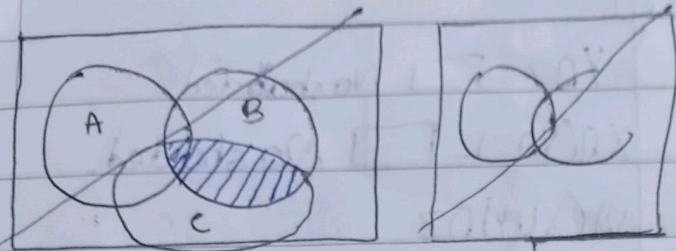


Unit 3

Ex 3.1

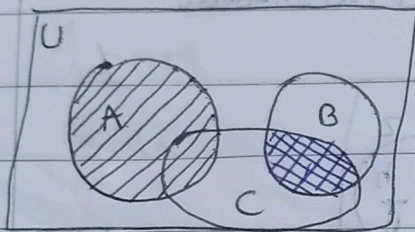
Q1

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

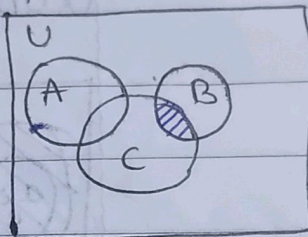


$B \cap C = \text{shaded area}$

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



$B \cap C = \text{shaded area}$



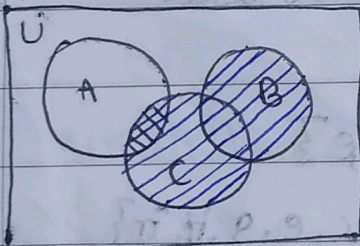
$B \cap C = \text{shaded area}$

$A \cup (B \cap C) = \text{shaded area} + \text{unshaded area}$

$A \cap (B \cap C) = \text{shaded area}$ No shaded

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

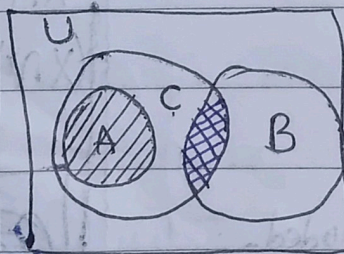
i) $A \cup (B \cap C)$



$A \cap (B \cup C) = \text{shaded area}$

2 part

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



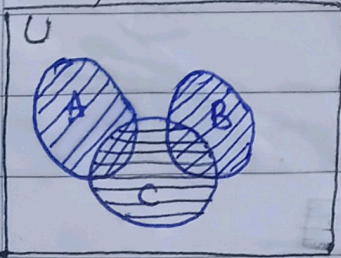
$B \cap C = \text{shaded area}$

$A \cap (B \cup C) = \text{shaded area}$

$(A \cup B) \cap C$

$A \cup (B \cap C) = \text{shaded area} + \text{unshaded area}$

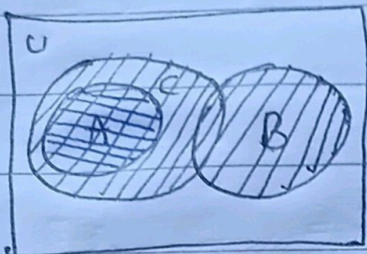
iii) $(A \cup B) \cap C$



$A \cup B = \text{shaded area}$

$(A \cup B) \cap C = \text{shaded area}$

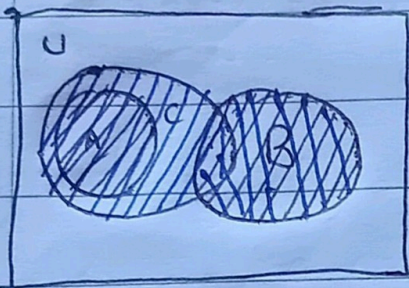
ii) $A \cap (B \cup C)$



$B \cup C =$

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

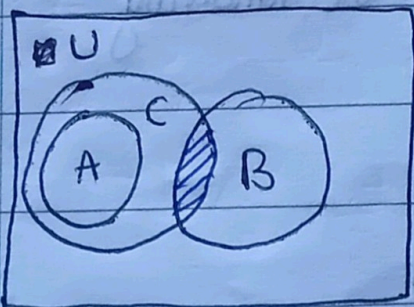
iii) $(A \cup B) \cap C$



$A \cup B =$

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

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

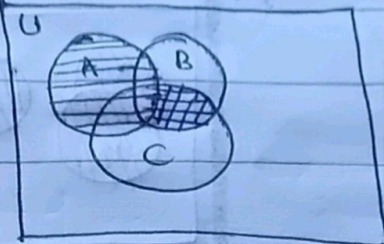


$B \cap C =$

$A \cap (B \cap C) =$ No shaded

3 part

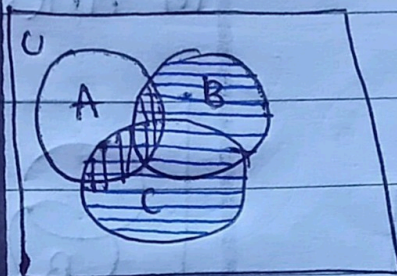
i) $A \cup (B \cap C)$



$B \cap C =$

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

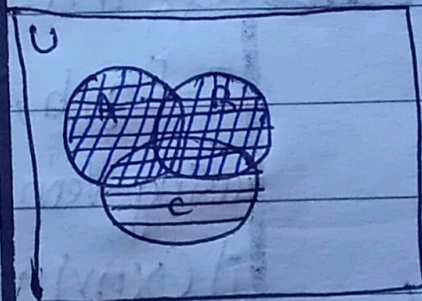
ii) $A \cap (B \cup C)$



$B \cup C =$

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

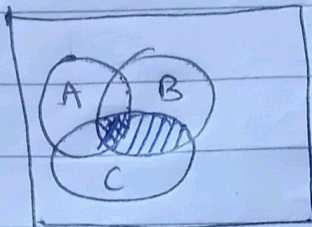
iii) $(A \cup B) \cap C$



$A \cup B =$

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

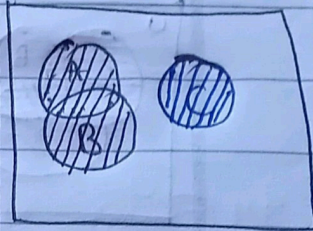
iv) $A \cap (B \cap C)$



$B \cap C =$ [vertical lines]

$A \cap (B \cap C) =$ [grid pattern]

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

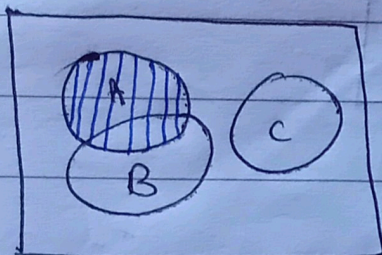


$A \cup B =$ [vertical lines]

$(A \cup B) \cup C =$ [vertical lines]

4 part

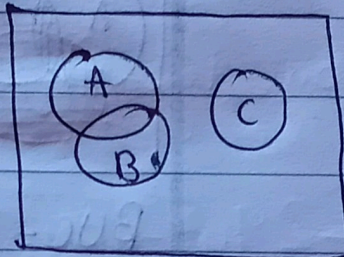
i) $A \cup (B \cap C)$



$B \cap C =$ [no shading]

$A \cup (B \cap C) =$ [vertical lines and grid pattern]

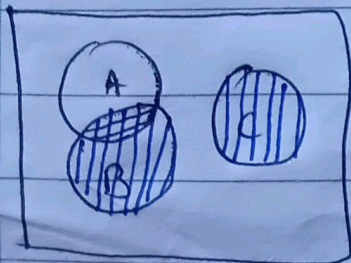
iv) $A \cap (B \cap C)$



$B \cap C =$ [no shading]

$A \cap (B \cap C) =$ [no shading]

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



$B \cup C =$ [vertical lines]

$A \cap (B \cup C) =$ [grid pattern]

Q2 if $X = \{a, b, c, d, e\}$ $Y = \{a, c, e\}$

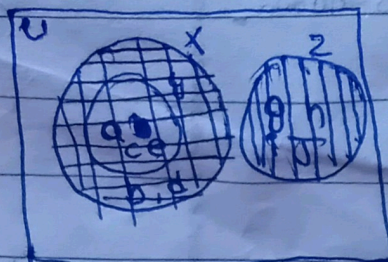
$Z = \{g, h, i, j\}$ then find the following

using Venn diagram?

i) $(X \cup Y) \cup Z$

$(X \cup Y) = \{a, b, c, d, e\}$

$(X \cup Y) \cup Z = \{a, b, c, d, e, g, h, i, j\}$



$X \cup Y =$ [grid pattern]

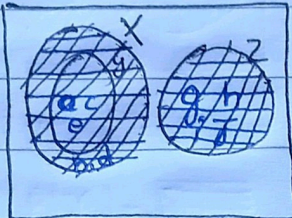
$(X \cup Y) \cup Z =$ [vertical lines]

ii)

$$X \cup (Y \cap Z)$$

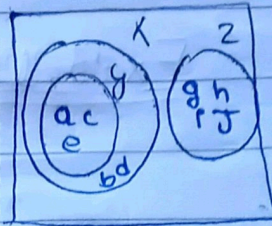
$$Y \cap Z = \{a, c, e, g, h, i, j\}$$

$$X \cup (Y \cap Z) = \{a, b, c, d, e, g, h, i, j\}$$



$$Y \cap Z = \text{diagonal shading}$$

$$X \cup (Y \cap Z) = \text{diagonal shading}$$



$$Y \cap Z = \square \text{ No shaded}$$

$$X \cap (Y \cap Z) = \square \text{ No shaded}$$

$$v) (X \cup Y) \cap Z$$

$$X \cup Y = \{a, b, c, d, e\}$$

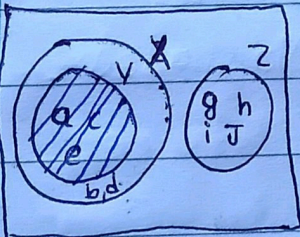
$$(X \cup Y) \cap Z = \{ \} \text{ No shaded}$$

iii)

$$(X \cap Y) \cap Z$$

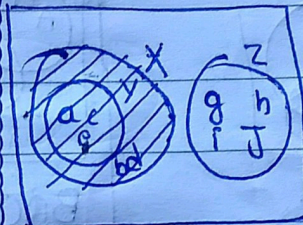
$$X \cap Y = \{a, c, e\}$$

$$(X \cap Y) \cap Z = \{ \}$$



$$X \cap Y = \text{diagonal shading}$$

$$(X \cap Y) \cap Z = \square \text{ No shaded}$$



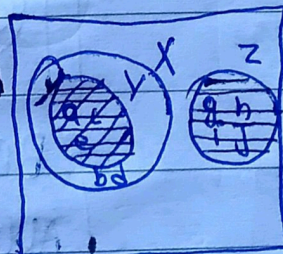
$$X \cup Y = \text{diagonal shading}$$

$$(X \cup Y) \cap Z = \square \text{ No shaded}$$

$$vi) (X \cap Y) \cup Z$$

$$X \cap Y = \{a, c, e\}$$

$$(X \cap Y) \cup Z = \{a, c, e, g, h, i, j\}$$



$$X \cap Y = \text{diagonal shading}$$

$$(X \cap Y) \cup Z = \text{diagonal shading}$$

iv)

$$X \cap (Y \cap Z)$$

$$Y \cap Z = \{ \}$$

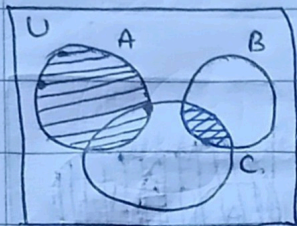
$$X \cap (Y \cap Z) = \{ \} \text{ No shaded}$$

Distributive property union over Intersection.

Q4) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ Distributive property Intersection over union.

L.H.S

$A \cup (B \cap C)$

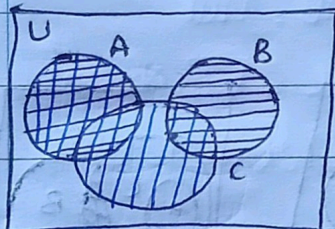


$B \cap C =$ [shaded box]

$A \cup (B \cap C) =$ [shaded box]

R.H.S

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



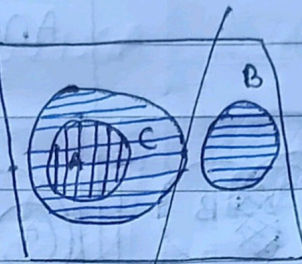
$A \cup B =$ [shaded box]

$A \cup C =$ [shaded box]

$(A \cup B) \cap (A \cup C) =$ [shaded box]

L.H.S

$A \cap (B \cup C)$

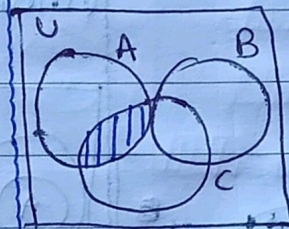


$B \cup C =$ [shaded box]

$A \cap (B \cup C) =$ [shaded box]

R.H.S

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



$A \cap B =$ [shaded box] No shaded.

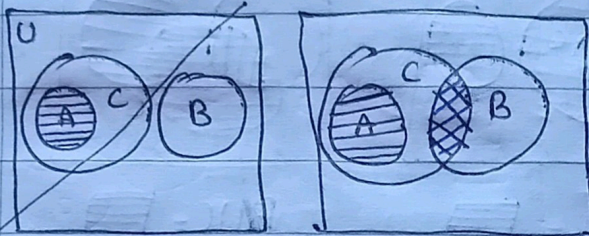
$A \cap C =$ [shaded box]

$(A \cap B) \cup (A \cap C) =$ [shaded box]

Distributive properties union over Intersection.

L.H.S.

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

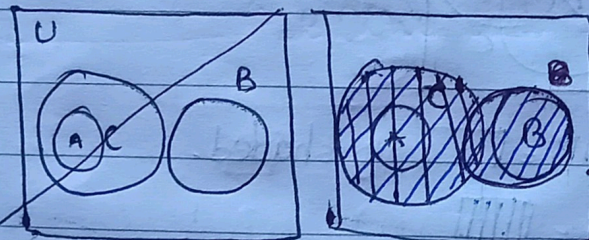


$$B \cap C = \text{[diagonal lines]} \text{ [cross-hatch]} \text{ [diagonal lines]}$$

$$A \cup (B \cap C) = \text{[diagonal lines]} \text{ [cross-hatch]} \text{ [diagonal lines]} \text{ [grid]}$$

R.H.S

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



$$A \cup B = \text{[diagonal lines]} \text{ [grid]} \text{ [diagonal lines]}$$

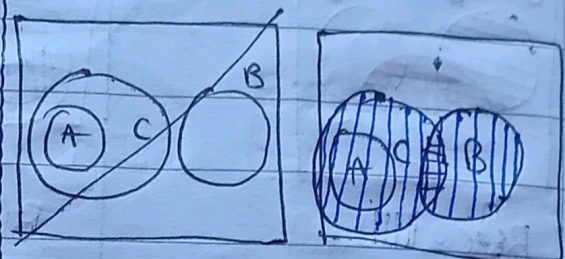
$$A \cup C = \text{[diagonal lines]} \text{ [grid]} \text{ [diagonal lines]}$$

$$(A \cup B) \cap (A \cup C) = \text{[diagonal lines]} \text{ [grid]} \text{ [diagonal lines]} \text{ [grid]}$$

Distributive property Intersection over union

L.H.S

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

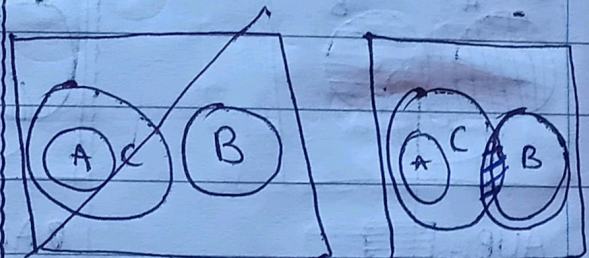


$$B \cup C = \text{[diagonal lines]} \text{ [vertical lines]} \text{ [diagonal lines]}$$

$$A \cap (B \cup C) = \text{[diagonal lines]} \text{ [vertical lines]} \text{ [diagonal lines]} \text{ [grid]}$$

R.H.S

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



$$A \cap B = \text{[empty box]} \text{ No shaded}$$

$$A \cap C = \text{[diagonal lines]} \text{ [grid]} \text{ [diagonal lines]}$$

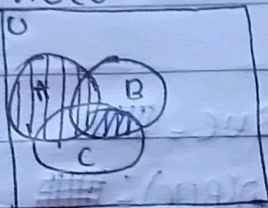
$$(A \cap B) \cup (A \cap C) = \text{[diagonal lines]} \text{ [grid]} \text{ [diagonal lines]} \text{ [diagonal lines]}$$

$S = \{0, 1, 2, 3, 4, 5, 6\}$
 $R = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$QUR = \{2, 3, 4, 5, 6, 7, 8, 9\}$
 $PUR = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

Distributive property union over Intersection

L.H.S
 $A \cup (B \cap C)$

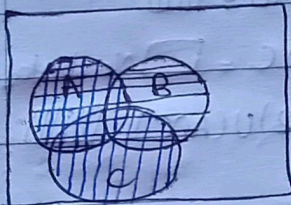


$B \cap C =$ [vertical lines]

$A \cup (B \cap C) =$ [horizontal lines]

R.H.S

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



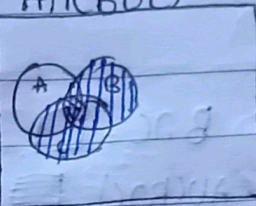
$A \cup B =$ [horizontal lines]

$A \cup C =$ [vertical lines]

$(A \cup B) \cap (A \cup C) =$ [grid]

Distributive Intersection over union

L.H.S
 $A \cap (B \cup C)$

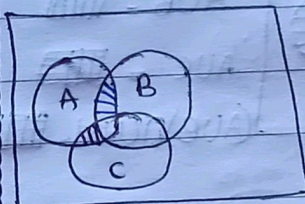


$B \cup C =$ [vertical lines]

$A \cap (B \cup C) =$ [vertical lines]

R.H.S

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



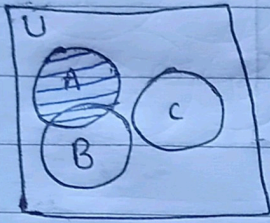
$A \cap B =$ [horizontal lines]

$(A \cap C) =$ [vertical lines]

$(A \cap B) \cup (A \cap C) =$ [grid]

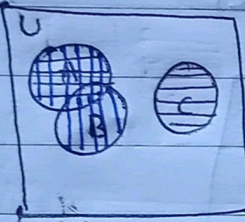
Distributive property union over Intersection.

L.H.S
 $A \cup (B \cap C)$



$B \cap C =$ [diagram of intersection of B and C]
 $A \cup (B \cap C) =$ [diagram of A union with intersection of B and C]

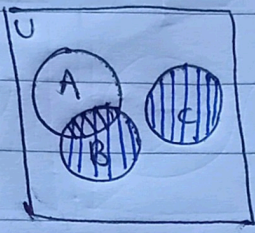
R.H.S
 $(A \cup B) \cap (A \cup C)$



$A \cup B =$ [diagram of union of A and B]
 $A \cup C =$ [diagram of union of A and C]
 $(A \cup B) \cap (A \cup C) =$ [diagram of intersection of the two unions]

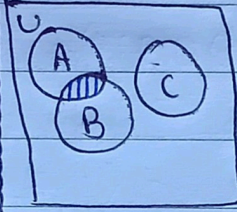
Distributive property Intersection over union.

L.H.S
 $A \cap (B \cup C)$



$B \cup C =$ [diagram of union of B and C]
 $A \cap (B \cup C) =$ [diagram of intersection of A with union of B and C]

R.H.S
 $(A \cap B) \cup (A \cap C)$



$A \cap B =$ [diagram of intersection of A and B]
 $A \cap C =$ [diagram of intersection of A and C, labeled 'No shaded']
 $(A \cap B) \cup (A \cap C) =$ [diagram of union of the two intersections]

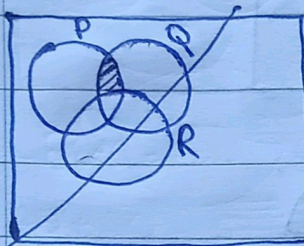
Q5 Prove by using Venn diagram $P = \{0, 1, 2, 3\}$, $Q = \{2, 3, 4, 5, 6\}$, $R = \{5, 6, 7, 8, 9\}$

a) $(P \cup Q) \cap R = P \cap (Q \cup R)$

L.H.S

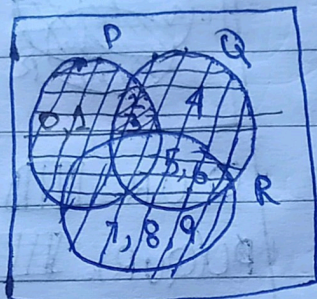
$P \cup Q = \{0, 1, 2, 3, 4, 5, 6\}$

$(P \cup Q) \cap R = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$



$P \cup Q =$ [diagonal shading] [horizontal shading]

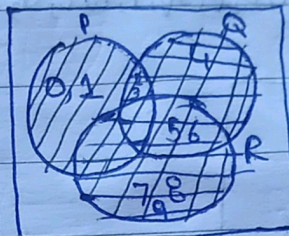
$(P \cup Q) \cap R =$ [diagonal shading] [horizontal shading]



R.H.S

$Q \cup R = \{2, 3, 4, 5, 6, 7, 8, 9\}$

$P \cap (Q \cup R) = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$



$Q \cup R =$ [diagonal shading] [horizontal shading]

$P \cap (Q \cup R) =$ [diagonal shading] [horizontal shading]

1

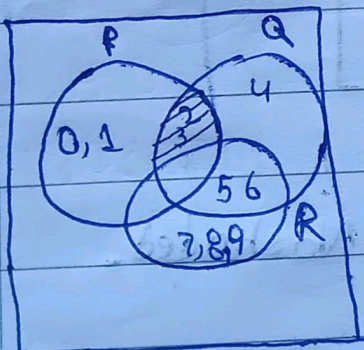
L.H.S = R.H.S

b) $(P \cap Q) \cap R = P \cap (Q \cap R)$

L.H.S.

$P \cap Q = \{2, 3\}$

$(P \cap Q) \cap R = \{3\}$



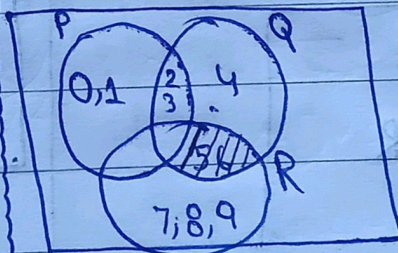
$P \cap Q =$ [diagonal shading]

$(P \cap Q) \cap R =$ [no shading] No shaded.

R.H.S

$Q \cap R = \{5, 6\}$

$P \cap (Q \cap R) = \{3\}$



$Q \cap R =$ [diagonal shading] [horizontal shading]

$P \cap (Q \cap R) =$ [no shading] No shaded.

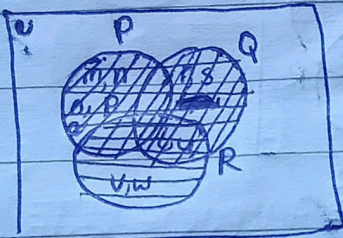
ii) $P = \{m, n, o, p, q\}$ $Q = \{r, s, t, u\}$ $R = \{v, w\}$

a) $(PUQ) \cup R = PU(Q \cup R)$

L.H.S

$PUQ = \{m, n, o, p, q, r, s, t, u\}$

$(PUQ) \cup R = \{m, n, o, p, q, r, s, t, u, v, w\}$

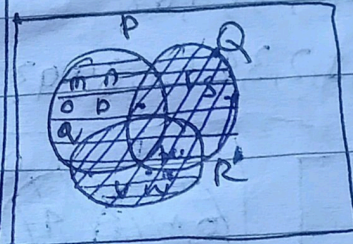


$PUQ =$ [diagonal shading]

$(PUQ) \cup R =$ [grid shading]

R.H.S

$(PU(Q \cup R))$



$Q \cup R =$ [diagonal shading]

$PU(Q \cup R) =$ [grid shading]

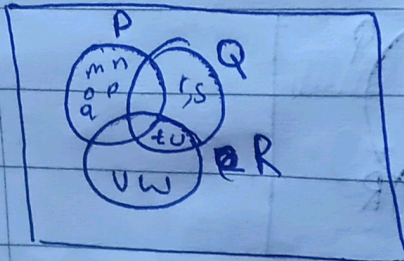
L.H.S = R.H.S

b) $(P \cap Q) \cap R = P \cap (Q \cap R)$

L.H.S

$P \cap Q = \{ \}$

$(P \cap Q) \cap R = \{ \}$



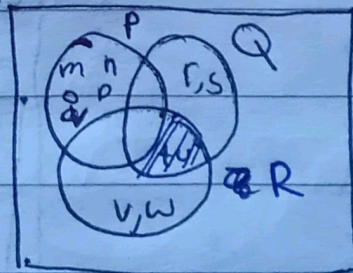
$P \cap Q =$ [diagonal shading]

$(P \cap Q) \cap R =$ [grid shading] No shaded

R.H.S

$P \cap (Q \cap R)$

$Q \cap R = \{ \}$



$Q \cap R =$ [diagonal shading]

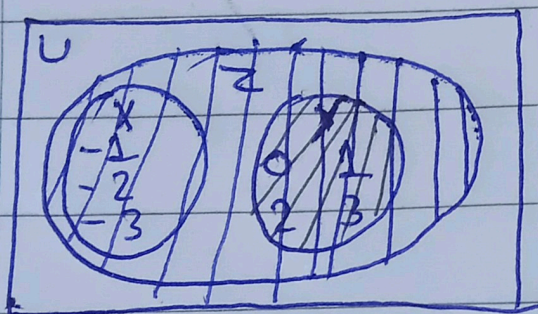
$P \cap (Q \cap R) =$ [grid shading] No shaded

Q6 $X = \{-1, -2, -3\}$ $Y = \{0, 1, 2, 3\}$ $Z = \{0, \pm 1, \pm 2, \pm 3\}$

$X \cup (Y \cap Z) = (X \cup Y) \cap (X \cup Z)$

L.H.S

$X \cup (Y \cap Z)$

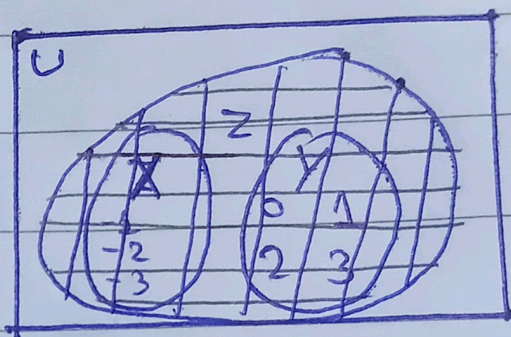


$Y \cap Z =$

$X \cup (Y \cap Z) =$

R.H.S

$(X \cup Y) \cap (X \cup Z)$



$X \cup Y =$

$X \cup Z =$

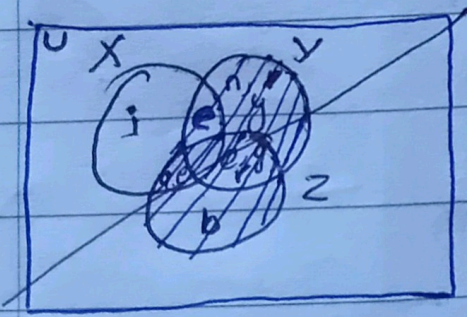
$(X \cup Y) \cap (X \cup Z) =$

L.H.S = R.H.S

Q7

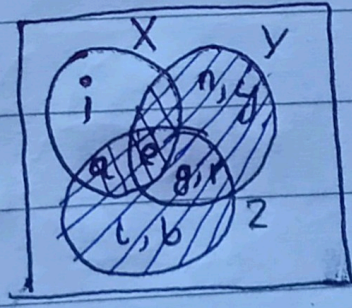
Verify $X \cap (Y \cup Z) = (X \cap Y) \cup (X \cap Z)$

$X = \{a, e, i\}$, $Y = \{Energy\}$, $Z = \{algebra\}$



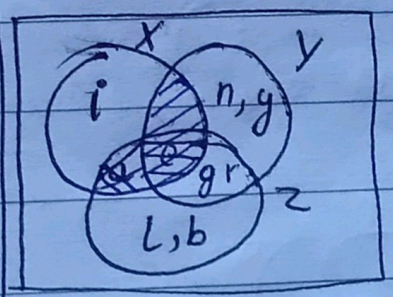
$Y \cup Z =$ [shaded area]

$X \cap (Y \cup Z) =$ [shaded area]



L.H.S = R.H.S.

R.H.S.



$X \cap Y =$ [shaded area]

$X \cap Z =$ [shaded area]

$(X \cap Y) \cup (X \cap Z) =$ [shaded area]