

Comprehensive Test Series-06
CHAPTER[1,2,4]

TIME: 1hr

MM: 30

General Instructions:

- All Questions are compulsory.
 - Each question carries 3 marks.
 - Use of calculator is not permitted.
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Q.1 If $U = \{a,b,c,d,e\}$, $A = \{a,b,c\}$ and $B = \{b,c,d,e\}$, then verify that:

(i) $(A \cup B)' = (A' \cap B')$ (ii) $(A \cap B)' = (A' \cup B')$

Q.2 In a group of 850 persons, 600 can speak Hindi and 340 can speak Tamil. Find

- (i) how many can speak both Hindi and Tamil.
- (ii) how many can speak Hindi only.
- (iii) how many can speak Tamil only.

Q.3 If $A = \{1, 3, 5\}$, $B = \{3, 4\}$ and $C = \{2, 3\}$, verify that:

(i) $A \times (B \cup C) = (A \times B) \cup (A \times C)$
(ii) $A \times (B \cap C) = (A \times B) \cap (A \times C)$

Q.4 Find the domain and range of the real function $f(x) = \sqrt{9-x^2}$.

Q.5 Using the principle of mathematical induction, prove the following for all $n \in \mathbb{N}$:
 $2 + 6 + 18 + \dots + 2 \cdot 3^{n-1} = (3^n - 1)$

Q.6 $1 \cdot 2 + 2 \cdot 2^2 + 3 \cdot 2^3 + \dots + n \cdot 2^n = (n - 1) \cdot 2^{n+1} + 2$

Q.7 $(2^{3n} - 1)$ is divisible by 7.

Q.8 $(x^{2n} - 1)$ is divisible by $(x - 1)$, where $x \neq 1$.

Q.9 $(x^{2n} - y^{2n})$ is divisible by $(x + y)$.

Q.10 Describe the following sets in Roster form:

(i) $\{x \in \mathbb{N} : x^2 < 36\}$

(ii) $\{x : x \text{ is a two digit number such that the sum of its digits is } 8\}$