

Answer any two questions from the following: $2 \times 5 = 10$

1. Let Z be the set of all integers and $A = \{x \in Z : 1 \leq x \leq 10\}$,
 $B = \{x \in Z : 6 \leq x \leq 15\}$, $C = \{x \in Z : 3 \leq x \leq 12\}$ verify that $A \cup (B \cap C)$
 $= (A \cup B) \cap (A \cup C)$

2. In an examination of 100 students, 70 passed in Mathematics, 65 passed in Physics and 55 passed in Chemistry. Of these students, 50 passed in Mathematics and Physics, 45 passed in Mathematics and Chemistry, 40 passed in Physics and Chemistry and 35 passed in all the three subjects.
 (i) How many students passed in exactly two of the three subjects?
 (ii) How many students failed in all the three subjects?

3. If $A \cap B = A \cap C$ and $A \cup B = A \cup C$, prove that $B = C$.

4. Use Set theory to find the H.C.F. and L.C.M. of the numbers 12, 20

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5. N is a set of Natural numbers and a relation R defined on $N \times N$ such that $(a, b) R (c, d) \Rightarrow ad = bc \quad \forall (a, b) \text{ and } (c, d) \in N \times N$.
 Show that R on $N \times N$ is an equivalence relation.