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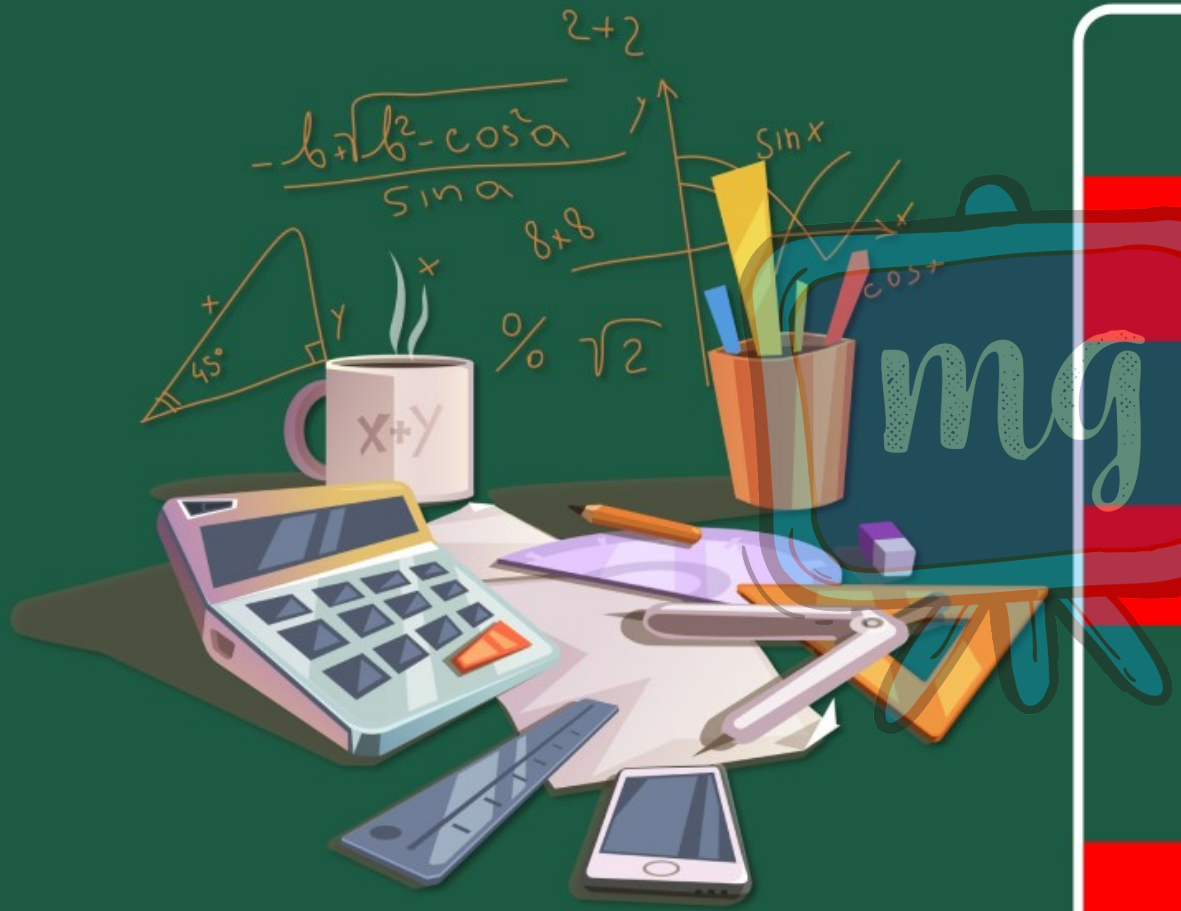

कक्षा - 11

गणित

अध्याय – 1

समुच्चय

भाग – 14

विविध प्रश्नावली (3 से 4)

हर्ष गोयल

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विविध प्रश्नावली

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3. मान लीजिए A, B, और C ऐसे समुच्चय हैं कि $A \cup B = A \cup C$ तथा $A \cap B = A \cap C$, तो दर्शाइए कि $B = C$.



दिया है : $A \cup B = A \cup C$ — (1)

तथा $A \cap B = A \cap C$ — (2)

सिद्ध करना है : $B = C$

(i) $B \subset C$

(ii) $C \subset B$

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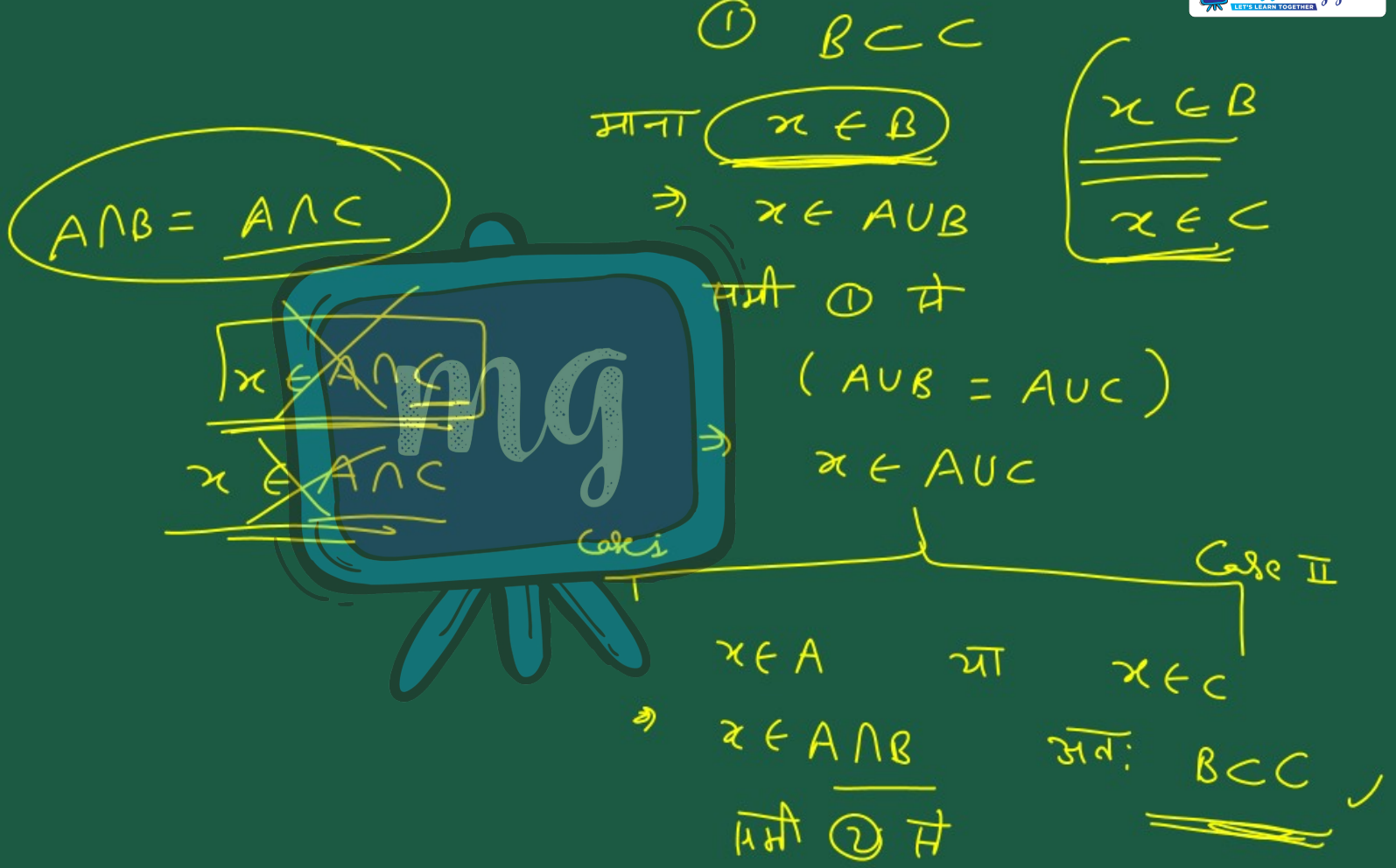

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Case I

$x \in A \cap B$

समी (2)

$(\because A \cap B = A \cap C)$

$\Rightarrow x \in A \cap C$

$\Rightarrow x \in C$

अतः

$B \subset C$

Case II

$B \subset C$

$\boxed{B \subset C}$ — (3)



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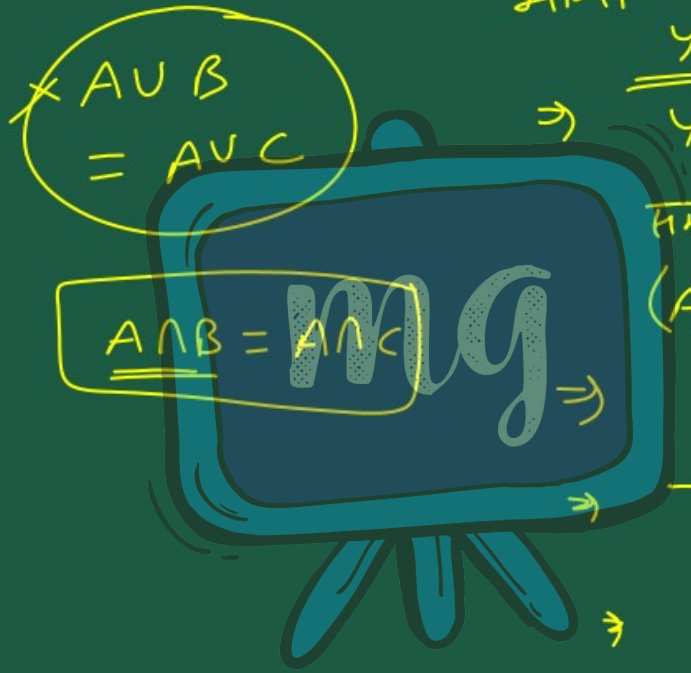

$A \cup B = A \cup C$

$A \cap B = A \cap C$

$C \subset B$

माना $y \in C$

$\Rightarrow y \in A \cup C$

समी ① से

$(A \cup C = A \cup B)$

$y \in A \cup B$

$y \in A$ या $y \in B$

$y \in A \cap C$

समी ② से

$(A \cap C = A \cap B)$

$y \in C$

$y \in B$

अतः $C \subset B$

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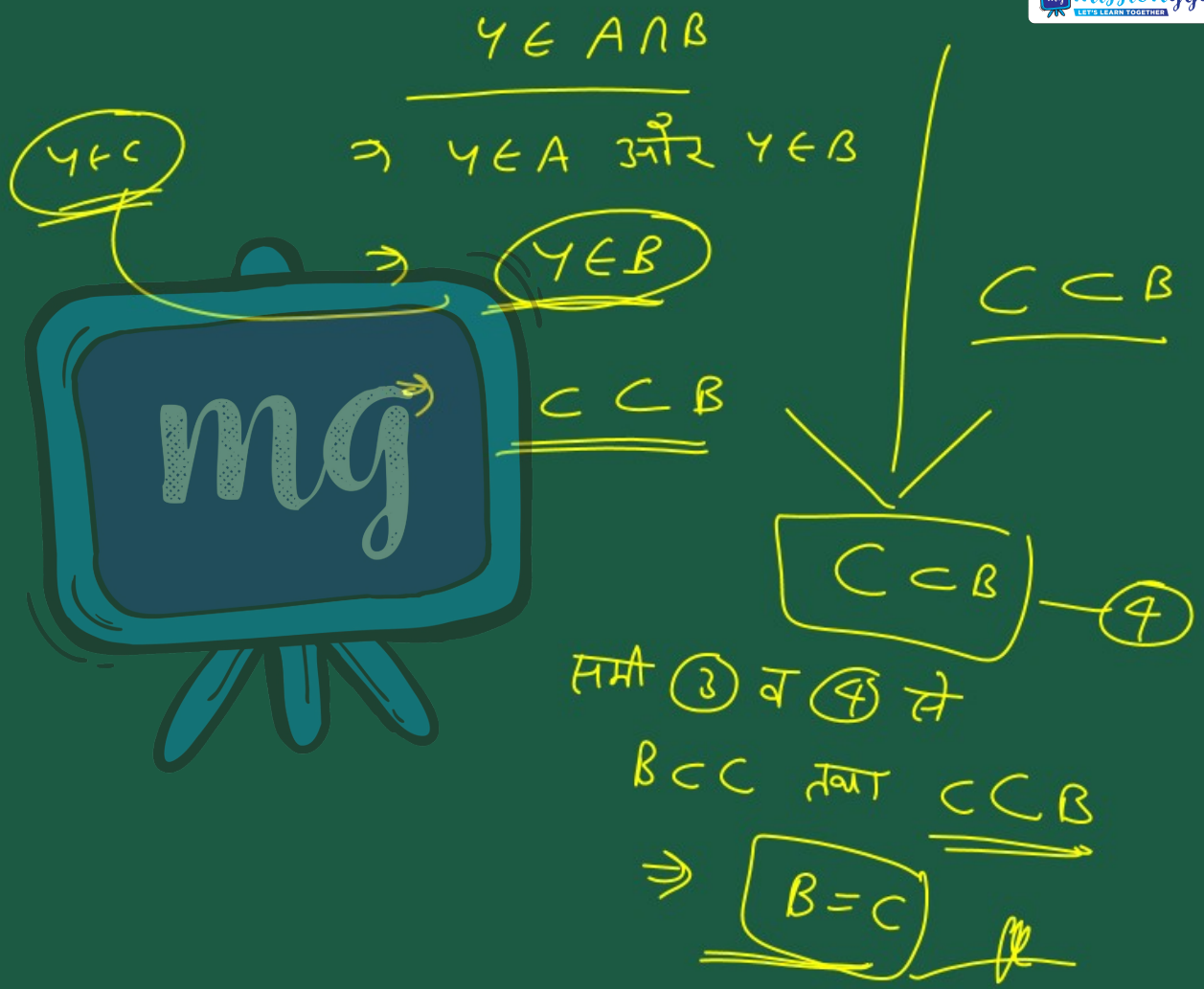

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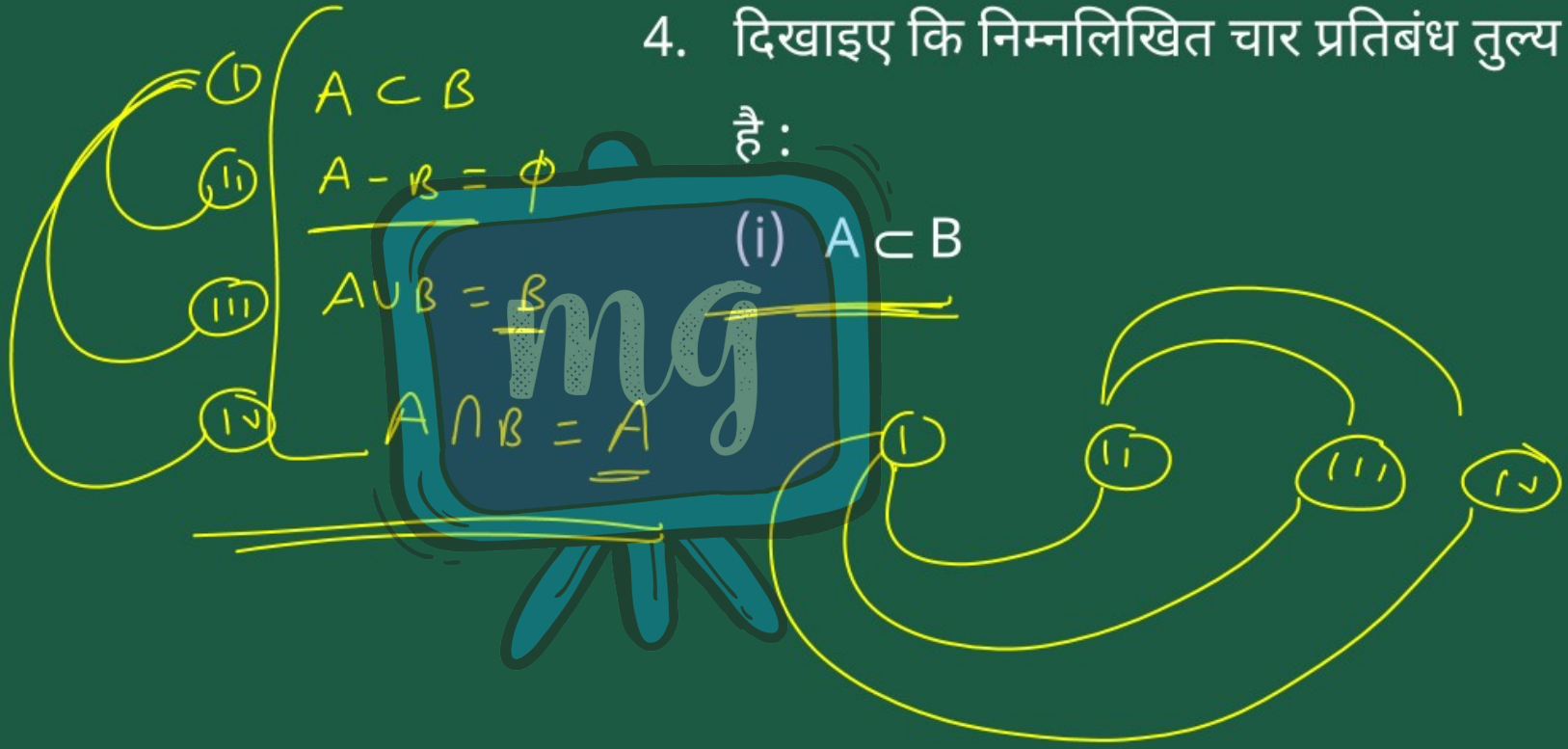
4. दिखाइए कि निम्नलिखित चार प्रतिबंध तुल्य है :

(i) $A \subset B$



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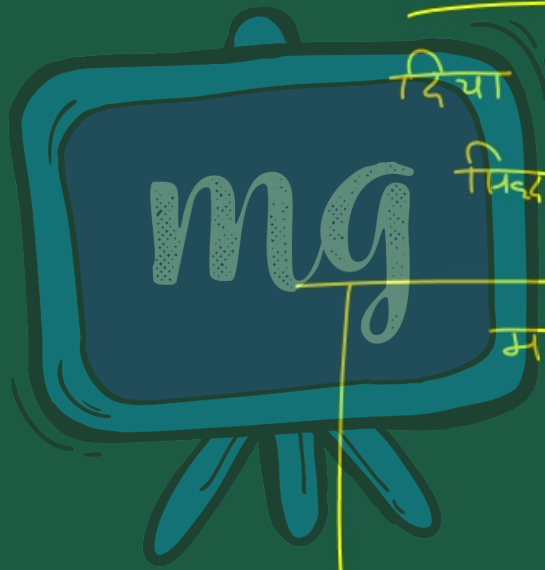
(ii) $A - B = \phi$

दिया है : $A - B = \phi$

सिद्ध करना है : $A \subset B$



माना

$A = \{1, 2\}$

$B = \{1, 2, 3\}$

$A - B = \phi$

$\rightarrow$ $A \subset B$

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$A \subset B$

$A - B = \phi$

माना $x \in A$

$(\because A - B = \phi)$

$\Rightarrow x \in B$

$\Rightarrow \boxed{A \subset B}$



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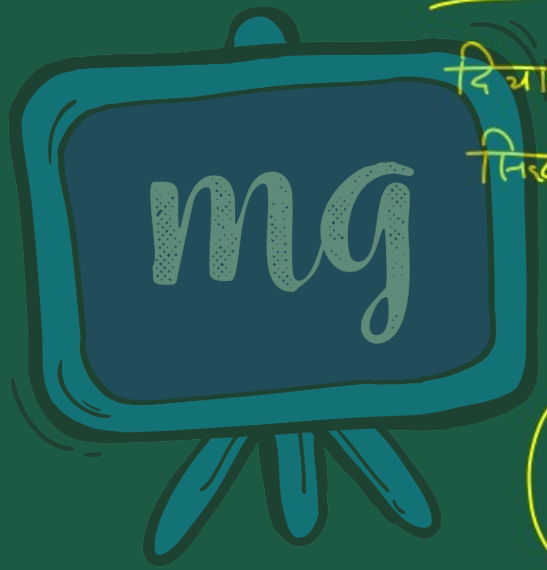
(iii) $A \cup B = B$



दिया है: $A \cup B = B$

सिद्ध करना है $A \subset B$

माना $x \in A$

$\Rightarrow x \in A \cup B$

$(\because A \cup B = B)$

$\Rightarrow x \in B$

$\Rightarrow A \subset B$

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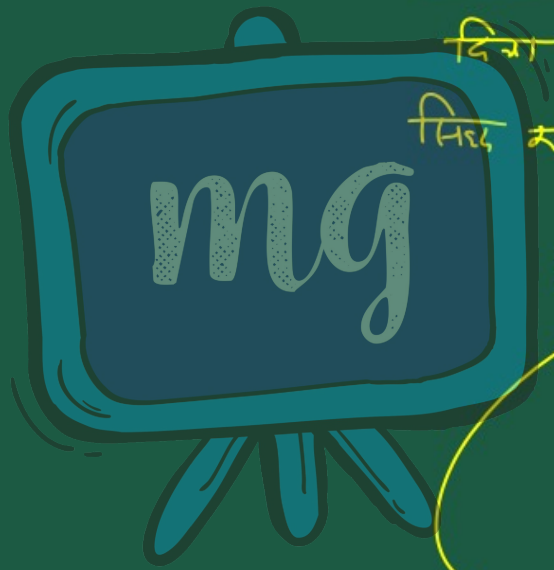
(iv) $A \cap B = A$



दिया है : $A \cap B = A$

सिद्ध करना है : $A \subset B$

माना $x \in A$

$(\because A \cap B = A)$

$\Rightarrow x \in A \cap B$

$\Rightarrow x \in B$

$\Rightarrow A \subset B$

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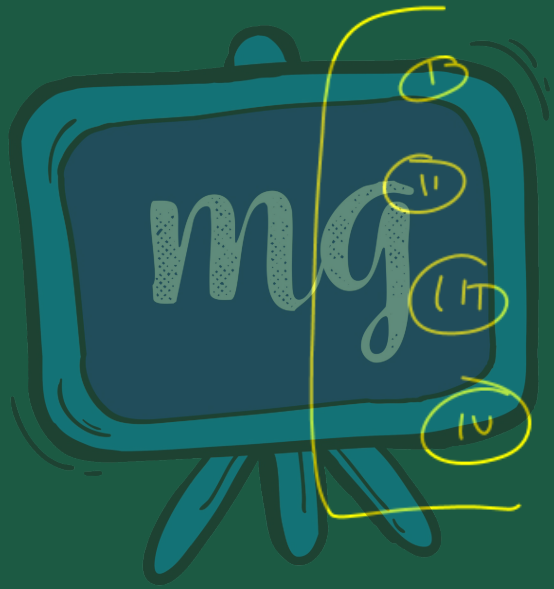
अत: चारो आपस मे तुल्य है :



I $A \subset B$

II $A - B = \phi$

III $A \cup B = B$

IV $A \cap B = A$