Exercise - 1.7

Multiple choice questions:

(1) Which of the following is correct?

(1) $\{7\} \in \{1,2,3,4,5,6,7,8,9,10\}$ (2) $7 \in \{1,2,3,4,5,6,7,8,9,10\}$

(3) $7 \notin \{1,2,3,4,5,6,7,8,9,10\}$ (4) $\{7\} \notin \{1,2,3,4,5,6,7,8,9,10\}$

$\Rightarrow$ (2) $7 \in \{1,2,3,4,5,6,7,8,9,10\}$.

(2) The Set $P = \{x \mid x \in \mathbb{Z}, -1 < x < 1\}$ is a

(1) singleton set (2) power set (3) Null set (4) subset.

$\Rightarrow$ $P = \{x \mid x \in \mathbb{Z}, -1 < x < 1\}$

$P = \{0\}$. $\therefore$ singleton set (1)

(3) If $U = \{x \mid x \in \mathbb{N}, x < 10\}$ and $A = \{x \mid x \in \mathbb{N}, 2 \le x < 6\}$ then $(A')'$ is —

(1) $\{1,6,7,8,9\}$ (2) $\{1,2,3,4\}$ (3) $\{2,3,4,5\}$ (4) $\{\}$.

$\Rightarrow$ $U = \{x \mid x \in \mathbb{N}, x < 10\}$ and $A = \{x \mid x \in \mathbb{N}, 2 \le x < 6\}$

$U = \{1,2,3,4,5,6,7,8,9\}$ $A = \{2,3,4,5\}$

$A' = U - A = \{1,6,7,8,9\}$

$(A')' = U - A' = \{2,3,4,5\}$ (3)

(4) If $B \subseteq A$ then $n(A \cap B)$ is

(1) $n(A-B)$ (2) $n(B)$ (3) $n(B-A)$ (4) $n(A)$

$\Rightarrow$ $n(A \cap B) = n(B)$ (2)

(5) If $A = \{x,y,z\}$ then the number of non-empty subsets of A is

(1) 8 (2) 5 (3) 6 (4) 7.

$\Rightarrow$ All subsets of A are $\{x\}, \{y\}, \{z\}, \{x,y\}, \{y,z\}$ $\{x,z\}, \{x,y,z\}$

$\therefore$ 7 subsets of A (4)

(6) Which of the following is correct?

(1) $\phi \subseteq \{a,b\}$ (2) $\phi \in \{a,b\}$ (3) $\{a\} \in \{a,b\}$ (4) $a \subseteq \{a,b\}$.

$\Rightarrow$ (1) $\phi \subseteq \{a,b\}$.

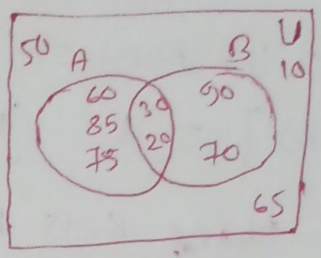
(7) If $A \cup B = A \cap B$, then
(1) $A \neq B$ (2) $A = B$ (3) $A \in B$ (4) $B \subset A$.

⇒ $A \cup B = A \cap B$ then, $A = B$ (2)

(8) If $B - A$ is B, then $A \cap B$ is.
(1) A (2) B (3) U (4) ϕ

⇒ $B - A = B$ then $A \cap B = \phi$ (4)

(9) From the adjacent diagram $n[P(A \triangle B)]$ is
(1) 8 (2) 16
(3) 32 (4) 64



⇒ Given diagram
$A - B = \{60, 85, 75\}$
$B - A = \{90, 70\}$
$A \triangle B = \{60, 85, 75\} \cup \{90, 70\} = \{60, 70, 75, 85, 90\}$.
$n(A \triangle B) = 5 \therefore n[P(A \triangle B)] = 2^5 = 32$ (3)

(10) If $n(A) = 10$ and $n(B) = 15$, then the minimum and maximum number of elements in $A \cap B$ is
(1) 10, 15 (2) 15, 10 (3) 10, 0 (4) 0, 10

⇒ $n(A) = 10$, $n(B) = 15$
∴ minimum elements $n(A \cap B) = 0$.
maximum elements $n(A \cap B) = 10$ (4)

(11) Let $A = \{\phi\}$ and $B = P(A)$, then $A \cap B$ is
(1) $\{\phi, \{\phi\}\}$. (2) $\{\phi\}$ (3) ϕ (4) $\{0\}$.

⇒ $A = \{\phi\}$ and $B = P(A) = \{\phi, \{\phi\}\}$.
$A \cap B = \{\phi\} \cap \{\phi, \{\phi\}\} = \{\phi\}$ (2)

(12) In a class of 50 boys, 35 boys play carrom and 20 boys play chess then the number of boys play both games is -
(1) 5 (2) 30 (3) 15 (4) 10

⇒ $n(A \cup B) = 50$, $n(A) = 35$, $n(B) = 20$.
Now, $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$50 = 35 + 20 - n(A \cap B)$
$n(A \cap B) = 5$ (1).

A = carrom play
B = chess play
U = all ~~state~~ boys

(13) If $U = \{x : x \in N \text{ and } x < 10\}$, $A = \{1,2,3,5,8\}$ and $B = \{2,5,6,7,9\}$, then $n[(A \cup B)']$ is -

(1) 1 (2) 2 (3) 4 (4) 8

$\Rightarrow U = \{x : x \in N \text{ and } x < 10\}$ and $A = \{1,2,3,5,8\}$

$U = \{1,2,3,4,5,6,7,8,9\}$ and $B = \{2,5,6,7,9\}$

$(A \cup B) = \{1,2,3,5,8\} \cup \{2,5,6,7,9\}$

$= \{1,2,3,5,6,7,8,9\}$

$(A \cup B)' = U - (A \cup B) = \{4\}$

$n[(A \cup B)'] = 1$ (1)

(14) For any three sets P, Q and R, $P - (Q \cap R)$ is

(1) $P - (Q \cup R)$ (2) $(P \cap Q) - R$

(3) $(P - Q) \cup (P - R)$ (4) $(P - Q) \cap (P - R)$

$\Rightarrow P - (Q \cap R) = (P - Q) \cup (P - R)$ (3)

(15) Which of the following is true?

(1) $A - B = A \cap B$ (2) $A - B = B - A$

(3) $(A \cup B)' = A' \cup B'$ (4) $(A \cap B)' = A' \cup B'$

$\Rightarrow$ (4) $(A \cap B)' = A' \cup B'$

(16) If $n(A \cup B \cup C) = 100$, $n(A) = 4x$, $n(B) = 6x$, $n(C) = 5x$, $n(A \cap B) = 20$, $n(B \cap C) = 15$, $n(A \cap C) = 25$ and $n(A \cap B \cap C) = 10$, then the value of x is

(1) 10 (2) 15 (3) 25 (4) 30

$\Rightarrow n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$

$100 = 4x + 6x + 5x - 20 - 15 - 25 + 10$

$100 = 15x - 60 + 10$

$15x = 100 + 50$

$x = 10$

(1)

(17) For any three sets A, B and C, $(A-B) \cap (B-C)$ is equal to (1) A only (2) B only (3) C only (4) ϕ

$\Rightarrow (A-B) \cap (B-C) = \phi$ (4)

(18) If J = Set of three sided shapes, K = set of shapes with two equal sides and L = set of shapes with right angle, then $J \cap K \cap L$ is -

(1) Set of isoceles triangles (2) Set of equilateral triangles

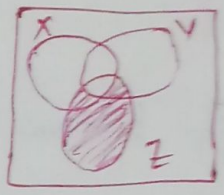
(3) Set of isoceles right triangles (4) Set of right angled triangles.

$\Rightarrow J \cap K \cap L$ = Set of isoceles right triangles (3)

(19) The shaded region in the venn diagram is

(1) $Z-(X \cup Y)$ (2) $(X \cup Y) \cap Z$

(3) $Z-(X \cap Y)$ (4) $Z \cup (X \cap Y)$



$\Rightarrow$ (3) $Z-(X \cap Y)$.

(20) In a city, 40% people like only one fruit, 35% people like only two fruits, 20% people like all the three fruits, How many percentage of people do not like any one of the above three fruits?

(1) 5 (2) 8 (3) 10 (4) 15

$\Rightarrow$ Let x% people do not like any one of the three fruits.

Now, $40\% + 35\% + 20\% + x\% = 100\%$

$95\% + x\% = 100\%$

$x\% = 100\% - 95\%$

$x\% = 5\%$

Thus, 5% people do not like any one of the three fruits. (1)