

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. $¬\left(p\rightarrow q\right) $and …………………. are logically equivalent.
2. $\left(p∨-q\right)$
3. $\left(-p∨-q\right)$
4. $\left(p∨q\right)$

1. $\left(p∧-q\right)$

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 $∀xP\left(x\right)$ is ……………….

 a. $∀x¬P\left(x\right)$

 b. $∃xP\left(x\right)$

 c. $∃x¬P\left(x\right)$

 d. $v¬xP\left(x\right)$

5. The equation $x^{n}+y^{n}=z^{n}$ has no solution for ……………. and ………….

 a. $xyz=0$ and $n<0$

 b. $xyz\ne 0 $and $n>0$

 c. $xyz=0$ and $n>2$

 d. $xyz\ne 0$ and $n>2$

6. Let A be the set of odd positive integers less than 10, then $\left|A\right|$ = ………

 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 $f\left(x\right)=2x+3$ and $\left(x\right)=3x+2$ , then $\left(y^{o}f\right)\left(x\right)$= ……………………….

 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 $Σ\_{4}^{8}\left(-1\right)^{k}$ 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 $\left(\left(P∨Q\right)∧R\right)$ 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 $x$ and $y$ be the real numbers and $p\left(x,y\right)$ be denoted by “x+y=0”, find the truth of $∀x∀yP\left(x,y\right)$.

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

 16. Explain Recursive Algorithm. Give a recursive algorithm to compute $a^{n}$.

 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)**