges
3) Null graph	C) Number of edges appearing in sequence
4) Path length	D) Contains only isolated nodes

   A) 1-B 2-D 3-A 4-C
   B) 1-D 2-A 3-B 4-C
   C) 1-B 2-A 3-D 4-C
   D) 1-B 2-A 3-C 4-D

10. A set which contains repetition of elements is called:
    A) Poset B) multiset C) lattice D) Power set

11. Choose the false option:
    A) A finite group of order 7 is abelian.
    B) Every abelian group is cyclic
    C) Every group of order is less than 4 is cyclic.
    D) Every group of prime order is cyclic

12. The set O of odd positive integers less than 10 can be expressed by _____ .
    A) {1, 2, 3}
    B) {1, 3, 5, 7, 9}
    C) {1, 2, 5, 9}
    D) {1, 5, 7, 9, 11}

13. Which of the following two sets are disjoint?
    A) {1, 3, 5} AND {1, 3, 6}
    B) {1, 2, 3} AND {1, 2, 3}
    C) {1, 3, 5} AND {2, 3, 4}
    D) {1, 3, 5} and {2, 4, 6}

14. The set N of natural numbers where x * y = max{x, y} is a .....

A) Ring B) Complete lattice

C) Semigroup D) Field

15. Circle has.....

A) No vertices B) only 1 vertices

C) 8 vertices D) none of the above

16. Hasse diagram are drawn

A) Partially ordered sets B) Lattices

C) Boolean algebra D) poset

17. The maximum degree of any vertex in a simple graph with n vertices is

A) n-1 B) n+1 C) 2n+1 D) n

18. The relation { (1,2), (1,3), (3,1), (1,1), (3,3), (3,2), (1,4), (4,2), (3,4)} is

A) Reflexive B) Transitive

C) Symmetric D) Asymmetric

19. If R is a relation "Less Than" from A = {1,2,3,4} to B = {1,3,5} then RoR-1 is

A) {(3,3), (3,4), (3,5)}

B) {(3,1), (5,1), (3,2), (5,2), (5,3), (5,4)}

C) {(3,3), (3,5), (5,3), (5,5)}

D) {(1,3), (1,5), (2,3), (2,5), (3,5), (4,5)}

20. A graph is tree if and only if

A) Contains a circuit B) Is planar

C) Is completely connected D) Is minimally

*****

University of Science and Technology, Meghalaya

Date Stamp:_____

SESSION 2016-17

COURSE_____PAPER Code:_____

NAME OF THE PAPER:_____

SEMESTER_____

Instructions to Candidates

1. This answer booklet has 4 pages. Please check before writing whether it is complete or in good condition.
2. Do not write your name anywhere in the answer booklet.
3. Write legibly on both sides of the paper
4. You may use some space for any rough notes or calculation on the answer booklet if you need. These rough notes, calculations must be scored out before submitting the answer booklet.
5. Do not bring any book or loose paper in the examination hall.
6. Do not tear any page from the answer booklet.
7. Do not write anything on the question paper or blotting paper or any pieces of paper while you are in the examination hall.
8. Any act of indiscipline or misbehavior in the examination hall will result in your expulsion.
9. No examinee is allowed to leave the examination hall until 30 minutes lapse after the commencement of the examination.
10. Additional answer sheet will be supplied after the main answer booklet is completed.

For Objective Type Questions

Page No.	Marks
Total	

For Descriptive Type Questions

Question No.	Marks
Total	
Grand Total	

Session: 2016-17

Course_____

Roll No._____

Enrollment No._____

Semester_____

Name of the Paper_____

_____

_____

Paper Code_____

Scrutinizer's Signature

Examiner's Signature

Invigilator's Signature