

Date:

Registration number:

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

**BCA - II SEMESTER**

**SEMESTER EXAMINATION: APRIL 2022**

**(Examination conducted in July 2022)**

**CA 2321 – Discrete Mathematical Structures**

Time- 2 hrs Max Marks-60

This Question Paper has three parts

**Part A**

**Answer all the following questions (10\*1=10)**

1. and …………………. are logically equivalent.

2. Use De-Morgan’s law to find the negation of the statement “Allen has a book and he has a pen”.

a. “Allen does not have a book or he does not have a pen”.

b. “Allen has a book or he has a pen”.

c. “Allen does not have a book and he does not have a pen”.

d. “Allen does not have a book or he has a pen”.

3. Let Q(x, y) denote the statement “x=y+3” , what are the truth value of the proposition Q(3,0) ?

a. True

b. False

c. Neither True nor False

d. None of the above

4. The negation of the statement is ……………….

a.

b.

c.

d.

5. The equation has no solution for ……………. and ………….

a. and

b. and

c. and

d. and

6. Let A be the set of odd positive integers less than 10, then = ………

a. 4

b. 10

c. 3

d. 5

7. Which of the following set are called disjoint sets.

a. A={1,2,3,4,5} and B={4,7,5,6,1}

b. A={1,2,3,4} and B={5,6,7,8}

c. A={34,45,55} and B={34,74,56}

d. All of the above.

8. Let and , then = ……………………….

a. 6x+7

b. 6x+11

c. 6x+10

d. 6x+8

9. The following sequence is an example of …………………….:

1, -1, 1, -1,…………..

a. Arithmetic Progression

b. Geometric Progression

c. Recursive function

d. None of the above

10. What is the value of the following summation notation is …………

a. 1

b. -1

c. 0

d. 2

**Part B**

**Answer any 5 questions. Each question carries 4 marks each. (5\*4=20)**

11. Find using Truth Table.

12. Define and explain the Pigeonhole principle.

13. a) How many Permutations of the letters ABCDEFGH contains the string ABC.

b) How many Poker hands of 6 cards can be dealt from a deck of 52 cards?

**(2+2)**

14. Let and be the real numbers and be denoted by “x+y=0”, find the truth of .

15. Explain the principle of Inclusion-Exclusion using an example.

16. Explain Recursive Algorithm. Give a recursive algorithm to compute .

17. Explain the following Graph terminologies:

a) Degree of a Vertex

b) The Handshake theorem

c) Complete graph

d) Bipartite graph **(1+1+1+1)**

**Part C**

**Answer any 2 questions. Each question carries 15 marks each. (15\*2=30)**

18. a) Explain the Binomial theorem with an example.

b) How many different strings can be made by re-ordering the letters of the word SUCCESS.

c) Explain the tower of Hanoi problem in detail. **(5+5+5)**

19. a) Explain Generating function with an example.

b) There are 345 students at a college who have taken a course in calculus, 212 who have taken a course in Discrete Mathematics and 188 who have taken courses in both Calculus and Discrete Mathematics. How many students have taken a course in either Calculus or Discrete mathematics? Solve using Inclusive-Exclusive principle. **(8+7)**

20. a) Briefly explain any five different types of Graph models.

b) What is Adjacency matrix?

c) What is Graph Colouring?

d) Give any three examples of Graph Colouring problem. **(5+2+2+6)**