Set Theory and Number System

SOLUTIONS

Exercise-I (JEE Main Pattern)

SECTION–A

1. **Ans. (2)**

If an element belongs to any set we use $\in$ sign.

So $3 \in \{1, 3, 5\}$

and if a set is a subset of another set we use $\subseteq$ sign

So $\{3\} \subseteq \{1, 3, 5\}$

2. **Ans. (1)**

(1) $A = \{x ! x > 1 \text{ and } x < 1\}$

these is no any number which is greater than as well as less than 1 so set A is an empty set

(2) $B = \{0\}$ as $x + 3 = 3$

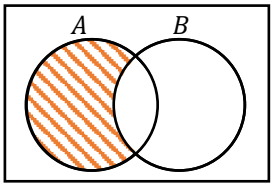
$\Rightarrow x = 0$

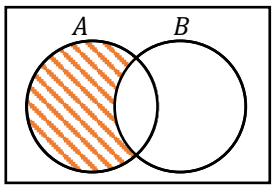
(3) $C = \{\phi\}$ is a set having one element (ϕ)

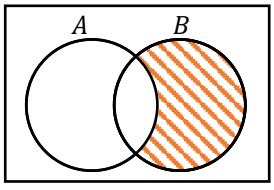
So not an empty set

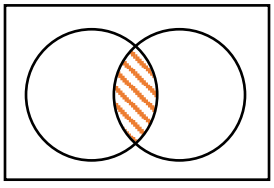
(4) $D = \{1\}$

3. **Ans. (1)**

$A - B =$ 

(1) $A \cap B'$ 

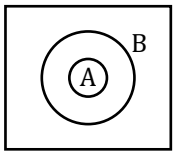
(2) $A' \cap B$ 

(3) $A \cap B$ 

Clearly venn diagram of $A - B$ and $A \cap B'$ are same.

4. **Ans. (1)**

If $A \subseteq B$ then set A is completely inside set B



$A \cap B = A$

5. **Ans. (1)**

$A \cup (A \cap B)$

$= (A \cup A) \cap (A \cup B) \quad \Rightarrow A \cap (A \cup B) \Rightarrow A$

6. **Ans. (2)**

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

it is a standard formula.

7. **Ans. (3)**

Let number of newspapers be x

If every student reads one news paper, then the number of students would be $x \times 60 = 60x$

Since, every student read 5 newspapers

therefore, number of students = $\frac{60x}{5} = 300$

$\Rightarrow x = 25$

8. **Ans. (2)**

Numbers divisible by 2

$\Rightarrow$ 200, 202, ..., 2022

$a_n = a + (n_1 - 1)2$

$\Rightarrow 2022 = 200 + (n_1 - 1)2 \quad \Rightarrow 1822 = (n_1 - 1)2 \quad \Rightarrow n_1 = 912$

Numbers divisible by 5

200, 205, ..., 2020

$\Rightarrow 2020 = 200 + (n_2 - 1)5$

$\Rightarrow n_2 - 1 = \frac{2020-200}{5} = 364$

$n_2 = 365$

Numbers divisibly by 2 and 5

200, 210, ..., 2020

$2020 = 200 + (n_3 - 1)10$

$\Rightarrow n_3 = 183$

Numbers divisible by 2 or 5 = $n_1 + n_2 - n_3$

$\Rightarrow$ 912 + 365 – 183

$\Rightarrow$ 1094.

9. **Ans. (1)**

Number of integers divisible by 3 between 500 to 2023

$\Rightarrow A = \{501, 504, \ldots, 2022\}$

$501 + (n - 1)3 = 2022$

$\Rightarrow n = 508$

$n(A) = 508$

Number of integers divisible by 5 between 500 to 2023

$B = \{505, 510, \ldots, 2020\}$

$505 + (n-1)5 = 2020$

$\Rightarrow n = 304$

$n(B) = 304$

Number of integers divisible by 2 between 500 to 2023

$C = \{502, 504, \ldots, 2022\}$

$A \cap B = \{510, 525, \ldots, 2010\}$

$510 + (n-1)15 = 2010$

$n = 101$

$n(A \cap B) = 101$

$A \cap C = \{504, 510, \ldots, 2022\}$

$504 + (n-1)6 = 2022$

$\Rightarrow n = 254$

$n(A \cap C) = 254$

$B \cap C = \{510, 520, \ldots, 2020\}$

$510 + (n-1)10 = 2020$

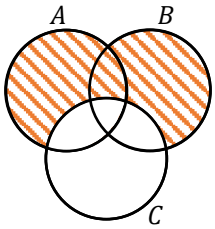
$\Rightarrow n = 152$

$n(B \cap C) = 152$

$A \cap B \cap C = \{510, 540, \ldots, 2010\}$

$510 + (n-1)30 = 2010$

$\Rightarrow n = 51 \Rightarrow n(A \cap B \cap C) = 51$



Number of integers in between 500 to 2023 divisible by 3 or 5 but not multiple of 2

$\Rightarrow n(A \cup B \cup C) - n(C)$

$= [n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - (B \cap C) + n(A \cap B \cap C)] - n(C)$

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

$\Rightarrow 508 + 304 - 101 - 254 - 152 + 51 \Rightarrow 356.$

10. Ans. (3)

For $A = \{1, 2\}$

possible $B = \{1, 2\}, \{1\}, \{2\}, \phi$

4 possible ordered pairs

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

possible $A = \{1, 2\}, \{1\}, \{2\}, \phi$

4 possible ordered pairs

but $A = \{1, 2\}, B = \{1, 2\}$ counted twice

So, 4 + 4 – 1 = 7 ordered pairs

and if $A = \{1\}, B = \{2\}$
and $A = \{2\}, B = \{1\}$ } 2 more possibilities

Total 7 + 2 = 9

11. Ans. (3)

P : Order does not matter in roster form

So P is true.

Q : Elements are not generally repeated in roster form so Q in true.

R : It is not a set so R is true.

S : It is also not a set S is false.

$\Rightarrow$ S statements are true.

12. Ans. (3)

(i) {Jan, June, July}

it is a set

(ii) It is not a set

(iii) Best cricket batsman of the world can be any players, it is not a set.

(iv) The collection of all boys in your class in a fixed collection so it is a set.

(v) Collection of all natural numbers less than 100 in a fixed collection so it is a set.

$\Rightarrow$ Number of sets = 3.

13. Ans. (4)

(a) It is correct.

(b) It is correct as

$x = \pm\sqrt{2}$ satisfies the equation and $\pm\sqrt{2}$ is irrational.

(c) It is correct.

(d) $x^2 = 4$

$\Rightarrow x = \pm 2$

+2, –2 both are even.

So it is correct.

All 4 are correct.

14. Ans. (4)

(a) There will be 7 elements in set W so it is a finite set. (correct)

(b) $x^2 = 16$

$\Rightarrow x = 4, -4$

$S = \{4, -4\}$ only two elements in the set S

So it is a finite set (correct)

(c) There will be infinite points on a line.

So G will be an infinite set (correct) all the 3 statements are correct.

15. Ans. (1)

P : if $A \subset B$ then all the elements of A will be in B

So if $a \in A \Rightarrow a \in B$

Q : It is correct.

R: It is correct.

S: It is correct.

All 4 statements are correct.

16. **Ans. (3)**

$x + y = 1$

$x^2 + y^2 = 2$

$(x + y)^2 = 1^2$

$\Rightarrow x^2 + y^2 + 2xy = 1$

$\Rightarrow 2 + 2(xy) = 1$ $\{ \because x^2 + y^2 = 2 \text{ given}\}$

$\Rightarrow xy = \frac{-1}{2}$

$(x^2 + y^2)^2 = 2^2$

$\Rightarrow x^4 + y^4 + 2x^2y^2 = 4$

$\Rightarrow x^4 + y^4 + 2(xy)^2 = 4$

$\Rightarrow x^4 + y^4 + 2\left(\frac{-1}{2}\right)^2 = 4$

$\Rightarrow x^4 + y^4 = 4 - \frac{1}{2} = \frac{7}{2}$

17. **Ans. (2)**

Let a, a, b, b, b are integers

then $a + a + b + b + b = 100$

$\Rightarrow 2a + 3b = 100$

Case-I if $a = 28$

$2 \times 28 + 3 \times b = 100$

$b = \frac{44}{3}$ (not possible as b is not integer)

Case-II $b = 28$

$2a + 3 \times 28 = 100$

$\Rightarrow 2a = 100 - 84$

$\Rightarrow a = 8$

it is possible.

So other number is 8.

18. **Ans. (3)**

$xy - 3x - 2y = 54$

$xy - 3x - 2y + 6 = 54 + 6$

$\Rightarrow x(y - 3) - 2(y - 3) = 60$

$\Rightarrow (x - 2)(y - 3) = 60$

$1 \times 60, 2 \times 30, 3 \times 20, 4 \times 15, 5 \times 12, 6 \times 10, 10 \times 6, 12 \times 5, 15 \times 4, 20 \times 3, 30 \times 2, 60 \times 1$

Total 12 possible combinations of $x - 2$ and $y - 3$ so it will be same for x, y.

SECTION–B

1. **Ans. (20)**

$n(M \cap C \cap T) = 10$

$n(M \cap C) = 20$

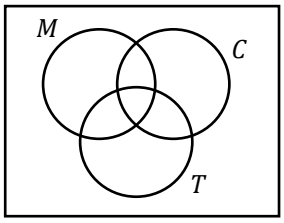
$n(C \cap T) = 30$

$n(M \cap T) = 25$

$n(\text{only } M) = 12$

$n(\text{only } C) = 5$

$n(\text{only } T) = 8$



$\Rightarrow n(\text{only } M) = 12 = n(M) - n(M \cap C) - n(M \cap T) + n(M \cap C \cap T)$

$\Rightarrow 12 = n(M) - 20 - 25 + 10$

$\Rightarrow n(M) = 47$

$\Rightarrow n(\text{only } C) = 5 = n(C) - n(M \cap C) - n(T \cap C) + n(M \cap C \cap T)$

$\Rightarrow 5 = n(C) - 20 - 30 + 10$

$\Rightarrow n(C) = 45$

$\Rightarrow n(\text{only } T) = 8 = n(T) - n(T \cap C) - n(M \cap T) + n(M \cap C \cap T)$

$\Rightarrow 8 = n(T) - 30 - 25 + 10$

$\Rightarrow n(T) = 53$

$\Rightarrow n(M \cup C \cup T) = n(M) + n(C) + n(T) - n(M \cap C) - n(C \cap T) - n(M \cap T) + n(M \cap C \cap T)$

$= 47 + 45 + 53 - 20 - 30 - 25 + 10$

$= 80$

Students who did not take any drinks = 100 – 80 = 20.

2. **Ans. (25)**

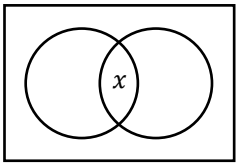
$n(C) = 63$

$n(A) = 76$

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

$= 63 + 76 - x$

$= 149 - x$



$76 \le n(C \cup A) \le 100$

$76 \le 149 - x \le 100$

$-100 \le x - 149 \le -76$

$\Rightarrow 149 - 100 \le x \le 149 - 76$

$\Rightarrow 49 \le x \le 73$

integral values of $x \Rightarrow 49, 50, \ldots, 73$

Total 25 integers.

3. **Ans. (7)**

$\frac{1}{m} + \frac{2}{n} = \frac{1}{2}$

$\Rightarrow \frac{n+2m}{mn} = \frac{1}{2}$

$\Rightarrow 2(n + 2m) = mn$

$\Rightarrow mn - 4m - 2n = 0$

$\Rightarrow m(n - 4) - 2(n - 4) - 8 = 0$

$\Rightarrow (m-2)(n-4) = 8$

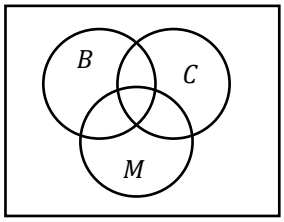
possible values of $(m-2) \times (n-4)$ ar

1 × 8, 2 × 4, 4 × 2, 8 × 1, (–1) × (–8), (–2) × (–4), (–4) × (-2), (–8) × (–1)

but (–2) × (–4) will not be possible as in this case $m = n = 0$ which will not be possible.

Total 7 ordered pairs.

4. Ans. (110)



$n(B \cup C \cup M) = 300$

$n(B) = 120$

$n(C) = 150$

$n(M) = 200$

$n(B \cap C \cap M) = 30$

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

$\Rightarrow 300 = 120 + 150 + 200 - [n(B \cap C) + n(C \cap M) + n(M \cap B)] + 30$

$\Rightarrow n(B \cap C) + n(C \cap M) + n(M \cap B) = 200$

$\Rightarrow n(\text{Exactly two subjects}) = n(B \cap C) + n(C \cap M) + n(M \cap B) - 3n(B \cap C \cap M)$

$\Rightarrow 200 - 3 \times 30$

$\Rightarrow 110$

5. Ans. (2)

$n(W) = 6$

$n(R) = 6$

Number of male tigers $n(M) = 5$

Number of female tigers $n(F) = 6 + 6 - 5 = 7$

Number of royal tiger or male tiger $n(R \cup M) = 10$

$n(T) = n(W) + n(R)$

$\Rightarrow 6 + 6 = 12$

also, $n(R \cup M) = n(R) + n(M) - n(R \cup M)$

$= 6 + 5 - 10$

$= 1$

Consider, $n(W \cup F) = n(T) - n(R \cap M)$

$\Rightarrow 12 - 1$

$\Rightarrow 11$

$n(W \cup F) = n(W) + n(F) - n(W \cup F)$

$\Rightarrow 6 + 7 - 11$

$\Rightarrow 2.$

Exercise - II (JEE Main PYQs)

1. **Ans. (1)**

$A \cup B = A \cup C$

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

$\Rightarrow (A \cap C) \cup (B \cap C) = C$ ...(i)

$A \cup B = A \cup C$

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

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

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

$\Rightarrow B = (A \cap C) \cup (B \cap C)$ ...(ii) $\{\because A \cap B = A \cap C\}$

Form (i) and (ii)

$B = C$

2. **Ans. (4)**

Let $n(A)$ = number of students opted Mathematics = 70,

$n(B)$ = number of students opted Physics = 46,

$n(C)$ = number of students opted Chemistry = 28,

$n(A \cap B) = 23$,

$n(B \cap C) = 9$,

$n(A \cap C) = 14$,

$n(A \cap B \cap C) = 4$,

Now $n(A \cup B \cup C)$

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

$- n(A \cap C) + n(A \cap B \cap C)$

$= 70 + 46 + 28 - 23 - 9 - 14 + 4 = 102$

So number of students not opted for any course

= Total $- n(A \cup B \cup C)$

$= 140 - 102 = 38.$

3. **Ans. (3)**

Let population = 100

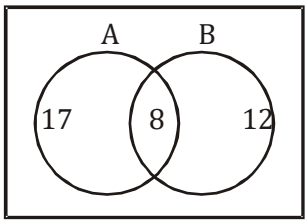
$n(A) = 25$

$n(B) = 20$

$n(A \cap B) = 8$

$n(A \cap \bar{B}) = 17$

$n(\bar{A} \cap B) = 12$



Required Percentage

$= \frac{30}{100} \times 17 + \frac{40}{100} \times 12 + \frac{50}{100} \times 8$

$= 5.1 + 4.8 + 4 = 13.9$

4. **Ans. (3)**

$A = \{x \in \mathbb{Z}: (2)^{(x+2)(x^2-5x+6)} = 1\}$

$(2)^{(x+2)(x^2-5x+6)} = 1$

$\Rightarrow (x+2)(x^2-5x+6) = 0$

$\Rightarrow (x+2)(x-2)(x-3) = 0$

$\Rightarrow x = -2,2,3$

$A = \{-2,2,3\}$

$B = \{x \in \mathbb{Z}: -3 < 2x-1 < 9\}$

$\Rightarrow -3 < 2x-1 < 9$

$\Rightarrow -3+1 < 2x-1+1 < 9+1$

$\Rightarrow -2 < 2x < 10$

$\Rightarrow -1 < x < 5$ and $x \in \mathbb{Z}$

Possible value of x are $x = 0,1,2,3,4$

$B = \{0,1,2,3,4\}$

Number of element in $A \times B = 15$

Number of subset of set $A \times B = (2)^{15}$

5. **Ans. (29.00)**

n(A) = 25

n(B) = 7

$n(A \cap B) = 3$

$n(A \cup B) = 25 + 7 - 3 = 29$

6. **Ans. (4)**

C → person like coffee

T → person like Tea

n(C) = 73

n(T) = 65

$n(C \cup T) \le 100$

$n(C) + n(T) - n(C \cap T) \le 100$

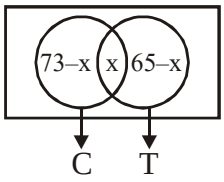
$73 + 65 - x \le 100$

$x \ge 38$

$73 - x \ge 0 \Rightarrow x \le 73$

$65 - x \ge 0 \Rightarrow x \le 65$

$\boxed{38 \le x \le 65}$



7. **Ans. (112)**

A = {1,2,3,4,5,6,7} and

B = {3,6,7,9}

Total subset of A = $2^7 = 128$

$C \cap B = \phi$ when set C contains the element 1, 2, 4, 5

$\therefore$ S = $\{C \subseteq A; C \cap B \neq \phi\}$

= Total – $(C \cap B = \phi)$

= $128 - 2^4 = 112$

8. **Ans. (3)**

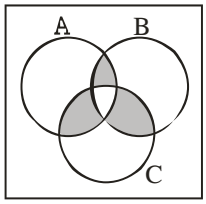
$|A|=48$

$|B|=25$

$|C|=18$

$|A\cup B\cup C|=60$ [Total]

$|A\cap B\cap C|=5$



$|A\cup B\cup C|=\sum|A|-\sum|A\cap B|+|A\cap B\cap C|$

$\Rightarrow \sum|A\cap B|=48+25+18+5-60$

$= 36$

No. of men who received exactly 2 medals

$=\sum|A\cap B|-3|A\cap B\cap C|$

$= 36 - 15$

$= 21$

Exercise - III (JEE Advanced Pattern)

SECTION-I

1. **Ans. (A,C,D)**

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

$A = \{1,2,3,5,6\}$

$B = \{2,3,4,7,8\}$

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

$B - A = B \cap A' = B - (A \cap B) = \{4,7,8\}$

$A' = U - A = \{4,7,8\}$

$A' \cup B = \{2,3,4,7,8\}$

$A - B = \{1,5,6\}$

$(A - B)' = U - (A - B) = \{2,3,4,7,8\}$

Option A, C, D are correct.

2. **Ans. (A,D)**

(A) $[2, 10] - \{2,10\} = (2,10)$

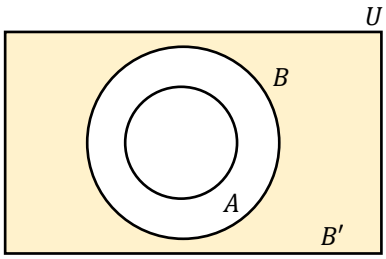
(B) $[3, 5] - \{5\} = [3,5)$

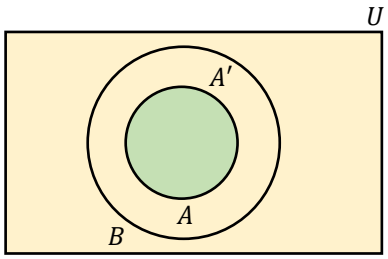
(C) $(-3,5] - \{-3\} = (-3, 5]$

(D) $[-2, 15] - (2, 15] = [-2,2]$

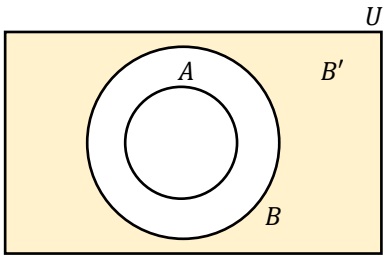
Option A, D are correct.

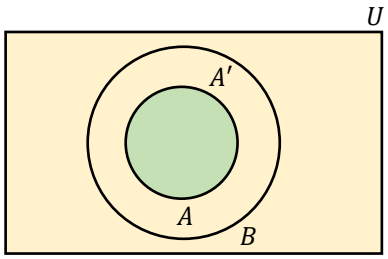
3. Ans. (B,C)

(A) $B' =$ 

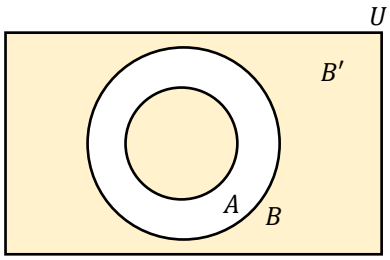
$A' =$ 

$A' \not\subseteq B'$

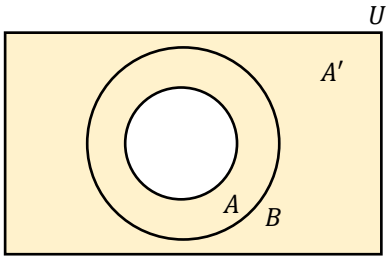
(B) $B' =$ 

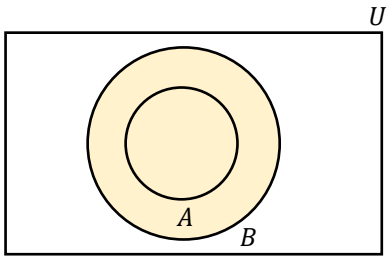
$A' =$ 

$B' \subseteq A'$

(C) 

$A \cap B' = \phi$

(D) $A' =$ 

$B =$ 

$A' \cap B' \neq \phi$

$\because$ option B,C are correct

4. Ans. (A,B)

(A) $[a, b)$ is an interval from a to b, including a but excluding

(B) $(a, b]$ is an interval from a to b, including b but excluding a

Open interval = Boundary points are not included

Closed interval = Boundary points are included

Option (A, B) are

5. Ans. (A,B,C)

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

$A = \{0,2,3,4,8\}$

$B = \{0,3,5,6,8\}$

$A' = U - A = \{1,5,6,7,9\}$

$B' = U - B = \{1,2,4,7,9\}$

$A \cap B = \{0,3,8\}$

$(A \cap B)' = U - (A \cap) = \{1,2,4,5,6,7,9\}$

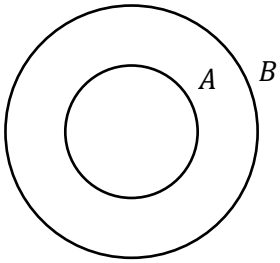
$A - B = \{2,4\}$

$(A - B)' = U - (A - B) = \{0,1,3,5,6,7,8,9\}$

Option (A,B,C) are correct.

6. Ans. (A,B,D)

$A \subset B$ and $A \neq B$



A is called proper subset of B

B is called superset of A

$A = \{1,2,3\}$ $B = \{1,2,3,4\}$

$ACB \Rightarrow A$ is called proper subset of B

If set A has only are element, then we call it a singleton set.

Option A,B,D are correct

7. Ans. (B,C,D)

(A) $A = \{x: x + 2 = 3\}$

$A = \{1\}$

$B = \{x: x \in \mathbb{N}$ and is less than $2\}$

$B = \{1\}$

$A = B$

(B) $A = \{x: x \in \mathbb{N}$ and $3x - 1 < 2\}$

$3x - 1 < 2 \Rightarrow x < 1$

$A = \phi$

$B = \{x: x \in \mathbb{W}$ and $3x - 1 < 2\}$

$3x - 1 < 2$

$x < 1$

$B = \{0\}$

$A \neq B$

(C) $A = \{x: x \in \mathbb{N}$ and is prime factor of $36\}$

$A = \{2,3\}$

$B = \{1,2,3,4,6,9,12\}$

$A \neq B$

(D) $A = \{x: x \in I$ and $x^2 \leq 4\}$

$\Rightarrow x^2 - 4 \leq 0$

$\Rightarrow (x - 2)(x + 2) \leq 0$

$\Rightarrow x \in [-2,2]$

$A = \{-2, -1,0,1,2\}$

$B = \{x: x \in \mathbb{R} \text{ and } x^2 - 3x + 2 = 0\}$

$\Rightarrow x^2 - 3x + 2 = 0$

$\Rightarrow (x-2)(x-1) = 0$

$\Rightarrow x = 1,2$

$B = \{1,2\}$

$A \neq B$

Option B,C,D are correct

8. Ans. (A,C,D)

(A) A = set of odd natural number divisible by 2

$A = \phi$

(B) A = Set of even prime numbers

$A = \{2\}$

(C) $A = \{x: x \text{ is a natural number } x < 5 \text{ and } x > 7\}$

$A = \phi$

(D) $A = \{y : y \text{ is a point common to any two parallel lines}\}$

$\because$ tow parallel line will never interest, hance no emman point will occur

$A = \phi$

Option A,C,D are correct

9. Ans. (A,B,C,D)

(A) Null set is subset of every set

Therefore (A) is Correct option

(B) $A = \{1,3\}$, $B = \{1,5,9\}$

$3 \in A$ but $3 \notin B$

$\therefore A \not\subset B$

Therefore (B) is Correct option

(C) $A = \{1,3\}$, $C = \{1,3,5,7,9\}$

$1,3, \in A$ and also belongs to C

$\therefore A \subset C$

Therefore (C) is Correct options

(D) $B = \{1,5,9\}$, $C = \{1,3,5,7,9\}$

Each element of B is also an element of C

$\therefore B \subset C$

therefore (D) is correct option.

10. Ans. (A,B)

(A) {2,3,4,5} and {3,6} have one element common which is '3' therefore they are not disjoint sets.

(B) $\{a, e, i, o, u\}$ and $\{a, b, c, d\}$ have one element Common which is 'a' therefore they are not disjoint sets.

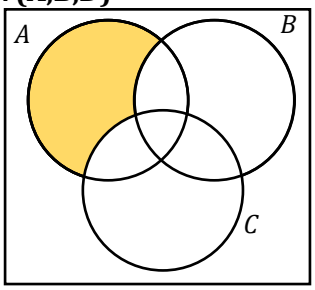
(C) {2,6,10,14} and {3,7,11,15} have no element in common therefore they are disjoint sets.

(D) {2,6,10} and {3,7,11} have no element in common therefore they are disjoint sets.

SECTION–II

11. Ans. (A,B,D)

(A)

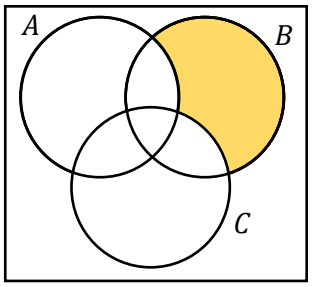


$A \cap (B \cup C)'$

Shaded region is R_1

$\therefore R_1 = A \cap (B \cup C)'$

(B)

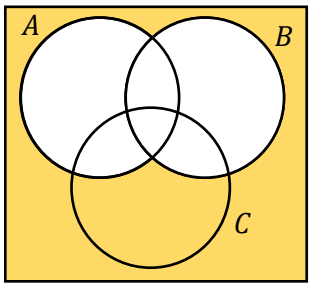


$B \cap (A' \cap C') = B \cap (A \cup C)'$

Shaded region is R_2

$\therefore R_2 = B \cap (A' \cap C')$

(C)

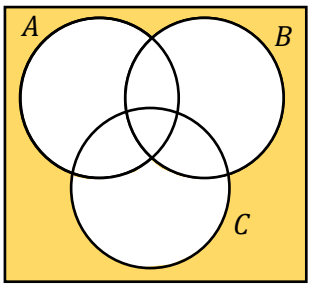


$(A \cup B)'$

Shaded region is $R_3 + R_8$

But $R_3 + R_8 \neq R_3$

(D)

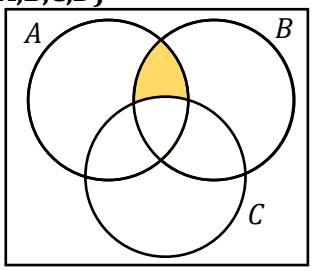


Shaded region is R_8

$\therefore R_8 = (A \cup B \cup C)'$

12. Ans. (A,B,C,D)

(A)

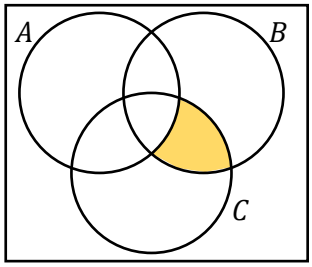


$(A \cap B) \cap C'$

Shaded region is R_4

$\therefore R_4 = (A \cap B) \cap C'$

(B)

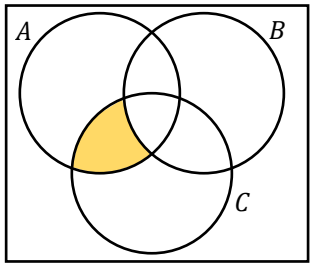


$(B \cap C) \setminus A$

Shaded region is R_5

$\therefore R_5 = (B \cap C) \setminus A$

(C)

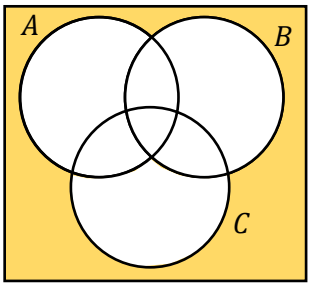


$(A \cap C) \cap (A \cap B \cap C)'$

Shaded region is R_6

$\therefore R_6 = (A \cap C) \cap (A \cap B \cap C)'$

(D)



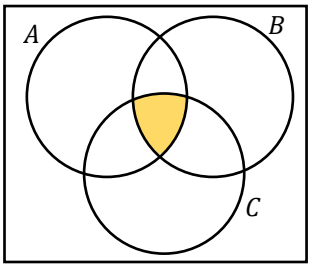
$A' \cap B' \cap C'$

Shaded region is R_8

$\therefore R_8 = A' \cap B' \cap C'$

13. Ans. (A,B,C,D)

(A)

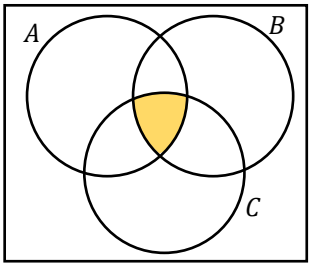


$A \cap B \cap C$

Shaded region is R_7

$\therefore R_7 = A \cap B \cap C$

(B)

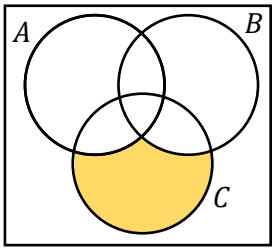


$(A' \cup B' \cup C')'$

Shaded region is R_7

$\therefore R_7 = (A' \cup B' \cup C')'$

(C)

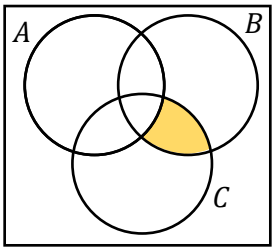


$(A' \cap B') \cap C$

Shaded region is R_3

$\therefore R_3 = (A' \cap B') \cap C$

(D)



$(B \setminus C') \cap A'$

Shaded region is R_5

$\therefore R_5 = (B \setminus C') \cap A'$

SECTION–III

14. Ans. (A→Q, B→R, C→S, D→P)

(A) from number line $-5 \le x \le -1;\ x \in \mathbb{R}$

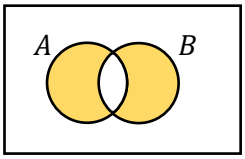
(B) from number line $2 \le x;\ x \in \mathbb{R}$

(C) from number line $-4 \le x \le 3;\ x \in \mathbb{R}$

(D) from number line $-1 \le x \le 5;\ x \in \mathbb{R}$

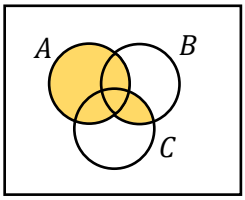
15. Ans. (A→Q, B→P, C→R, D→S)

(A)



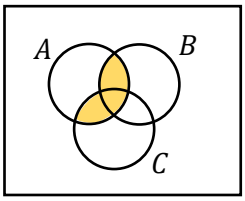
$(A-B) \cup (B-A)$

(B)



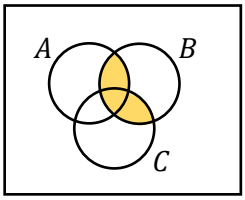
$A \cup (B \cap C)$

(C)



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

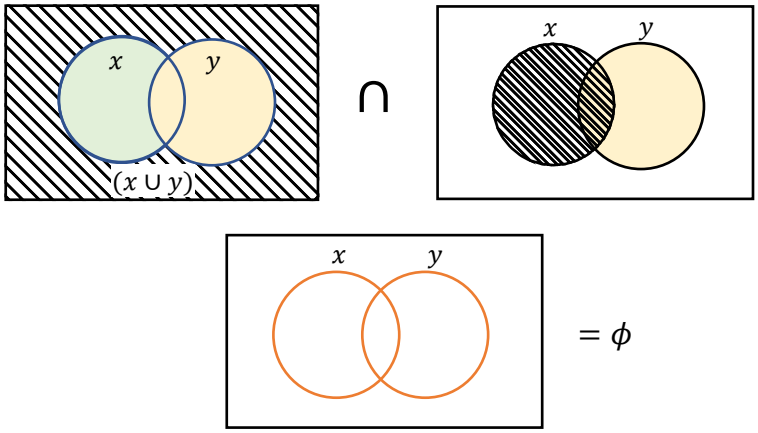
(D)



$(A \cup C) \cap B$

Exercise - IV (JEE Advanced PYQs)

1. **Ans. (C)**



2. **Ans. (C)**

$A = \{1,2,3,4,5\}$

$n(A) = 5$

Number of subset of set $A = 2^5 = 32$

Number of proper subset of set $A = 32 - 1 = 31$

3. **Ans. (B)**

$A \cup B = A \cup C$

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

$\Rightarrow (A \cap c) \cup (B \cap c) = c$ ...(i)

$A \cup B = A \cup C$

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

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

$\Rightarrow B = (A \cap C) \cup (B \cap C)$ ...(ii)

Form (i) and (ii)

$B = C$

4. **Ans. (B)**

$n(A) = 3$

$n(B) = 6$

For $n(A \cup B)$ minimum $\Rightarrow n(A \cap B)$ should be maximum

$n(A \cap B)$ maximum = 3

$n(A \cap B) = n(A) + n(B) - n(A \cap B)$

$= 3 + 6 - 3 = 6$