Q.1 If $X=\{1,4,7,9\}$ and

$Y=\{2,4,5,9\}$ then find:

Solution:

(i) $X\cup Y$

$$X\cup Y=\{1,4,7,9\}\cup\{2,4,5,9\}$$
$$=\{1,2,4,5,7,9\}$$

(ii) $X\cap Y$

$$X\cap Y=\{1,4,7,9\}\cap\{2,4,5,9\}$$
$$=\{4,9\}$$

(iii) $Y\cup X$

$$Y\cup X=\{2,4,5,9\}\cup\{1,4,7,9\}$$
$$=\{1,2,4,5,7,9\}$$

(iv) $Y\cap X$

$$Y\cap X=\{2,4,5,9\}\cap\{1,4,7,9\}$$
$$=\{4,9\}$$

Q.2 If X= Set of Prime numbers less than or equal to 17.

Y= Set of first 12 natural numbers, then find

Solution:

$$X=\{2,3,5,7,11,13,17\}$$

$$Y=\{1,2,3,4,...,12\}$$

(i) $X\cup Y$

$$X\cup Y=\{2,3,5,7,11,13,17\}\cup\{1,2,3,4,...,12\}$$
$$=\{1,2,3,4,5,6,7,8,9,10,11,12,17\}$$

(ii) $Y\cup X$

$$Y\cup X=\{1,2,3,4,...,12\}\cup\{2,3,5,7,11,13,17\}$$
$$=\{1,2,3,4,5,6,7,8,9,10,11,12,17\}$$

(iii) $X\cap Y$

$$X\cap Y=\{2,3,5,7,11,13,17\}\cap\{1,2,3,4,...,12\}$$
$$=\{2,3,5,7,11\}$$

(iv) $Y\cap X$

$$Y\cap X=\{1,2,3,4,...,12\}\cap\{2,3,5,7,11,13,17\}$$
$$=\{2,3,5,7,11\}$$

Q.3 If $X=\phi$ $Y=Z^+$ $T=O^+$ then find

(i) $X\cup Y$

$X=\phi$ $Y=\{0,1,2,3.....\}$

$X\cup Y=\{\ \}\cup\{0,1,2,3.....\}$

$X\cup Y=\{0,1,2,3.....\}$

(ii) $X\cup T$

$X=\phi$ $T=\{1,3,5....\}$

$X\cup T=\phi\cup\{1,3,5....\}$

$X\cup T=\{1,3,5....\}$

(iii) $Y\cup T$

$Y=\{0,1,2,3.....\}$ $T=\{1,3,5,7....\}$

$Y\cup T=\{0,1,2,3.....\}\cup\{1,3,5,7....\}$

$Y\cup T=\{0,1,2,3,4,5.....\}$

(iv) $X\cap Y$

$X = \phi \quad Y = \{0,1,2,3.....\}$

$X \cap Y = \{\ \} \cap \{0,1,2,3.....\}$

$X \cap Y = \{\ \}$

(v) $X \cap T$

$X = \phi \quad T = \{1,3,5,7....\}$

$X \cap T = \{\ \} \cap \{1,3,5,7....\}$

$X \cap T = \{\ \}$ or ϕ

(vi) $Y \cap T$

$Y \cap T = Z^+ \cap O^+$

$Y \cap T = \{1,2,3,4,5,.....\} \cap \{1,3,5,7....\}$

$Y \cap T = \{1,3,5,7....\}$

Q.4 If $U = \{x \mid x \in N \wedge 3 < x \leq 25\}$

$X = \{x \mid x \text{ is Prime } \wedge 8 < x < 25\}$

$Y = \{x \mid x \in W \wedge 4 \leq x \leq 17\}$

then find the value of:

Solution: $U = \{4,5,6,7,...,25\}$

$X = \{11,13,17,19,23\}$

$Y = \{4,5,6,7,...,17\}$

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

$X \cup Y = \{11,13,17,19,23\} \cup \{4,5,6,7,...,17\}$

$= \{4,5,6,7,8,9,10,11,12,13,14,15,16,17,19,23\}$

$(X \cup Y)' = U - (X \cup Y)$

$= \{4,5,6,7,...,25\} - \{4,5,6,7,8,9,10,11,12,13,14,15,16,17,19,23\}$

$= \{18,20,21,22,24,25\}$

(ii) $X' \cap Y'$

$X' = U - X$

$X' = \{4,5,6,7,...,25\} - \{11,13,17,19,23\}$

$= \{4,5,,...10,12,14,15,16,18,20,21,22,24,25\}$

$Y' = U - Y$

$Y' = \{4,5,6,7,...,25\} - \{4,5,6,7,...,17\}$

$= \{18,19,20,21,22,23,24,25\}$

$X' \cap Y' = \{4,5,6,7,8,9.....17,19,23\} \cap \{18,19,20,21,22,23,24,25\}$

$X' \cap Y' = \{18,20,21,22,24,25\}$

(iii) $(X \cap Y)'$

$(X \cap Y) = \{11,13,17,19,23\} \cap \{4,5,6,7,...,17\}$

$= \{11,13,17\}$

$(X \cap Y)' = U - (X \cap Y)$

$= \{4,5,6,7,...,25\} - \{11,13,17\}$

$= \{4,5,6,7,8,9,10,12,14,15,16,18,19,20,21,22,23,24,25\}$

(iv) $X' \cup Y'$

$X' = U - X = \{4,5,6,7,...,25\} - \{11,13,17,19,23\}$

$= \{4,5,6,7,8,9,10,12,14,15,16,18,20,21,22,24,25\}$

$Y' = U - Y = \{4,5,6,7,...,25\} - \{4,5,6,7,...,17\}$

$= \{18,19,20,21,22,23,24,25\}$

$X' \cup Y' = \{4,5,6,7,8,9,10,12,14,15,16,18,20,21,22,24,25\}$
$\cup \{18,19,20,21,22,23,24,25\}$

$= \{4,5,6,7,8,9,10,12,14,15,16,18,19,20,21,22,23,24,25\}$

Q.5 If $X = \{2,4,6,...,20\}$ and

$Y = \{4,8,12,...,24\}$ then find the following

Solution: (i) $X - Y$

$X - Y = \{2,4,6,8,10,12,14,16,18,20\} - \{4,8,12,16,20,24\}$

$= \{2,6,10,14,18\}$

(ii) $Y - X$

$Y - X = \{4,8,12,16,20,24\} - \{2,4,6,8,10,12,14,16,18,20\}$

$= \{24\}$

Q.6 If A=N and B=W then find the value of

Solution: (i) $A - B$

$A - B = N - W = \{1,2,3,...\} - \{0,1,2,3,...\}$

$= \{\ \}$

(ii) $B - A$

$B - A = W - N = \{0,1,2,3,...\} - \{1,2,3,...\}$

$= \{0\}$

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