> **Following short questions are selected from previous 5 years papers of different boards. Solve these at your own to perform well in annual exams.**

1. Define complement of a set.

2. Define the difference of two sets.

3. Prove that for any two sets A and B, $A - B = A \cap B^c$.

4. What is the difference between $\{a, b\}$ and $\{\{a, b\}\}$?

5. If $A = \{1, 2, 3, 4\}$, $B = \{3, 4, 5, 7, 8\}$, $C = \{1, 2, 3, 7, 8, 9\}$, verify the associative laws of union and intersection.

6. Define power set of a set.

7. Write down the power set of $\{a, \{b, c\}\}$.

8. Write down the power sets of $\{\}$ and $\{0\}$.

9. Write any two proper subsets of $\{a, b, c\}$.

10. Show $A - B$ by Venn diagram when A and B are overlapping sets.

11. Under what conditions on A and B, $n(A) = n(A \cap B)$?

12. What is meant by a tautology?

13. Show that $\sim (p \to q) \to p$ is a tautology.

14. Show that $p \to (p \lor q)$ is a tautology.

15. Write the converse and inverse of $\sim p \Rightarrow q$.

16. Write the converse and contrapositive statement of $p \Rightarrow q$.

17. Construct the truth table for $(p \land \sim q) \Rightarrow q$.

18. For $A = \{1, 2, 3, 4\}$, find the relation $\{(x, y) : x = y\}$ in A.

19. For $A = \{1, 2, 3\}$, find the relation $\{(x, y) : x + y < 5\}$ in A.

20. Find the inverse of the relation $\{(1, 2), (2, 5), (3, 4), (2, 1), (5, 4)\}$.

21. Find the inverse of the relation $\{(x, y) : y^2 = 4ax, x \geq 0\}$.

22. Define a semigroup.

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23. Define a group.

24. If a and b are elements of a group G, then show that $(ab)^{-1} = b^{-1}a^{-1}$.

25. Show that the set of natural numbers, $\mathbb{N}$ is not a group w.r.t. addition.

26. Show that $\{1, \omega, \omega^2\}$, where $\omega^3 = 1$, is an abelian group w.r.t. multiplication.

27. If a, b are elements of a group G, then solve the equation $ax = b$.

28. If e is the identity in a group G, show that e is unique.

Best of Luck