

CODE: **192663**  
NOVEMBER 2020

TIME: 2Hrs  
MAX. MARKS : 50

**PART A**

(10 x 2=20)

Answer any **TEN** questions

1. Given that  $N = \{1, 2, 3, \dots, 100\}$ , then Write the subset A of N, whose element are odd numbers.
2. If a set A contains distinct elements, then the number of elements in power set A.
3. If A and B are non- empty sets having n elements in common, then show that  $A * B$  and  $B * A$  have  $n^2$  elements in common.
4. What is direct and indirect proof?
5. Compute the truth table of  $(F \vee G) \wedge \neg(F \wedge G)$ .
6. Which are five connectives used in propositional logic.
7. Give two example of predicates logic.
8. In  $Z_p$ , list the inverses of each non-zero element, where  $p = 23$ .
9. What are the squares in  $Z_{37}$ ?
10. Write the basic counting rules.
11. Define the basic properties of relation.
12. What is transitive relation?

**PART B**

(2 x 5=10)

Answer any **TWO** questions

13. Briefly explain the types of Sets.
14. If  $A = \{\alpha, \beta\}$  and  $B = \{1, 2, 3\}$  then find  $A * B$ ,  $B * A$ ,  $A * A$  and  $B * B$ .
15. Explain the Tautology and Contradiction.
16. Let  $P(x)$  and  $Q(x)$  be two predicates in one variable, and let  $D_x$  be the universe of x. Then the associated truth and falsity then which sets satisfy the properties
17. Briefly explain the division algorithm.
18. Write the various steps involved in Recursive algorithms.
19. Find the coefficient of  $x^{11}$  in the expansion of  $x^3 - 2^{12}/x^2$
20. Explain Equivalence relations with example.

**PART C**

(2x10=20)

Answer any **TWO** questions

21. Discuss briefly the various Laws of set Theory.
22. Explain different types of Functions.
23. Explain the following:
  - i. Prove that  $(1 + \sqrt{5})/2$  and  $(1 - \sqrt{5})/2$  are solutions to the equation  $x^2 = x + 1$
  - ii. Prove that if n is an even integer, then  $n = 4k$  or  $n = 4k + 2$  for some integer k.
24. Explain with example Permutations and Combinations.
25. Explain and Give example for binary relation.

