

OPERATIONS ON System

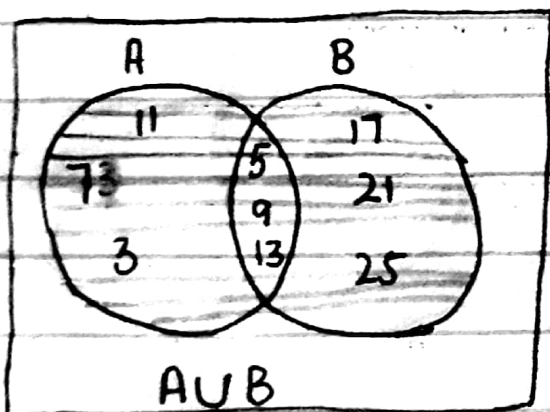
Exercise (1.3)

Verify the commutative law of union and intersection of the following sets through Venn diagrams:

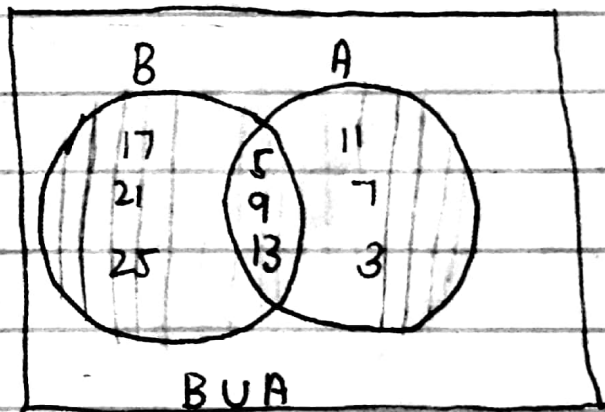
(i) $A = \{3, 5, 7, 9, 11, 13\}$ $B = \{5, 9, 13, 17, 21, 25\}$

$$A \cup B = \{3, 5, 7, 9, 11, 13\} \cup \{5, 9, 13, 17, 21, 25\}$$
$$= \{3, 5, 7, 9, 11, 13, 17, 21, 25\}$$

$$B \cup A = \{5, 9, 13, 17, 21, 25\} \cup \{3, 5, 7, 9, 11, 13\}$$
$$= \{3, 5, 7, 9, 11, 13, 17, 21, 25\}$$



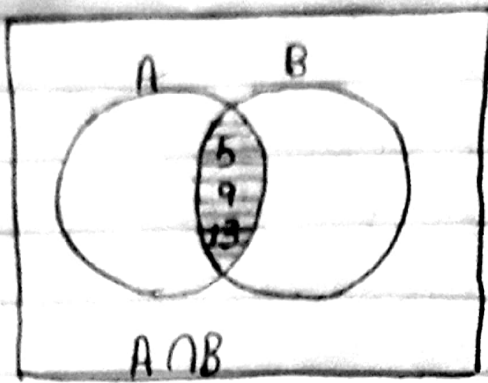
$$A \cup B = \equiv$$



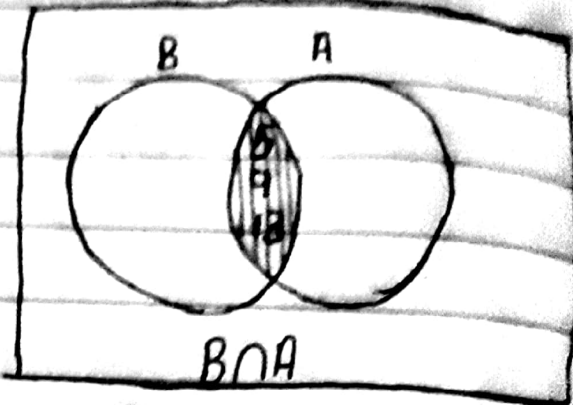
$$B \cup A = \equiv$$

$$A \cap B = \{5, 9, 13, 17, 21, 25\} \cap \{3, 5, 7, 9, 11, 13\}$$
$$= \{5, 9, 13\}$$

$$B \cap A = \{3, 5, 7, 9, 11, 13\} \cap \{5, 9, 13, 17, 21, 25\}$$
$$= \{5, 9, 13\}$$



$$A \cap B = \text{III}$$



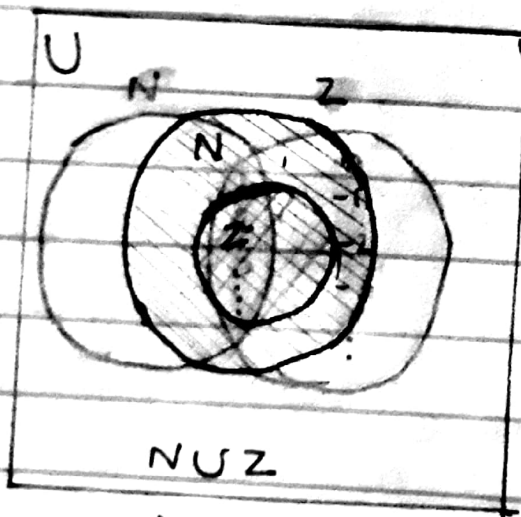
$$B \cap A = \text{III}$$

ii) The set N and Z ?

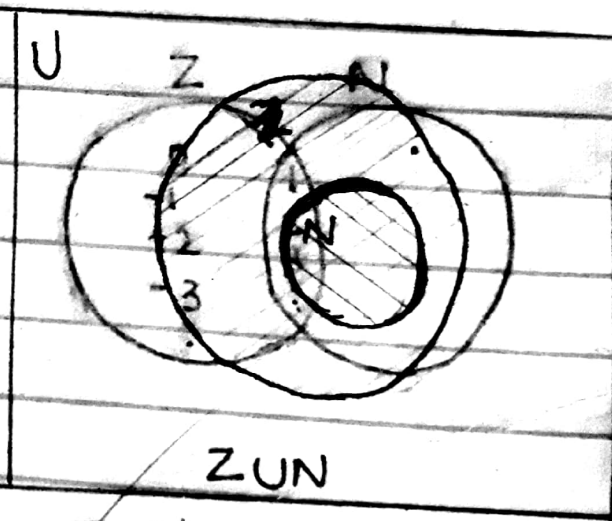
$$N = \{1, 2, 3, \dots\}, \quad Z = \{0, \pm 1, \pm 2, \pm 3, \dots\}$$

$$\begin{aligned} N \cup Z &= \{1, 2, 3, \dots\} \cup \{0, \pm 1, \pm 2, \pm 3, \dots\} \\ &= \{0, \pm 1, \pm 2, \pm 3, \dots\} \end{aligned}$$

$$\begin{aligned} Z \cup N &= \{0, \pm 1, \pm 2, \pm 3, \dots\} \cup \{1, 2, 3, 4, \dots\} \\ &= \{0, \pm 1, \pm 2, \pm 3, \pm 4, \dots\} \end{aligned}$$



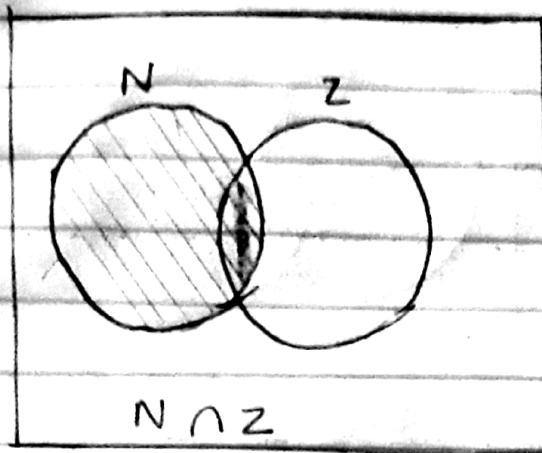
$$N \cap Z = \text{III}$$



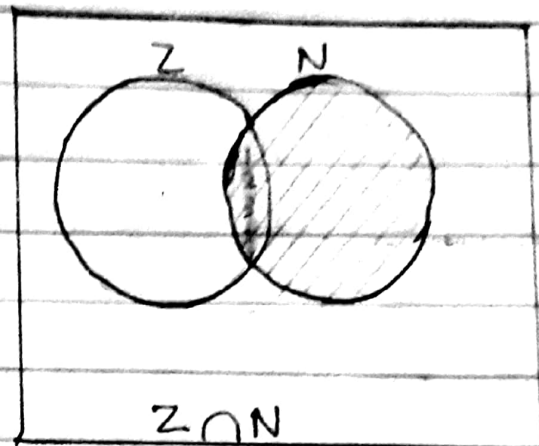
$$Z \cap N = \text{III}$$

$$\begin{aligned} N \cap Z &= \{1, 2, 3, \dots\} \cap \{0, \pm 1, \pm 2, \pm 3, \dots\} \\ &= \{1, 2, 3, 4, \dots\} \end{aligned}$$

$$\begin{aligned} Z \cap N &= \{0, \pm 1, \pm 2, \pm 3, \dots\} \cap \{1, 2, 3, \dots\} \\ &= \{1, 2, 3, 4, \dots\} \end{aligned}$$



$$N \cap Z = N \equiv$$

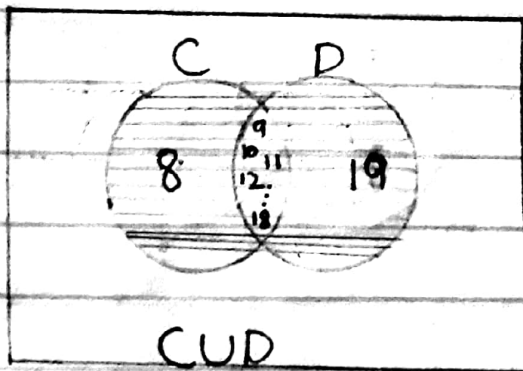


$$Z \cap N = N \equiv$$

iii) $C = \{x | x \in N \wedge 8 \leq x \leq 18\}$ $D = \{x | x \in N \wedge 9 \leq x \leq 19\}$
 $C = \{8, 9, 10, 11, \dots, 18\}$ $D = \{9, 10, 11, \dots, 19\}$
 $C \cup D = \{8, 9, 10, 11, \dots, 18\} \cup \{9, 10, 11, \dots, 19\}$
 $= \{8, 9, 10, 11, 12, \dots, 19\}$

$$D \cup C = \{9, 10, 11, 12, \dots, 19\} \cup \{8, 9, 10, \dots, 18\}$$

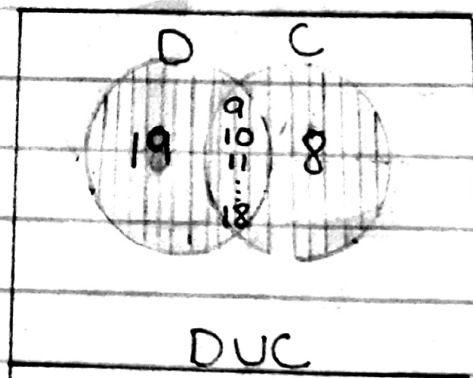
$$= \{8, 9, 10, 11, 12, \dots, 19\}$$



$$C \cap D = \equiv$$

$$C \cap D = \{8, 9, 10, 11, \dots, 18\} \cap \{9, 10, 11, \dots, 19\}$$

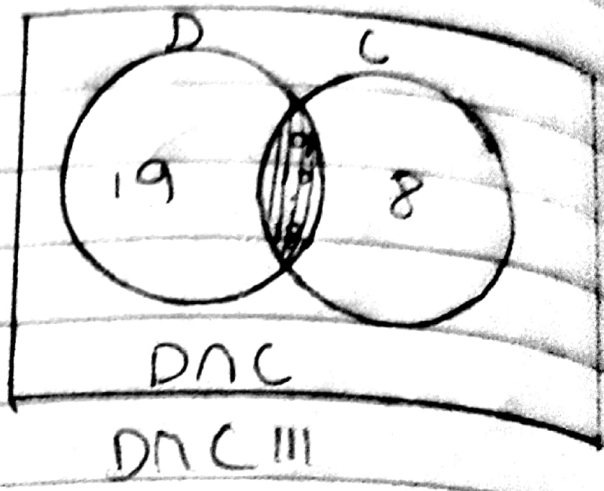
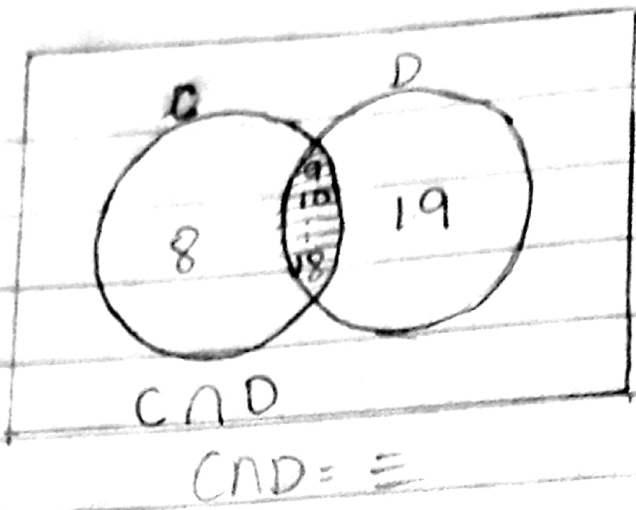
$$= \{9, 10, 11, 12, \dots, 18\}$$



$$D \cap C = \equiv$$

$$D \cap C = \{9, 10, 11, \dots, 19\} \cap \{8, 9, 10, \dots, 18\}$$

$$= \{9, 10, 11, \dots, 18\}$$



v- The set E and O.

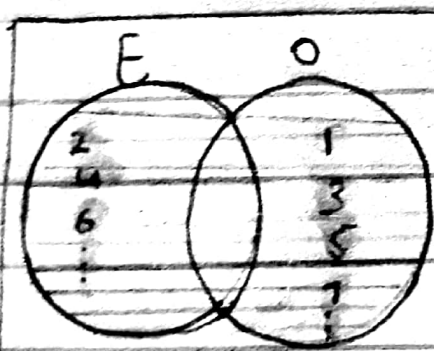
$$E = \{2, 4, 6, 8, \dots\}, O = \{1, 3, 5, 7, 9, \dots\}$$

$$E \cup O = \{2, 4, 6, 8, \dots\} \cup \{1, 3, 5, 7, 9, \dots\}$$

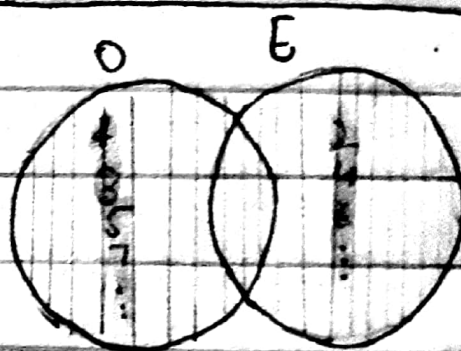
$$= \{1, 2, 3, 4, 5, 6, \dots\}$$

$$O \cup E = \{1, 3, 5, 7, 9, \dots\} \cup \{2, 4, 6, 8, \dots\}$$

$$= \{1, 2, 3, 4, 5, 6, \dots\}$$



$$E \cap O = \equiv$$



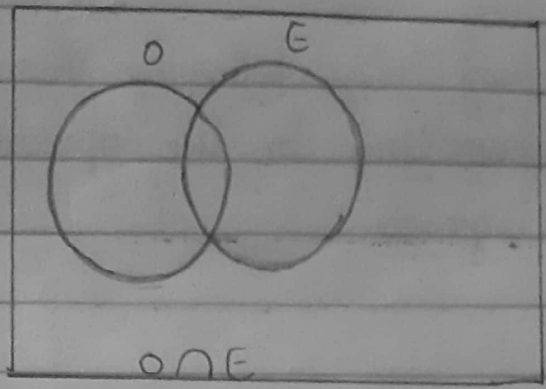
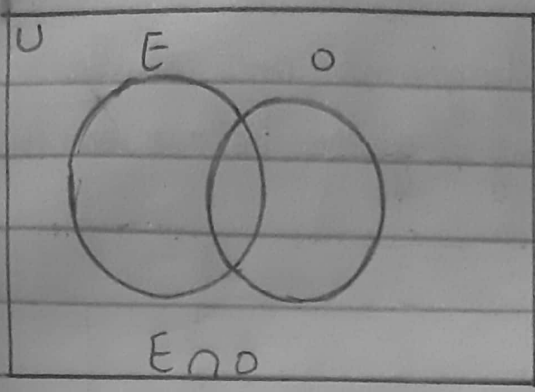
$$O \cap E = \equiv$$

$$E \cap O = \{2, 4, 6, 8, 9, \dots\} \cap \{1, 3, 7, 5, 11, \dots\}$$

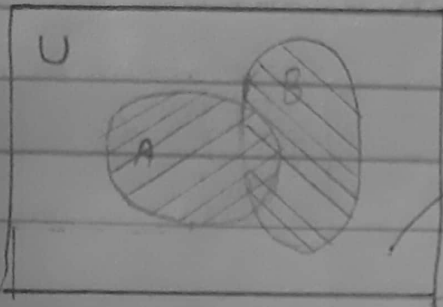
$$= \{ \}$$

$$O \cap E = \{1, 3, 7, 5, 11, \dots\} \cap \{4, 2, 6, 8, 9, \dots\}$$

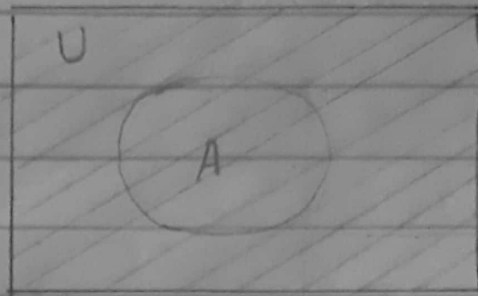
$$= \{ \}$$



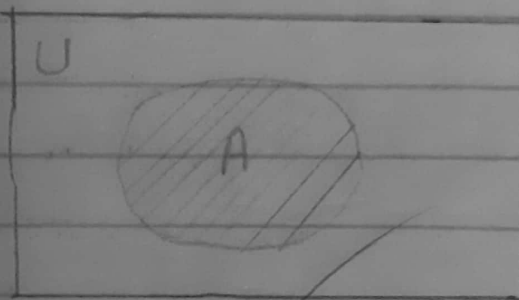
Q2 Copy the following figures and shade according to the operation mentioned below each:



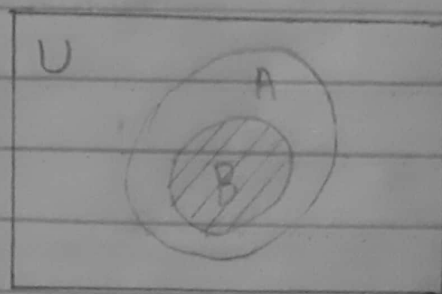
$A \cup B$



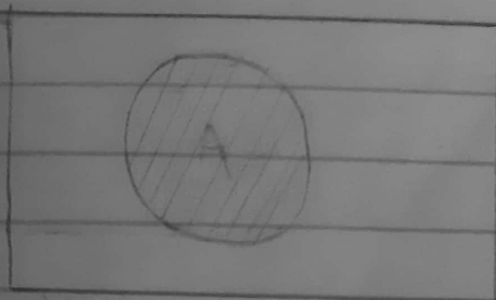
$U \cup A$



$A \cup U$



$A \cap B$

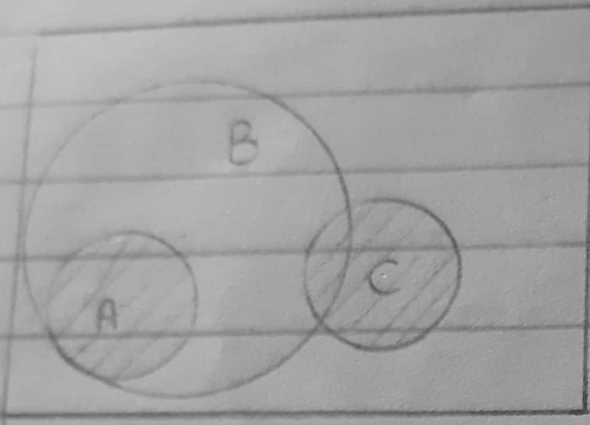


$U \cap A$

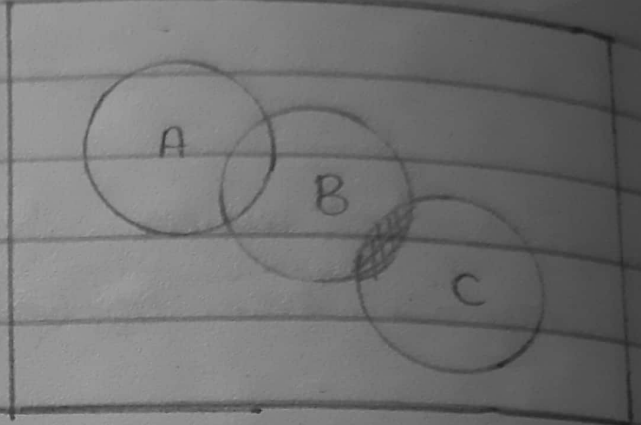


$A \cap A$

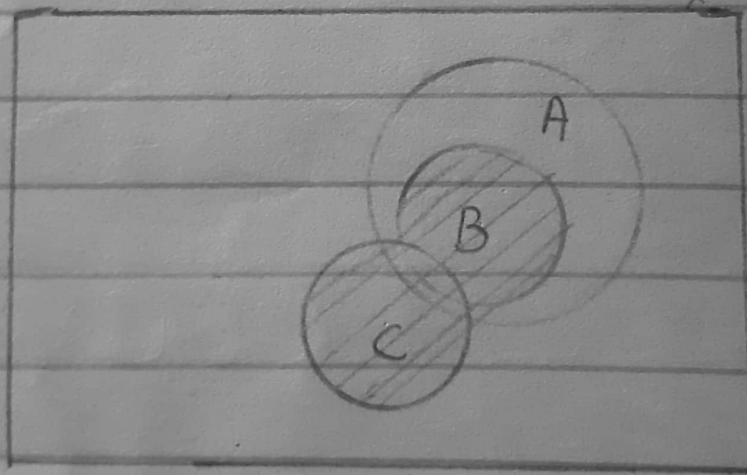
Q4 Copy the following Venn diagrams and shade according to the operating, given below each diagram.



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



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



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