

NDA 1 2025

LIVE

MATHS

SETS-RELATION FUNCTION

CLASS 4

NAVJYOTI SIR

SSBCrack
CLAMS

Crack
EXAMS



07 Oct 2024 Live Classes Schedule

- 8:00AM
07 OCTOBER 2024 DAILY CURRENT AFFAIRS
RUBY MA'AM
- 9:00AM
07 OCTOBER 2024 DAILY DEFENCE UPDATES
DIVYANSHU SIR

SSB INTERVIEW LIVE CLASSES

- 9:30AM
OVERVIEW ON PPDT & PRACTICE
ANURADHA MA'AM

NDA 1 2025 LIVE CLASSES

- 11:30AM
GK - MINERALS & RESOURCES
RUBY MA'AM
- 1:00PM
BIOLOGY - GROWTH IN ANIMALS
SHIVANGI MA'AM
- 4:00PM
MATHS - SETS, RELATION & FUNCTION - CLASS 4
NAVJYOTI SIR
- 5:30PM
ENGLISH - SPOTTING ERRORS - CLASS 3
ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

- 11:30AM
GK - MINERALS & RESOURCES
RUBY MA'AM
- 1:00PM
BIOLOGY - GROWTH IN ANIMALS
SHIVANGI MA'AM
- 5:30PM
ENGLISH - SPOTTING ERRORS - CLASS 3
ANURADHA MA'AM
- 7:00PM
MATHS - TIME & WORK - CLASS 2
NAVJYOTI SIR

AFCAT 1 2025 LIVE CLASSES

- 10:00AM
REASONING - FIGURE COMPLETION
RUBY MA'AM
- 4:00PM
STATIC GK - OLYMPICS & COMMON WEALTH GAMES
DIVYANSHU SIR
- 5:30PM
ENGLISH - SPOTTING ERRORS - CLASS 3
ANURADHA MA'AM
- 7:00PM
MATHS - TIME & WORK - CLASS 2
NAVJYOTI SIR

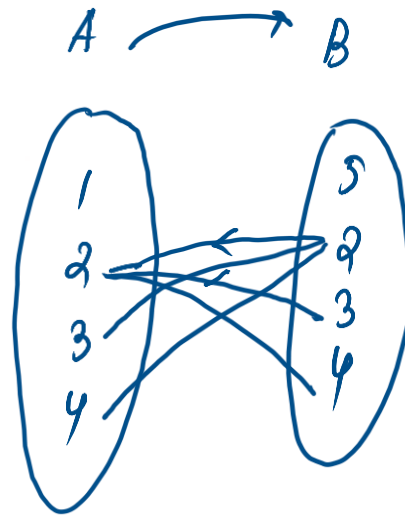


NDA 1 2025 LIVE CLASS - MATHS - PART 4

If A and B are two non-empty sets having 10 elements in common, then how many elements do $A \times B$ and $B \times A$ have in common?

(PYQ - 2024 - II)

- (a) 10
- (b) 20
- (c) 40
- (d) 100 ✓



If 10 elements are in common,
 \downarrow
 $10^2 = 100$

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

$$n[(A \times B) \cap (B \times A)] = 3 + 3 + 3$$

$$= 9 = (3^2)$$

If 'm' elements are common
 in $A \cap B$ i.e. $n(A \cap B) = m$
 then $n[(A \times B) \cap (B \times A)] = m^2$

NDA 1 2025 LIVE CLASS - MATHS - PART 4

If A and B are two non-empty sets having 10 elements in common, then how many elements do $A \times B$ and $B \times A$ have in common?

(PYQ – 2024 – II)

- (a) 10
- (b) 20
- (c) 40
- (d) 100

Ans: (d)

Q) Let $R = \{x \mid x \in N, x \text{ is a multiple of } 3 \text{ and } x \leq 100\}$

$S = \{x \mid x \in N, x \text{ is a multiple of } 5 \text{ and } x \leq 100\}$

What is the number of elements in $(R \times S) \cap (S \times R)$?

- (a) 36
- (c) 20

- (b) 33
- (d) 6

$$R = \{3, 6, 9, \dots, 99\}$$

$$S = \{5, 10, 15, 20, \dots, 100\}$$

$$n(R \cap S) = \underline{6}$$

Multiples of (3×5)

$$R \cap S = \{15, 30, 45, 60, 75, 90\}$$

$$n[(R \times S) \cap (S \times R)] = 6^2 = \underline{36}$$

Q) Let $R = \{x \mid x \in N, x \text{ is a multiple of } 3 \text{ and } x \leq 100\}$

$S = \{x \mid x \in N, x \text{ is a multiple of } 5 \text{ and } x \leq 100\}$

What is the number of elements in $(R \times S) \cap (S \times R)$?

(a) 36

(b) 33

(c) 20

(d) 6

Ans: (a)

Q) If $f(x) + 2f\left(\frac{1}{x}\right) = 3x$, $x \neq 0$ and

$$\underline{f(x)} + 2 \underline{f\left(\frac{1}{x}\right)} = \underline{3x} \text{ --- (1)}$$

$S = \{x \in \mathbb{R} : \underline{f(x) = f(-x)}\}$; then S:

$$f\left(\frac{1}{x}\right) + 2f\left(\frac{1}{\frac{1}{x}}\right) = 3\left(\frac{1}{x}\right)$$

(a) contains exactly two elements. ✓

(b) contains more than two elements.

$$\underline{f\left(\frac{1}{x}\right)} + 2 \underline{f(x)} = \underline{\frac{3}{x}} \text{ --- (2)}$$

(c) is an empty set.

(d) contains exactly one element.

$$\text{(1) + (2)}$$

$$3f(x) + 3f\left(\frac{1}{x}\right) = 3x + \frac{3}{x}$$

$$3\left(f(x) + f\left(\frac{1}{x}\right)\right) = 3\left(x + \frac{1}{x}\right) \Rightarrow$$

$$\underline{f(x)} + \underline{f\left(\frac{1}{x}\right)} = \underline{x + \frac{1}{x}} \text{ --- (3)}$$

$$f(x) + \underline{2f\left(\frac{1}{x}\right)} = 3x \quad \text{--- (1)}$$

$$\underline{f\left(\frac{1}{x}\right)} + 2f(x) = \frac{3}{x} \quad \text{--- (2)}$$

$$\text{(2)} - \text{(1)},$$

$$f(x) - f\left(\frac{1}{x}\right) = \frac{3}{x} - 3x = 3\left(\frac{1}{x} - x\right)$$

$$f(x) - f\left(\frac{1}{x}\right) = \frac{3}{x} - 3x \quad \text{--- (4)}$$

$$f(x) + f\left(\frac{1}{x}\right) = x + \frac{1}{x} \quad \text{--- (3)}$$

$$\text{(4)} + \text{(3)}, \quad 2f(x) = \frac{4}{x} - 2x \quad \Rightarrow \quad \left(f(x) = \frac{2}{x} - x\right)$$

$$f(x) = f(-x)$$

$$\frac{2}{x} - x = \frac{2}{(-x)} - (-x)$$

$$\frac{2}{x} - x = -\frac{2}{x} + x$$

$$\frac{4}{x} = 2x$$

$$2 = x^2$$

$$\Rightarrow x = \underline{+\sqrt{2}, -\sqrt{2}}$$

$$S = \underline{\{+\sqrt{2}, -\sqrt{2}\}}$$

Q) If $f(x) + 2f\left(\frac{1}{x}\right) = 3x$, $x \neq 0$ and

$S = \{x \in \mathbb{R} : f(x) = f(-x)\}$; then S:

- (a) contains exactly two elements.
- (b) contains more than two elements.
- (c) is an empty set.
- (d) contains exactly one element.

Ans: (a)

NDA 1 2025 LIVE CLASS - MATHS - PART 4

Let P and Q be two non-void relations on a set A . Which of the following statements are correct? (PYQ - 2024 - II)

- I. P and Q are reflexive $\Rightarrow P \cap Q$ is reflexive. ✓
- II. P and Q are symmetric $\Rightarrow P \cup Q$ is symmetric. ✓
- III. P and Q are transitive $\Rightarrow P \cap Q$ is transitive. ✓

Select the answer using the code given below.

- (a) I and II only
(b) II and III only
(c) I and III only
(d) I, II and III ✓

I.) Let $a \in A$,

$$\underline{(a, a)} \in P \text{ and } \underline{(a, a)} \in Q$$

$$\Rightarrow (a, a) \in P \cap Q$$

$\Rightarrow P \cap Q$ is reflexive

II.) Let $(a, b) \in P \cup Q$

$$\Rightarrow \underline{(a, b)} \in P \text{ or } (a, b) \in Q \text{ or } (a, b) \in P \cap Q,$$

$$\Rightarrow (b, a) \in P \text{ or } (b, a) \in Q \text{ or } (b, a) \in P \cap Q$$

$$\Rightarrow \underline{(b, a)} \in P \cup Q$$

$\Rightarrow P \cup Q$ is symmetric

NDA 1 2025 LIVE CLASS - MATHS - PART 4

11.) Let (a, b) , (b, c) \in $P \cap Q$

$(a, b), (b, c) \in P$ and $(a, b), (b, c) \in Q$

\Rightarrow $(a, c) \in P$ and $(a, c) \in Q$

\Rightarrow $(a, c) \in P \cap Q$

\Rightarrow $P \cap Q$ is transitive.

NDA 1 2025 LIVE CLASS - MATHS - PART 4

Let P and Q be two non-void relations on a set A . Which of the following statements are correct? (PYQ – 2024 – II)

- I. P and Q are reflexive $\Rightarrow P \cap Q$ is reflexive.
- II. P and Q are symmetric $\Rightarrow P \cup Q$ is symmetric.
- III. P and Q are transitive $\Rightarrow P \cap Q$ is transitive.

Select the answer using the code given below.

- (a) I and II only
- (b) II and III only
- (c) I and III only
- (d) I, II and III

Ans: (d)

NDA 1 2025 LIVE CLASS - MATHS - PART 4

Suppose that A denotes the collection of all complex numbers whose square is a negative real number. Which one of the following statements is correct ?

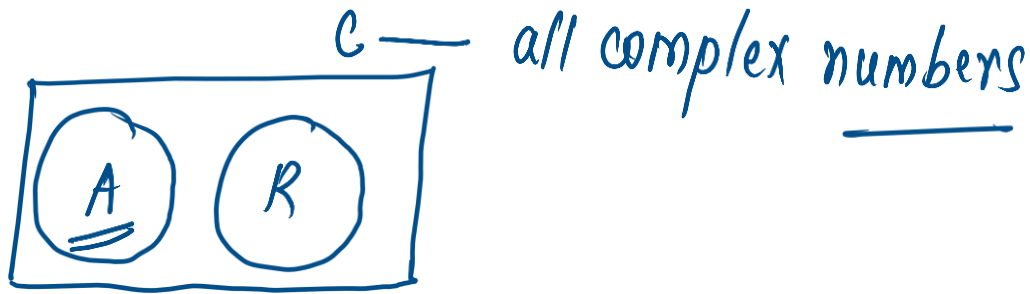
- (a) $A \subseteq \mathbb{R}$ α
- (b) $A \supseteq \mathbb{R}$ α
- (c) $A = \{x+iy \mid x^2 \in \mathbb{R} \mid x, y \in \mathbb{R}\}$
- (d) $A = \{iy \mid y \in \mathbb{R}\}$ ✓

$$\underline{a + ib}$$

$A = \{ \text{set of all imaginary nos.} \}$

$$\sqrt{-4} = 4i \text{ (imaginary number)}$$

$$(i = \sqrt{-1})$$



(e) $A = \{ \text{complex numbers} \}$

NDA 1 2025 LIVE CLASS - MATHS - PART 4

Suppose that A denotes the collection of all complex numbers whose square is a negative real number. Which one of the following statements is correct ?

- (a) $A \subseteq \mathbb{R}$
- (b) $A \supseteq \mathbb{R}$
- (c) $A = \{x + iy \mid x^2 \in \mathbb{R}, y \in \mathbb{R}\}$
- (d) $A = \{iy \mid y \in \mathbb{R}\}$

Ans: (d)

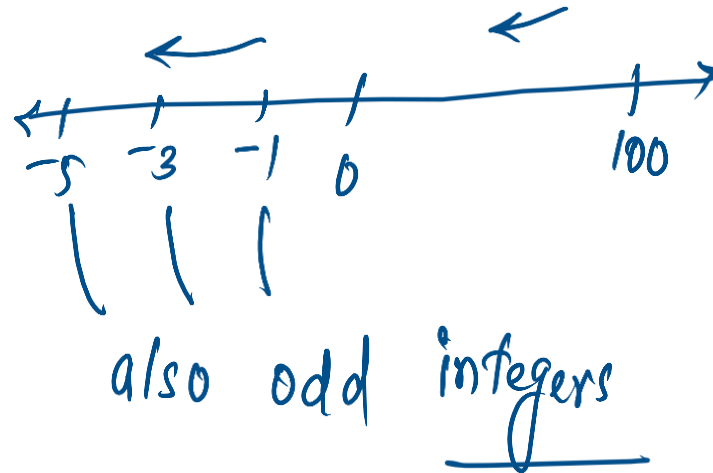
Q) Consider the following statements :

(PYQ – 2024 – I)

1. The set of all irrational numbers between $\sqrt{2}$ and $\sqrt{5}$ is an infinite set. ✓
2. The set of all odd integers less than 100 is a finite set. ✗

Which of the statements given above is/are correct ?

- (a) 1 only ✓
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2



Q) Consider the following statements :

(PYQ – 2024 – I)

1. The set of all irrational numbers between $\sqrt{2}$ and $\sqrt{5}$ is an infinite set.
2. The set of all odd integers less than 100 is a finite set.

Which of the statements given above is/are correct ?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans: (a)

NDA 1 2025 LIVE CLASS - MATHS - PART 4

Consider the following statements :

(PYQ – 2024 – II)

I. The set of all irrational numbers between $\sqrt{12}$ and $\sqrt{15}$ is an infinite set. ✓

II. The set of all odd integers less than 1000 is a finite set. ✗

Which of the statements given above is/are correct?

(a) I only ✓

(b) II only

(c) Both I and II

(d) Neither I nor II

NDA 1 2025 LIVE CLASS - MATHS - PART 4

Consider the following statements :

- I. The set of all irrational numbers between $\sqrt{12}$ and $\sqrt{15}$ is an infinite set.
- II. The set of all odd integers less than 1000 is a finite set.

Which of the statements given above is/are correct?

- (a) I only
- (b) II only
- (c) Both I and II
- (d) Neither I nor II

Ans: (b)

Q) For f to be a function, what is the domain of f , if

$$f(x) = \frac{1}{\sqrt{|x| - x}} ?$$

- (a) $(-\infty, 0)$ (b) $(0, \infty)$ (c) $(-\infty, \infty)$ (d) $(-\infty, 0)$

$$f(x) = \frac{1}{\sqrt{x-x}} \quad (x \neq x)$$

$$= \frac{1}{\sqrt{0}}$$

$$|x| = \begin{cases} x, & x \geq 0 \\ -x, & x < 0 \end{cases} \longrightarrow f(x) \text{ is not defined}$$

$$f(x) = \frac{1}{\sqrt{-x-x}} = \frac{1}{\sqrt{-2x}} \longrightarrow \text{if } \underline{x < 0} \quad \left| \begin{array}{l} x < 0, \\ (-\infty, 0) \end{array} \right.$$

Q) For f to be a function, what is the domain of f , if

$$f(x) = \frac{1}{\sqrt{|x| - x}} ?$$

- (a) $(-\infty, 0)$ (b) $(0, \infty)$ (c) $(-\infty, \infty)$ (d) $(-\infty, 0)$

Ans: (a)

Q) Which one of the following is the second degree polynomial function $f(x)$ where, $f(0) = 5$, $f(-1) = 10$ and $f(1) = 6$?

- (a) $5x^2 - 2x + 5$ (b) $3x^2 - 2x - 5$
(c) $3x^2 - 2x + 5$ (d) $3x^2 - 10x + 5$

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- (a) $5x^2 - 2x + 5$ (b) $3x^2 - 2x - 5$
(c) $3x^2 - 2x + 5$ (d) $3x^2 - 10x + 5$

Ans: (c)

Q) If $A = \{x : 0 \leq x \leq 2\}$ and $B = \{y : y \text{ is a prime number}\}$, then what is $A \cap B$ equal to?

- (a) ϕ (b) $\{1\}$ (c) $\{2\}$ (d) $\{1, 2\}$

Q) If $A = \{x : 0 \leq x \leq 2\}$ and $B = \{y : y \text{ is a prime number}\}$, then what is $A \cap B$ equal to?

- (a) ϕ (b) $\{1\}$ (c) $\{2\}$ (d) $\{1, 2\}$

Ans: (c)

Q) Which one of the following sets has all elements as odd positive integers ?

(a) $S = \{x \in \mathbb{R} | x^3 - 8x^2 + 19x - 12 = 0\}$

(b) $S = \{x \in \mathbb{R} | x^3 - 9x^2 + 23x - 15 = 0\}$

(c) $S = \{x \in \mathbb{R} | x^3 - 7x^2 + 14x - 8 = 0\}$

(d) $S = \{x \in \mathbb{R} | x^3 - 12x^2 + 44x - 48 = 0\}$

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(d) $S = \{x \in \mathbb{R} | x^3 - 12x^2 + 44x - 48 = 0\}$

Ans: (b)

Q) Which of the following statements is not correct for the relation R defined by aRb if and only if b lives within one kilometer from a ?

- (a) R is reflexive (b) R is symmetric
(c) R is not anti-symmetric (d) None of the above

Q) In a group of 500 students, there are 475 students who can speak Hindi and 200 can speak Bengali. What is the number of students who can speak Hindi only ?

- (a) 275 (b) 300
(c) 325 (d) 350

Ans: (b)

Q) If a set A contains 3 elements and another set B contains 6 elements, then what is the minimum number of elements that $(A \cup B)$ can have?

(a) 3

(b) 6

(c) 8

(d) 9

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(a) 3

(b) 6

(c) 8

(d) 9

Ans: (b)

Q) Let $P = \{p_1, p_2, p_3, p_4\}$
 $Q = \{q_1, q_2, q_3, q_4\}$ and
 $R = \{r_1, r_2, r_3, r_4\}$.

If $S_{10} = \{(p_i, q_j, r_k) : i + j + k = 10\}$,
how many elements does S_{10} have ?

- (a) 2 (b) 4
(c) 6 (d) 8

Q)let μ = the set of all triangles, P = the set of all isosceles triangles, Q = the set of all equilateral triangles, R = the set of all right-angled triangles. What do the sets $P \cap Q$ and $R - P$ represents respectively ?

- (a) The set of isosceles triangles; the set of non- isosceles right angled triangles
- (b) The set of isosceles triangles; the set of right angled triangles
- (c) The set of equilateral triangles; the set of right angled triangles
- (d) The set of isosceles triangles; the set of equilateral triangles

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- (b) The set of isosceles triangles; the set of right angled triangles
- (c) The set of equilateral triangles; the set of right angled triangles
- (d) The set of isosceles triangles; the set of equilateral triangles

Ans: (a)

Q) Consider the following statements:

For non empty sets A, B and C

1. $A - (B - C) = (A - B) \cup C$

2. $A - (B \cup C) = (A - B) - C$

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

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Which of the statements given above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Ans: (b)

Q) A relation R is defined over the set of non-negative integers

as $xRy \Rightarrow x^2 + y^2 = 36$ what is R ?

- (a) $\{(0, 6)\}$
- (b) $\{(6, 0), (\sqrt{11}, 5), (3, 3, \sqrt{3})\}$
- (c) $\{(6, 0), (0, 6)\}$
- (d) $\{(\sqrt{11}, 5), (2, 4\sqrt{2}), (5\sqrt{11}), (4\sqrt{2}, 2)\}$

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- (c) $\{(6, 0), (0, 6)\}$
- (d) $\{(\sqrt{11}, 5), (2, 4\sqrt{2}), (5\sqrt{11}), (4\sqrt{2}, 2)\}$

Ans: (c)

Q) Consider the following statements:

1. Parallelism of lines is an equivalence relation.
2. $x R y$, if x is a father of y , is an equivalence relation.

Which of the statements given above is/are correct?

- | | |
|------------------|---------------------|
| (a) 1 only | (b) 2 only |
| (c) Both 1 and 2 | (d) Neither 1 nor 2 |

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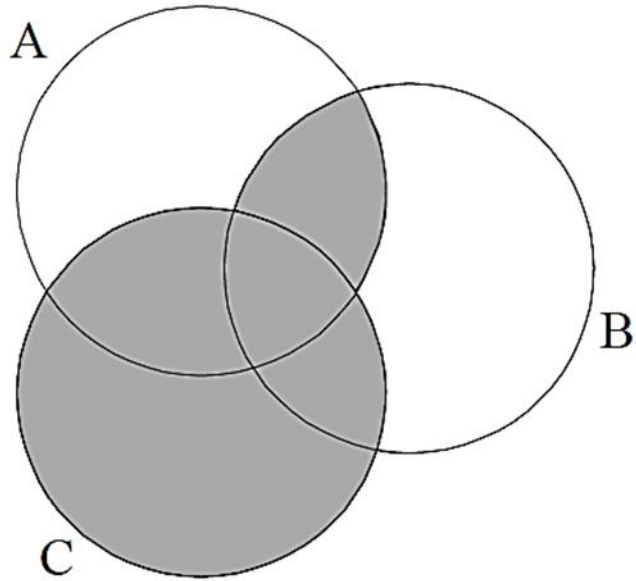
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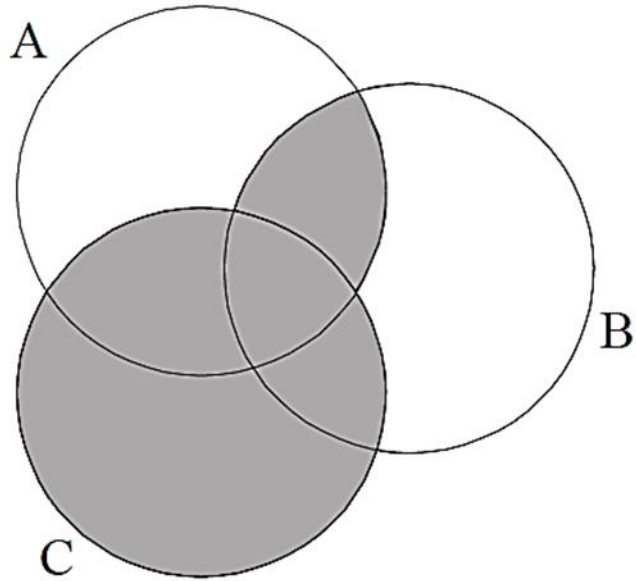
Ans: (a)

Q) What does the shaded region in the Venn diagram given below represent ?



- (a) $C \cap (A' \cap B')$ (b) $C \cup (C' \cap A \cap B)$
 (c) $C \cup (C \cap A) \cup (C \cap B)$ (d) $C \cup (A/B)$

Q) What does the shaded region in the Venn diagram given below represent ?



- (a) $C \cap (A' \cap B')$ (b) $C \cup (C' \cap A \cap B)$
 (c) $C \cup (C \cap A) \cup (C \cap B)$ (d) $C \cup (A/B)$

Ans: (b)

Q) Let R be the set of real numbers.

Statement-1: $A = \{(x, y) \in R \times R : y - x \text{ is an integer}\}$ is an equivalence relation on R .

Statement-2: $B = \{(x, y) \in R \times R : x = \alpha y \text{ for some rational number } \alpha\}$ is an equivalence relation on R .

- (a) Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1.
- (b) Statement-1 is true, Statement-2 is false.
- (c) Statement-1 is false, Statement-2 is true.
- (d) Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1.

Q) Let R be the set of real numbers.

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- (c) Statement-1 is false, Statement-2 is true.
- (d) Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1.

Ans: (b)

Q) Let A and B two sets containing 2 elements and 4 elements respectively. The number of subsets of $A \times B$ having 3 or more elements is

- (a) 256 (b) 220 (c) 219 (d) 211

Q) Let A and B two sets containing 2 elements and 4 elements respectively. The number of subsets of $A \times B$ having 3 or more elements is

- (a) 256 (b) 220 (c) 219 (d) 211

Ans: (c)

Q) If A , B and C are three sets such that $A \cap B = A \cap C$ and

$A \cup B = A \cup C$, then

(a) $A = C$

(b) $B = C$

(c) $A \cap B = \phi$

(d) $A = B$

Q) If A , B and C are three sets such that $A \cap B = A \cap C$ and

$A \cup B = A \cup C$, then

- (a) $A = C$ (b) $B = C$
(c) $A \cap B = \phi$ (d) $A = B$

Ans: (b)

- Q)** Let W denote the words in the English dictionary. Define the relation R by $R = \{(x, y) \in W \times W \mid \text{the words } x \text{ and } y \text{ have at least one letter in common.}\}$ Then R is
- (a) not reflexive, symmetric and transitive
 - (b) reflexive, symmetric and not transitive
 - (c) reflexive, symmetric and transitive
 - (d) reflexive, not symmetric and transitive

- Q)** Let W denote the words in the English dictionary. Define the relation R by $R = \{(x, y) \in W \times W \mid \text{the words } x \text{ and } y \text{ have at least one letter in common.}\}$ Then R is
- (a) not reflexive, symmetric and transitive
 - (b) reflexive, symmetric and not transitive
 - (c) reflexive, symmetric and transitive
 - (d) reflexive, not symmetric and transitive

Ans: (b)

- Q)** Let $R = \{(3, 3), (6, 6), (9, 9), (12, 12), (6, 12), (3, 9), (3, 12), (3, 6)\}$ be a relation on the set $A = \{3, 6, 9, 12\}$. The relation is
- (a) reflexive and transitive only
 - (b) reflexive only
 - (c) an equivalence relation
 - (d) reflexive and symmetric only

- Q)** Let $R = \{(3, 3), (6, 6), (9, 9), (12, 12), (6, 12), (3, 9), (3, 12), (3, 6)\}$ be a relation on the set $A = \{3, 6, 9, 12\}$. The relation is
- (a) reflexive and transitive only
 - (b) reflexive only
 - (c) an equivalence relation
 - (d) reflexive and symmetric only

Ans: (a)

Q) If X and Y are two sets, then $X \cap (X \cup Y)^c$ equals.

(a) X

(b) Y

(c) ϕ

(d) None of these.

Q) If X and Y are two sets, then $X \cap (X \cup Y)^c$ equals.

(a) X

(b) Y

(c) ϕ

(d) None of these.

Ans: (c)

Q) Suppose $f : \mathbf{R} \rightarrow \mathbf{R}$ is defined by $f(x) = \frac{x^2}{1+x^2}$. What is

the range of the function?

- (a) $[0, 1)$ (b) $[0, 1]$ (c) $(0, 1]$ (d) $(0, 1)$

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- (a) $[0, 1)$ (b) $[0, 1]$ (c) $(0, 1]$ (d) $(0, 1)$

Ans: (a)

Q) If a set X contains n ($n > 5$) elements, then what is the number of subsets of X containing less than 5 elements ?

(a) $C(n, 4)$

(b) $C(n, 5)$

(c) $\sum_{r=0}^5 C(n, r)$

(d) $\sum_{r=0}^4 C(n, r)$

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Ans: (d)

Q) In an examination out of 100 students, 75 passed in English, 60 passed in Mathematics and 45 passed in both English and Mathematics. What is the number of students passed in exactly one of the two subjects?

- | | |
|--------|--------|
| (a) 45 | (b) 60 |
| (c) 75 | (d) 90 |

Q) In an examination out of 100 students, 75 passed in English 60 passed in Mathematics and 45 passed in both English and Mathematics. What is the number of students passed in exactly one of the two subjects?

- | | |
|--------|--------|
| (a) 45 | (b) 60 |
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Ans: (a)

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MATHS

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CLASS 1

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