SESSION : 2025-26

DPP
DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : MATHS
DPP No. :1

Topic :-SETS

1 **(b)**
For any $a \in R$, we have $a \geq a$
Therefore, the relation R is reflexive.
R is not symmetric as $(2,1) \in R$ but $(1,2) \notin R$. The relation R is transitive also, because $(a, b) \in R, (b, c) \in R$ imply that $a \geq b$ and $b \geq c$ which in turn imply that $a \geq c$

2 **(d)**
Clearly, R is an equivalence relation

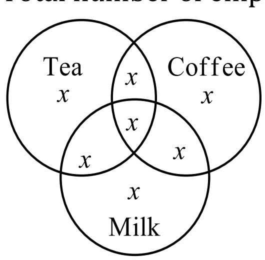
3 **(c)**
Let M and E denote the sets of students who have taken Mathematics and Economics respectively.
Then, we have
$n(M \cup E) = 35, n(M) = 17$ and $n(M \cap E') = 10$
Now,
$n(M \cap E') = n(M) - n(M \cap E)$
$\Rightarrow 10 = 17 - n(M \cap E) \Rightarrow n(M \cap E) = 7$
Now,
$n(M \cup E) = n(M) + n(E) - n(M \cap E)$
$\Rightarrow 35 = 17 + n(E) - 7 \Rightarrow n(E) = 25$
$\therefore n(E \cap M') = n(E) - n(E \cap M) = 25 - 7 = 18$

4 **(a)**
Let $A = \{n(n+1)(2n+1): n \in Z\}$
Putting $n = \pm 1, \pm 2, \dots$, we get $A = \{\dots - 30, -6, 0, 6, 30, \dots\}$
$\Rightarrow \quad \{n(n+1)(2n+1): n \in Z\} \subset \{6k: k \in Z\}$

5 **(a)**
$\because \quad A \cup B = \{1, 2, 3, 4, 5, 6\}$
$\therefore \quad (A \cup B) \cap C = \{1, 2, 3, 4, 5, 6\} \cap \{3, 4, 6\}$
$= \{3, 4, 6\}$

6 **(d)**
We have,
$n(A \cap \bar{B}) = 9, n(\bar{A} \cap B) = 10$ and $n(A \cup B) = 24$
$\Rightarrow n(A) - n(A \cap B) = 9, n(B) - n(A \cap B) = 10$ and, $n(A) + n(B) - n(A \cap B) = 24$
$\Rightarrow n(A) + n(B) - 2n(A \cap B) = 19$ and $n(A) + n(B) - n(A \cap B) = 24$

$\Rightarrow n(A \cap B) = 5$
$\therefore n(A) = 14$ and $n(B) = 15$
Hence, $n(A \times B) = 14 \times 15 = 210$
7 **(a)**
Clearly, $P \subset T$
$\therefore P \cap T = P$
8 **(a)**
It is given that A is a proper subset of B
$\therefore A - B = \phi \Rightarrow n(A - B) = 0$
We have, $n(A) = 5$. So, minimum number of elements in B is 6
Hence, the minimum possible value of $n(A \,\Delta\, B)$ is $n(B) - n(A) = 6 - 5 = 1$
9 **(d)**
$\because \quad n(A \times B \times C) = n(A) \times n(B) \times n(C)$
$\therefore \quad n(C) = \dfrac{24}{4 \times 3} = 2$
10 **(b)**
Use $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
11 **(d)**
$\because A = \{(a, b): a^2 + 3b^2 = 28, a, b \in Z\}$
$=\{(5, 1), (-5, -1), (5, -1), (-5, 1), (1, 3), (-1, -3), (-1, 3), (1, -3), (4, 2), (-4, -2), (4, -2), (-4, 2)\}$
And $B = \{(a, b): a > b, a, b \in Z\}$
$\therefore \quad A \cap B = \{(-1, -5), (1, -5), (-1, -3), (1, -3), (4, 2), (4, -2)\}$
$\therefore$ Number of elements in $A \cap B$ is 6.
13 **(d)**
We have
$R = \{(1,39), (2,37), (3,35), (4,33), (5,31), (6,29), (7,27), (8,25), (9,23), (10,21), (11,19), (12,17), (13,15), (14,13), (15,11), (16,9), (17,7), (18,5), (19,3), (20,1)\}$
Since $(1,39) \in R$, but $(39,1) \notin R$
Therefore, R is not symmetric
Clearly, R is not reflexive. Now, $(15,11) \in R$ and $(11,19) \in R$ but $(15,19) \notin R$
So, R is not transitive
14 **(c)**
Total number of employees $= 7x$ i.e. a multiple of 7. Hence, option (c) is correct



15 **(a)**

The power set of a set containing n elements has 2^n elements.
Clearly, 2^n cannot be equal to 26

16 **(b)**

The relation is not symmetric, because $A \subset B$ does not imply that $B \subset A$. But, it is anti-symmetric because

$A \subset B$ and $B \subset A \Rightarrow A = B$

18 **(c)**

We have, $A \supset B \supset C$

$\therefore A \cup B \cup C = A$ and $A \cap B \cap C = C$

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

19 **(c)**

Given, $n(C) = 63, n(A) = 76$ and $n(C \cap A) = x$

We know that,

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

$\Rightarrow \quad 100 = 63 + 76 - x \Rightarrow x = 139 - 100 = 39$

And $n(C \cap A) \leq n(C)$

$\Rightarrow \quad x \leq 63 \quad \therefore 39 \leq x \leq 63$

20 **(b)**

We have,

$X =$ Set of some multiple of 9

and, $Y =$ Set of all multiple of 9

$\therefore X \subset Y \Rightarrow X \cup Y = Y$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	D	C	A	A	D	A	A	D	B
Q.	11	12	13	14	15	16	17	18	19	20
A.	D	D	D	C	A	B	D	C	C	B

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Solutions

Subject : MATHS
DPP No. :2

Topic :-SETS

21 **(c)**

$A \cap B = \{x : x$ a multiple of $3\}$and $\{x : x$ is a multiple of $5\}$

$= \{x : x$ is a multiple of $15\}$

$= \{15, 30, 45, \dots \dots \dots .\}$

22 **(b)**

We have,

$n(A \times B) = 45$

$\Rightarrow n(A) \times n(B) = 45$

$\Rightarrow n(A)$ and $n(B)$ are factors of 45 such that their product is 45

Hence, $n(A)$ cannot be 17

24 **(a)**

For any $x \in R$, we have

$x - x + \sqrt{2} = \sqrt{2}$ an irrational number

$\Rightarrow x\ R\ x$ for all x

So, R is reflexive

R is not symmetric, because $\sqrt{2}\ R\ 1$ but $1 \not R \sqrt{2}$

R is not transitive also because $\sqrt{2}\ R\ 1$ and $1\ R\ 2\sqrt{2}$ but $\sqrt{2} \not R\ 2\sqrt{2}$

25 **(b)**

We have,

$n(H) - n(H \cap E) = 22, n(E) - n(H \cap E) = 12, n(H \cup E) = 45$

$\therefore n(H \cup E) = n(H) + n(E) - n(H \cap E)$

$\Rightarrow 45 = 22 + 12 + n(H \cup E)$

$\Rightarrow n(H \cap E) = 11$

26 **(c)**

We have, $A \subset B$ and $B \subset C$

$\therefore A \cup B = B$ and $B \cap C = B$

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

27 **(c)**

Let $A = \left\{x \in R : \frac{2x-1}{x^3+4x^2+3x}\right\}$

Now, $x^3 + 4x^2 + 3x = x(x^2 + 4x + 3)$

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$= x(x+3)(x+1)$

$\therefore \quad A = R - \{0, -1, -3\}$

29 **(d)**

Clearly, $y^2 = x$ and $y = |x|$ intersect at (0,0), (1,1) and $(-1,-1)$. Hence, option (d) is correct

31 **(d)**

Let M, P and C be the sets of students taking examinations in Mathematics, Physics and Chemistry respectively.

We have,

$n(M \cup P \cup C) = 50, n(M) = 37, n(P) = 24, n(C) = 43$

$n(M \cap P) < 19, n(M \cap C) \leq 29, n(P \cap C) \leq 20$

Now,

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

$-n(M \cap C) - n(P \cap C) + n\,(M \cap P \cap C)$

$\Rightarrow 50 = 37 + 24 + 43 - \{n(M \cap P) + n(M \cap C) + n(P \cap C)\}$

$+n(M \cap P \cap C)$

$\Rightarrow n(M \cap P \cap C) = n(M \cap P) + n(M \cap C) + n(P \cap C) - 54$

$\Rightarrow n(M \cap P) + n(M \cap C) + n(P \cap C)$

$= n(M \cap P \cap C) + 54 \quad$ ...(i)

Now,

$n(M \cap P) \leq 19, n(M \cap C) \leq 29, n(P \cap C) \leq 20$

$\Rightarrow n(M \cap P) + n(M \cap C) + n(P \cap C) \leq 19 + 29 + 20 \quad$ [Using (i)]

$\Rightarrow n(M \cap P \cap C) + 54 \leq 68$

$\Rightarrow n(M \cap P \cap C) \leq 14$

33 **(a)**

Given, $n(N) = 12, n(P) = 16, n(H) = 18,$

$n(N \cup P \cup H) = 30$

And $\quad n(N \cap P \cap H) = 0$

Now, $n(N \cup P \cup H) = n(N) + n(P) + n(H)$

$-n(N \cap P) - n(P \cap H) - n(H \cap N)$

$+n(N \cap P \cap H)$

$\Rightarrow n(N \cap P) + n(P \cap H) + n(H \cap N) = (12 + 16 + 18) - 30$

$= 46 - 30 = 16$

35 **(b)**

The void relation R on A is not reflexive as $(a, a) \notin R$ for any $a \in A$. The void relation is symmetric and transitive

36 **(c)**

Given, A's are 30 sets with five elements each, so

$\sum_{i=1}^{30} n(A_i) = 5 \times 30 = 150 \quad$ ...(i)

If the m distinct elements in S and each elements of S belongs to exactly 10 of the A_i's, then

$\sum_{i=1}^{30} n(A_i) = 10m \quad$ ...(ii)

From Eqs. (i) and (ii), $m = 15$

Similarly, $\sum_{j=1}^{n} n(B_j) = 3n$ and $\sum_{j=1}^{n} n(B_j) = 9m$

$\therefore \quad 3n = 9m$

$$\Rightarrow \quad n = \frac{9m}{3} = 3 \times 15 = 45$$

38 **(b)**

$A \cup B$ will contain minimum number of elements if $A \subset B$ and in that case, we have

$n(A \cup B) = n(B) = 6$

40 **(c)**

It is given that $A_1 \subset A_2 \subset A_3 \subset \cdots \subset A_{100}$

$$\therefore \bigcup_{i=3}^{100} A_i = A \Rightarrow A_3 = A \Rightarrow n(A) = n(A_3) = 3 + 2 = 5$$

ANSWER-KEY

Q.	1	2	3	4	5	6	7	8	9	10
A.	C	B	D	A	B	C	C	A	D	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	D	C	A	B	B	C	B	B	B	C

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41 **(d)**
We have,
$A \cap (A \cap B)^c = A \cap (A^c \cup B^c)$
$\Rightarrow A \cap (A \cap B)^c = (A \cap A^c) \cup (A \cap B^c)$
$\Rightarrow A \cap (A \cap B)^c = \phi \cup (A \cap B^c) = A \cap B^c$
42 **(c)**
Since R is a reflexive relation on A.
$\therefore (a, a) \in R$ for all $a \in A$
$\Rightarrow n(A) \leq n(R) \leq n(A \times A) \Rightarrow 13 \leq n(R) \leq 169$
43 **(d)**
Clearly, R is reflexive symmetric and transitive. So, it is an equivalence relation
44 **(a)**
We have,
Required number of families
$= n(A' \cap B' \cap C')$
$= n(A \cup B \cup C)'$
$= N - n(A \cup B \cup C)$
$= 10000 - \{n(A) + n(B) + n(C) - n(A \cap B)\}$
$-n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)\}$
$= 10000 - 4000 - 2000 - 1000 + 500 + 300 + 400 - 200$
$= 4000$
45 **(a)**
We have,
$A \subset A \cup B$
$\Rightarrow A \cap (A \cup B) = A$
46 **(b)**
We have,
$(A \cup B) \cap B' = A$
$\therefore \left((A \cup B) \cap B'\right) \cup A' = A \cup A' = N$
48 **(b)**
The set A consists of all points on $y = e^x$ and the set B consists of points on $y = e^{-x}$, these two curves intersect at (0, 1). Hence, $A \cap B$ consists of a single point
50 **(b)**

Given, $A \cap B = A \cap C$ and $A \cup B = A \cup C$
$\Rightarrow \quad B = C$
51 **(d)**
Required number
$$= \frac{3^4 + 1}{2} = 41$$
52 **(b)**
Clearly, A is the set of all points on a circle with centre at the origin and radius 2 and B is the set of all points on a circle with centre at the origin and radius 3. The two circles do not intersect. Therefore,
$A \cap B = \phi \Rightarrow B - A = B$
53 **(c)**
We have,
$n(A^c \cap B^c)$
$= n\{(A \cup B)^c\}$
$= n(\mathcal{U}) - n(A \cup B)$
$= n(\mathcal{U}) - \{n(A) + n(B) - n(A \cap B)\}$
$= 700 - (200 + 300 - 100) = 300$
54 **(a)**
We have,
$\cos\theta > -\frac{1}{2}$ and $0 \leq \theta \leq \pi$
$\Rightarrow 0 \leq \theta \leq 2\pi/3$ and $0 \leq \theta \leq \pi$
$\Rightarrow 0 \leq \theta \leq \frac{2\pi}{3} \Rightarrow A = \{\theta : 0 \leq \theta \leq 2\pi/3\}$
Also,
$\sin\theta > \frac{1}{2}$ and $\pi/3 \leq \theta \leq \pi$
$\Rightarrow \frac{\pi}{3} \leq \theta \leq \frac{5\pi}{6} \Rightarrow B = \left\{\theta : \frac{\pi}{3} \leq \theta \leq \frac{5\pi}{6}\right\}$
$\therefore A \cap B = \left\{\theta : \frac{\pi}{3} \leq \theta \leq \frac{2\pi}{3}\right\}$ and $A \cup B = \left\{\theta : 0 \leq \theta \leq \frac{5\pi}{6}\right\}$
55 **(d)**
Clearly, R is an equivalence relation
56 **(c)**
Given, $A = \{1, 2, 3\}, B = \{a, b\}$
$\therefore \quad A \times B = \{(1, a), (1, b), (2, a), (2, b), (3, a), (3, b)\}$
57 **(b)**
Clearly,
$A_2 \subset A_3 \subset A_4 \subset \cdots \subset A_{10}$
$\therefore \bigcup_{n=2}^{10} A_n = A_{10} = \{2,3,5,7,11,13,17,19,23,29\}$
58 **(c)**

Clearly,
$R = \{(4,6),(4,10),(6,4),(10,4)(6,10),(10,6),(10,12),(12,10)\}$
Clearly, R is symmetric
$(6,10) \in R$ and $(10,12) \in R$ but $(6,12) \notin R$
So, R is not transitive
Also, R is not reflexive

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	D	C	D	A	A	B	C	B	B	B
Q.	11	12	13	14	15	16	17	18	19	20
A.	D	B	C	A	D	C	B	C	A	D

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Subject : MATHS
DPP No. :4

Topic :-SETS

61 **(c)**

It is given that

$A_1 \subset A_2 \subset A_3 \dots \subset A_{99}$

$$\bigcup_{i=1}^{999} A_i = A_{99}$$

$$\Rightarrow n\left(\bigcup_{i=1}^{99} A_i\right) = n(A_{99}) = 99 + 1 = 100$$

62 **(b)**

It is given that $2^m - 2^n = 56$

Obviously, $m = 6, n = 3$ satisfy the equation

63 **(b)**

Clearly, $(a, a) \in R$ for any $a \in A$

Also,

$(a, b) \in R$

$\Rightarrow a$ and b are in different zoological parks

$\Rightarrow b$ and a are in different zoological parks

$\Rightarrow (b, a) \in R$

Now, $(a, b) \in R$ and $(b, a) \in R$ but $(a, a) \notin R$

So, R is not transitive

64 **(d)**

$X \cap Y = \{1, 2, 4, 5, 8, 10, 20, 25, 40, 50, 100, 200\}$

$\therefore \quad n(X \cap Y) = 12$

66 **(c)**

We have,

$X \cap (Y \cup X)' = X \cap (Y' \cap X') = (X \cap X') \cap Y' = \phi \cap Y' = \phi$

67 **(b)**

The number of subsets of A containing 2, 3 and 5 is same as the number of subsets of set $\{1, 4, 6\}$ which is equal to $2^3 = 8$

68 **(a)**

We have,

$B_1 = A_1 \Rightarrow B_1 \subset A_1$
$B_2 = A_2 - A_1 \Rightarrow B_2 \subset A_2$
$B_3 = A_3 - (A_1 \cup A_2) \Rightarrow B_3 \subset A_3$
$\therefore B_1 \cup B_2 \cup B_3 \subset A_1 \cup A_2 \cup A_3$

69 **(d)**

The identity relation on a set A is reflexive and symmetric both. So, there is always a reflexive and symmetric relation on a set

70 **(a)**

Let the total number of voters be n. Then,
Number of voters voted for $A = \frac{nx}{100}$
Number of voters voted for $B = \frac{n(x+20)}{100}$
$\therefore$ Number of voters who voted for both

$$= \frac{nx}{100} + \frac{n(x+20)}{100}$$
$$= \frac{n(2x+20)}{100}$$

Hence, $n - \frac{n(2x+20)}{100} = \frac{20n}{100} \Rightarrow x = 30$

71 **(c)**

Since $(1,1) \notin R$. So, R is not reflexive
Now, $(1,2) \in R$ but, $(2,1) \notin R$. Therefore, R is not symmetric.
Clearly, R is transitive

72 **(b)**

Let A and B denote respectively the sets of families who got new houses and compensation
It is given that
$n(A \cap B) = n(\overline{A \cup B})$
$\Rightarrow n(A \cap B) = 50 - n(A \cup B)$
$\Rightarrow n(A) + n(B) = 50$
$\Rightarrow n(B) + 6 + n(B) = 50 \quad [\because n(A) = n(B) + 6 \text{ (given)}]$
$\Rightarrow n(B) = 22 \Rightarrow n(A) = 28$

73 **(b)**

We have,
$n(A' \cap B') = n((A \cup B)')$
$\Rightarrow n(A' \cap B') = n(\mathcal{U}) - n(A \cup B)$
$\Rightarrow n(A' \cap B') = n(\mathcal{U}) - \{n(A) + n(B) - n(A \cap B)\}$
$\Rightarrow 300 = n\,(\mathcal{U}) - \{200 + 300 - 100\}$
$\Rightarrow n(\mathcal{U}) = 700$

74 **(b)**

For any integer n, we have
$n|n \Rightarrow n\ R\ n$
So, $n\ R\ n$ for all $n \in Z$
$\Rightarrow R$ is reflexive
Now, $2|6$ but 6 does not divide 2

$\Rightarrow (2,\ 6) \in R$ but $(6,2) \notin R$
So, R is not symmetric
Let $(m,n) \in R$ and $(n,p) \in R$. Then,
$$\left.\begin{array}{l}(m,n) \in R \Rightarrow m|n \\ (n,p) \in R \Rightarrow n|p\end{array}\right\} \Rightarrow m|p \Rightarrow (m,p) \in R$$
So, R is transitive
Hence, R is reflexive and transitive but it is not symmetric

75 **(c)**

Since, $A = B \cap C$ and $B = C \cap A$,
Then $A \equiv B$

76 **(d)**

Since $n|n$ for all $n \in N$. Therefore, R is reflexive. Since $2|6$ but $6 \nmid 2$, therefore R is not symmetric
Let $n\ R\ m$ and $m\ R\ p$
$\Rightarrow n\ R\ m$ and $m\ R\ p$
$\Rightarrow n|m$ and $m|p \Rightarrow n|p \Rightarrow n\ R\ p$
So, R is transitive

77 **(a)**

We have,
$b\ N = \{b\ x | x \in \mathrm{N}\}$ = Set of positive integral multiples of b
$c\ N = \{c\ x | x \in N\}$ = Set positive integral multiples of c
$\therefore bN \cap cN$ = Set of positive integral multiples of bc
$\Rightarrow bN \cap cN = bc\ N$ [$\because$ b and c are prime]
Hence, $d = bc$

79 **(b)**

Let $x, y \in A$. Then,
$x = m^2, y = n^2$ for some $m, n \in N$
$\Rightarrow xy = (mn)^2 \in A$

80 **(c)**

We have,
$A_1 \subset A_2 \subset A_3 \subset \cdots \subset A_{100}$
$$\therefore \bigcup_{i=1}^{100} A_i = A_{100} \Rightarrow n\left(\bigcup_{i=1}^{100} A_i\right) = n(A_{100}) = 101$$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	C	B	B	D	C	C	B	A	D	A
Q.	11	12	13	14	15	16	17	18	19	20
A.	C	B	B	B	C	D	A	C	B	C

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DAILY PRACTICE PRODUCTS

Class : XIth
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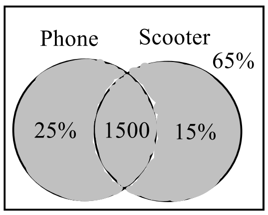
Solutions

Subject : MATHS
DPP No. :5

Topic :-SETS

81 **(c)**

Let the total population of town be x.



$\therefore \qquad \frac{25x}{100}+\frac{15x}{100}-1500+\frac{65x}{100}=x$

$\Rightarrow \qquad \frac{105x}{100}-x=1500$

$\Rightarrow \qquad \frac{5x}{100}=1500$

$\Rightarrow \qquad x=30000$

82 **(d)**

As A, B, C are pair wise disjoints. Therefore,

$A\cap B=\phi, B\cap C=\phi$ and $A\cap C=\phi$

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

83 **(b)**

Clearly, $R=\{(1,3),(3,1),(2,2)\}$

We observe that R is symmetric only

84 **(d)**

Given figure clearly represents

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

85 **(d)**

R_4 is not a relation from A to B, because $(7,9)\in R_4$ but $(7,9)\notin A\times B$

86 **(c)**

R is reflexive if it contains $(1,1),(2,2),(3,3)$

$\because (1,2)\in R, (2,3)\in R$

$\because R$ is symmetric, if $(2,1),(3,2)\in R$

Now, $R = \{(1,1), (2,2), (3,3), (2,1), (3,2), (2,3), (1,2)\}$
R will be transitive, if $(3,1), (1,3) \in R$
Thus, R becomes an equivalence relation by adding $(1,1)$ $(2,2)$ $(3,3)$, $(2,1)$ $(3,2)$, $(1,3)$, $(3,1)$. Hence, the total number of ordered pairs is 7

87 **(c)**

The set A is the set of all points on the hyperbola $xy = 1$ having its two branches in the first and third quadrants, while the set B is the set of all points on $y = -x$ which lies in second and four quadrants. These two curves do not intersect.
Hence, $A \cap B = \phi$.

88 **(b)**

Since R is an equivalence relation on set A. Therefore $(a, a) \in R$ for all $a \in A$.
Hence, R has at least n ordered pairs

89 **(d)**

It is given $A_1 \subset A_2 \subset A_3 \subset A_4 \dots \subset A_{50}$

$$\therefore \bigcup_{i=11}^{50} A_i = A_{11}$$

$$\Rightarrow n\left(\bigcup_{i=11}^{50} A_i\right) = n(A_{11}) = 11 - 1 = 10$$

90 **(d)**

We have,
$b\,N = \{b\,x | x \in \mathrm{N}\}$ = Set of positive integral multiples of b
$c\,N = \{c\,x | x \in N\}$ = Set of positive integral multiples of c
$\therefore c\,N = \{c\,x \mid x \in N\}$ = Set of positive integral multiples of b and c both
$\Rightarrow d = \mathrm{l.c.m.}$ of b and c

91 **(d)**

Clearly, R is an equivalence relation

92 **(b)**

Number of element is $S = 10$
And $A = \{(x, y); x, y \in S, x \neq y\}$
$\therefore$ Number of element in $A = 10 \times 9 = 90$

93 **(c)**

Clearly,
$R = \{$(BHEL, SAIL), (SAIL, BHEL), (BHEL, GAIL),
(GAIL, BHEL), (BHEL, IOCL), (IOCL, BHEL)$\}$
We observe that R is symmetric only

94 **(a)**

According to the given condition,

$$2^m = 112 + 2^n$$
$$\Rightarrow \quad 2^m - 2^n = 112$$
$$\Rightarrow \quad m = 7, n = 4$$

96 **(c)**

We have,

$$p = \frac{(n+2)(2n^5 + 3n^4 + 4n^3 + 5n^2 + 6)}{n^2 + 2n}$$

$$\Rightarrow p = 2n^4 + 3n^3 + 4n^2 + 5n + \frac{6}{n}$$

Clearly, $p \in Z^+$ iff n $= 1, 2, 3, 6$. So, A has 4 elements

97 **(b)**

Clearly,

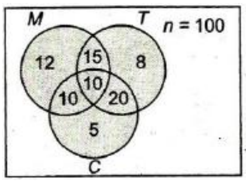
$x \in A - B \Rightarrow x \in A$ but $x \notin B$

$\Rightarrow x$ is a multiple of 3 but it is not a multiple of 5

$\Rightarrow x \in A \cap \bar{B}$

98 **(b)**

Total drinks=3(ie, milk, coffee, tea).



Total number of students who take any of the drink is 80.

∴The number of students who did not take any of three drinks$= 100 - 80 = 20$

100 **(d)**

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

$= 12 + 9 - 4 = 17$

Hence, $n[(AUB)^c] = n(U) - n(A \cup B)$

$= 20 - 17 = 3$

ANSWER-KEY

Q.	1	2	3	4	5	6	7	8	9	10
A.	C	D	B	D	D	C	C	B	D	D
Q.	11	12	13	14	15	16	17	18	19	20
A.	D	B	C	A	C	C	B	B	D	D

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Topic :-SETS

101 **(c)**
We have,
$\{x \in Z: |x-3| < 4\} = \{x \in Z: -1 < x < 7\} = \{0,1,2,3,4,5,6\}$
and,
$\{x \in Z: |x-4| < 5\} = \{x \in Z: -1 < x < 9\}$
$= \{0,1,2,3,4,5,6,7,8\}$
$\therefore \{x \in Z: |x-3| < 4\} \cap \{x \in Z: |x-4| < 5\}$
$= \{0,1,2,3,4,5,6\}$
102 **(a)**
Since R is reflexive relation on A
$\therefore (a, a) \in R$ for all $a \in A$
$\Rightarrow$ The minimum number of ordered pairs in R is n
Hence, $m \geq n$
104 **(c)**
We have, $y = \frac{4}{x}$ and $x^2 + y^2 = 8$
Solving these two equations, we have
$x^2 + \frac{16}{x^2} = 8 \Rightarrow (x^2 - 4) = 0 \Rightarrow x = \pm 2$
Substituting $x = \pm 2$ in $y = \frac{4}{x}$, we get $y = \pm 2$
Thus, the two curves intersect at two points only (2, 2) and (−2, 2). Hence, $A \cap B$ contains just two points
105 **(b)**
Let $(a, b) \in R$. Then,
$|a+b| = a+b \Rightarrow |b+a| = b+a \Rightarrow (b, a) \in R$
$\Rightarrow R$ is symmetric
106 **(c)**
Minimum possible value of $n(B \cap C)$ is $n(A \cap B \cap C) = 3$
107 **(a)**
To make R a reflexive relation, we must have (1,1), (3,3) and (5,5) in it. In order to make R a symmetric relation, we must inside (3,1) and (5,3) in it.

Now, $(1,3) \in R$ and $(3,5) \in R$. So, to make R a transitive relation, we must have, $(1,5) \in R$. But, R must be symmetric also. So, it should also contain $(5,1)$. Thus, we have
$R = \{(1,1), (3,3), (5,5), (1,3), (3,5), (3,1), (5,3), (1,5), (5,1)\}$
Clearly, it is an equivalence relation on $A\{1,3,5\}$
108 **(b)**
Clearly, $(3,3) \notin R$. So, R is not reflexive. Also, $(3,1)$ and $(1,3)$ are in R but $(3,3) \notin R$. So, R is not transitive
But, R is symmetric as $R = R^{-1}$
109 **(b)**
Let $(a, b) \in R$. Then,
$(a, b) \in R \Rightarrow (b, a) \in R^{-1}$ [By def. of R^{-1}]
$\Rightarrow (b, a) \in R$ [$\because R = R^{-1}$]
So, R is symmetric
110 **(b)**
We have,
$A_2 \subset A_3 \subset A_4 \subset \cdots \subset A_{10}$
$\therefore \bigcap_{n=3}^{10} A_n = A_3 = \{2,3,5\}$
111 **(c)**
The possible sets are $\{\pm 2, \pm 3\}$ and $\{\pm 4, \pm 1\}$; therefore, number of elements in required set is 8.
112 **(a)**
Given, $A = \{a, b, c\}$, $B = \{b, c, d\}$ and $C = \{a, d, c\}$
Now, $A - B = \{a, b, c\} - \{b, c, d\} = \{a\}$
And $B \cap C = \{b, c, d\} \cap \{a, d, c\} = \{c, d\}$
$\therefore (A - B) \times (B \cap C) = \{a\} \times \{c, d\}$
$= \{(a, c), (a, d)\}$
113 **(c)**
Given, $n(M) = 100, n(P) = 70$, $n(C) = 40$
$n(M \cap P) = 30$, $n(M \cap C) = 28$,
$n(P \cap C) = 23$ and $n(M \cap P \cap C) = 18$
$\therefore n(M \cap P' \cap C') = n[M \cap (P \cap C')]$
$= n(M) - n[M \cap (P \cap C)]$
$= n(M) - [n(M \cap P) + n(M \cap C) - n(M \cap P \cap C)]$
$= 100 - [30 + 28 - 18 = 60]$
114 **(d)**
$B \cap C = \{4\}$.
$\therefore A \cup (B \cap C) = \{1, 2, 3, 4\}$
115 **(c)**
$\because$ $A \subseteq B$
$\therefore$ $B \cup A = B$
116 **(c)**
$n((A \cup B)^c\} = n(\mathcal{U}) - n(A \cup B)$

$= n(\mathcal{U}) - \{n(A) + n(B) - n(A \cap B)\}$
$= 100 - (50 + 20 - 10) = 40$
117 **(d)**
If $A = \{1,2,3\}$, then $R = \{(1,1), (2,2), (3,3), (1,2)\}$ is reflexive on A but it is not symmetric
So, a reflexive relation need not be symmetric
The relation 'is less than' on the set Z of integers is antisymmetric but it is not reflexive
119 **(c)**
Clearly,
Required percent $= 20 + 50 - 10 = 60\%$
$[\because n(A \cup B) = n(A) + n(B) - n(A \cap B)]$
120 **(c)**
The greatest possible value of $n(A \cap B \cap C)$ is the least amongst the values $n(A \cap B), n(B \cap C)$ and $n(A \cap C)$ i.e. 10

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	C	A	B	C	B	C	A	B	B	B
Q.	11	12	13	14	15	16	17	18	19	20
A.	C	A	C	D	C	C	D	B	C	C

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DPP No. :7

Topic :-SETS

121 **(d)**
Clearly, $S \subset R$
$\therefore S \cup R = R$ and $S \cap R = S$
$\Rightarrow (S \cap R) - (S \cap R) =$ Set of rectangles which are not squares
122 **(b)**
Clearly, the relation is symmetric but it is neither reflexive nor transitive
123 **(d)**
Since, power set is a set of all possible subsets of a set.
$\therefore \quad P(A) = \{\phi, \{x\}, \{y\}, \{x, y\}\}$
124 **(b)**
We have,
$N = 10{,}000, n(A) = 40\%$ of $10{,}000 = 4000,$
$n(B) = 2000, n(C) = 1000, n(A \cap B) = 500,$
$n(B \cap C) = 300, n(C \cap A) = 400, n(A \cap B \cap C) = 200$
Now,
Required number of families $=$
$n(A \cap \bar{B} \cap \bar{C}) = n(A \cap (B \cup C)')$
$= n(A) - n(A \cap (B \cup C))$
$= n(A) - n\big((A \cap B) \cup (A \cap C)\big)$
$= n(A) - \{n(A \cap B) + n(A \cap C) - n(A \cap B \cap C)\}$
$= 4000 - (500 + 400 - 200) = 3300$
126 **(b)**
$A \cap \phi = \phi$ is true.
128 **(c)**
$A \cap B = \{2, 4\}$
$\{A \cap B\} \subseteq \{1, 2, 4\}, \{3, 2, 4\}, \{6, 2, 4\}, \{1, 3, 2, 4\},$
$\{1, 6, 2, 4\}, \{6, 3, 2, 4\}, \{2, 4\}, \{1, 3, 6, 2, 4\} \subseteq A \cup B$
$\Rightarrow \quad n(C) = 8$
129 **(a)**
We have,

$p = \dfrac{7n^2 + 3n + 3}{n} \Rightarrow p = 7n + 3 + \dfrac{3}{n}$

It is given that $n \in N$ and p is prime. Therefore, $n = 1$

$\therefore n(A) = 1$

130 **(d)**

$(Y \times A) = \{(1, 1), (1, 2), (2, 1), (2, 2),$
$(3, 1), (3, 2), (4, 1), (4, 2), (5, 1), (5, 2)\}$

And$(Y \times B) = \{(1, 3), (1, 4), (1, 5), (2, 3),$
$(2, 4), (2, 5), (3, 3), (3, 4), (3, 5), (4, 3),$
$(4, 4), (4, 5), (5, 3), (5, 4), (5, 5)\}$

$\therefore (Y \times A) \cap (Y \times B) = \phi$

131 **(b)**

Given, $n(A) = 4,\quad n(B) = 5$ and $\quad n(A \cap B) = 3$

$\therefore n[(A \times B) \cap (B \times A)] = 3^2 = 9$

132 **(c)**

$U = \{x: x^5 + 6x^4 + 11x^3 - 6x^2 = 0\} = \{0, 1, 2, 3\}$

$A = \{x: x^2 - 5x + 6 = 0\} = \{2, 3\}$

And $\ B = \{x: x^2 - 3x + 2 = 0\} = \{2, 1\}$

$\therefore \quad (A \cap B)' = U - (A \cap B)$

$= \{0, 1, 2, 3\} - \{2\} = \{0, 1, 3\}$

133 **(c)**

We have,

$R = \{(1,3), (1,5), (2,3), (2,5), (3,5), (4,5)\}$

$\Rightarrow R^{-1} = \{(3,1), (5,1), (3,2), (5,2), (5,3), (5,4)\}$

Hence, $R \ o\ R^{-1} = \{(3,3), (3,5), (5,3), (5,5)\}$

134 **(b)**

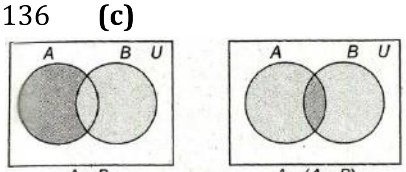
Let $(a, b) \in R$. Then,

a and b are born in different months $\Rightarrow (b, a) \in R$

So, R is symmetric

Clearly, R is neither reflexive nor transitive

136 **(c)**



$A - B$ $\qquad$ $A-(A-B)$

From the venn diagram

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

137 **(b)**

Required number of subsets is equal to the number of subsets containing 2 and any number of elements from the remaining elements 1 and 4

So, required number of elements $= 2^2 = 4$

140 **(b)**

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Clearly, 2 is a factor of 6 but 6 is not a factor of 2. So, the relation 'is factor of' is not symmetric. However, it is reflexive and transitive

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	D	B	D	B	B	B	D	C	A	D
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	C	C	B	B	C	B	B	A	B

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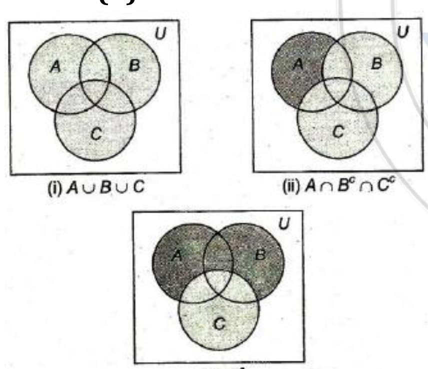
Subject : MATHS
DPP No. :8

Topic :-SETS

142 **(d)**
Clearly, R is neither reflexive, nor symmetric and not transitive
143 **(d)**
Clearly, given relation is an equivalence relation
145 **(c)**
Each subset will contain 3 and any number of elements from the remaining 3 elements 1, 2 and 4
So, required number of elements $= 2^2 = 8$
146 **(a)**
Since $(1,1),(2,2),(3,3) \in R$. Therefore, R is reflexive. We observe that $(1,2) \in R$ but $(2,1) \notin R$, therefore R is not symmetric.
It can be easily seen that R is transitive
147 **(b)**



(i) $A \cup B \cup C$ (ii) $A \cap B^c \cap C^c$ (iii) C^c

From figures (i), (ii) and (iii), we get
$(A \cup B \cup C) \cap (A \cap B^C \cap C^C) \cap C^C = (B^C \cap C^C)$
148 **(d)**
A relation on set A is a subset of $A \times A$
Let $A = \{a_1, a_2, \dots, a_n\}$. Then, a reflexive relation on A must contain at least n elements $(a_1, a_1), (a_2, a_2), \dots, (a_n, a_n)$
$\therefore$ Number of reflexive relations on A is 2^{n^2-n}
Clearly, $n^2 - n = n, n^2 - n = n - 1, n^2 - n = n^2 - 1$ have solutions in N but $n^2 - n = n + 1$ is not solvable in N.
So, 2^{n+1} cannot be the number of reflexive relations on A
149 **(a)**

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We have,

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

$\Rightarrow n(A \Delta B) = n(A) + n(B) - 2\, n(A \cap B)$

So, $n(A \Delta B)$ is greatest when $n(A \cap B)$ is least

It is given that $A \cap B \neq \phi$. So, least number of elements in $A \cap B$ can be one

$\therefore$ Greatest possible value of $n(A \Delta B)$ is $7 + 6 - 2 \times 1 = 11$

150 **(d)**

Let $R = \{(x, y): y = ax + b\}$. Then,

$(-2, -7), (-1, -4) \in R$

$\Rightarrow -7 = -2a + b$ and $-4 = -a + b$

$\Rightarrow a = 3, b = -1$

$\therefore y = 3x - 1$

Hence, $R = \{(x, y): y = 3x - 1, -2 \leq x < 3, x \in Z\}$

151 **(a)**

Let $\mathcal{U}$ be the set of all students in the school. Let C, H and B denote the sets of students who played cricket, hockey and basketball respectively. Then,

$n(\mathcal{U}) = 800, n(C) = 224, n(H) = 240, n(B) = 336$

$n(H \cap B) = 64, n(B \cap C) = 80, n(H \cap C) = 40$

and, $n(H \cap B \cap C) = 24$

$\therefore$ Required number

$= n(C' \cap H' \cap B')$

$= n(C \cup H \cup B)'$

$= n(\mathcal{U}) - n(C \cup H \cup B)$

$= n(\mathcal{U}) - \{n(C) + n(H) + n(B) - n(C \cap H) - n(H \cap B) - n(B \cap C) + n(C \cap H \cap B)\}$

$= 800 - \{224 + 240 + 336 + 336 - 64 - 80 - 40 + 24\}$

$= 800 - 640 = 160$

152 **(c)**

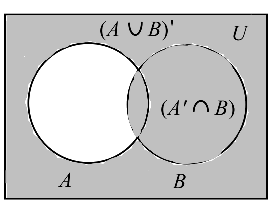
According to question,

$$2^m - 2^n = 48$$

This is possible only if $m = 6$ and $n = 4$.

153 **(a)**

From Venn-Euler's Diagram it is clear that



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

154 **(b)**

For any $a, b \in R$

$a \neq b \Rightarrow b \neq a \Rightarrow R$ is symmetric

Clearly, $2 \neq -3$ and $-3 \neq 2$, but $2 = 2$. So, R is not transitive.

Clearly, R is not reflexive

155 **(a)**

We have,

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

$\Rightarrow n(A \Delta B) = n(A) + n(B) - 2\, n(A \cap B)$

So, $n(A \Delta B)$ is greatest when $n(A \cap B)$ is least

It is given that $A \cap B \neq \phi$. So, least number of elements in $A \cap B$ can be one

$\therefore$ Greatest possible value of $n(A \Delta B)$ is $7 + 6 - 2 \times 1 = 11$

156 **(c)**

Since $x \nless x$, therefore R is not reflexive

Also, $x < y$ does not imply that $y < x$

So R is not symmetric

Let $x\ R\ y$ and $y\ R\ z$. Then, $x < y$ and $y < z. \Rightarrow x < z$ i. e. $x\ R\ z$

Hence, R is transitive

157 **(b)**

Number of elements common to each set is $99 \times 99 = 99^2$.

158 **(b)**

Given, $A \cap X = B \cap X = \phi$

$\Rightarrow$ A and X, B and X are disjoint sets.

Also, $A \cup X = B \cup X \Rightarrow A = B$

160 **(c)**

Clearly, R is reflexive and symmetric but it is not transitive

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	D	D	A	C	A	B	D	A	D
Q.	11	12	13	14	15	16	17	18	19	20
A.	A	C	A	B	A	C	B	B	A	C