NDA 1 2025

LIVE

MATHS

SETS RELATIONS FUNCTIONS - 2

MCQS

NAVJYOTI SIR

Crack
EXAMS

22 Jan 2025 Live Classes Schedule

9:00AM	22 JANUARY 2025 DAILY DEFENCE UPDATES	DIVYANSHU SIR
10:00AM	22 JANUARY 2025 DAILY CURRENT AFFAIRS	RUBY MA'AM

SSB INTERVIEW LIVE CLASSES

9:30AM	OVERVIEW OF GPE & PRACTICE	ANURADHA MA'AM

AFCAT 1 2025 LIVE CLASSES

12:30PM	REASONING - VERBAL CLASSIFICATION	RUBY MA'AM
3:00PM	STATIC GK - SCIENCE & TECHNOLOGY	DIVYANSHU SIR
4:30PM	ENGLISH - SPOTTING ERRORS - CLASS 3	ANURADHA MA'AM
5:30PM	MATHS - PROFIT & LOSS	NAVJYOTI SIR

NDA 1 2025 LIVE CLASSES

10:00AM	MATHS - SETS, RELATION AND FUNCTION - CLASS 2	NAVJYOTI SIR
11:30AM	ANCIENT HISTORY - CLASS 2	RUBY MA'AM
1:00PM	PHYSICS - REFLECTION OF LIGHT	NAVJYOTI SIR
4:30PM	ENGLISH - SPOTTING ERRORS - CLASS 3	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	ANCIENT HISTORY - CLASS 2	RUBY MA'AM
1:00PM	PHYSICS - REFLECTION OF LIGHT	NAVJYOTI SIR
4:30PM	ENGLISH - SPOTTING ERRORS - CLASS 3	ANURADHA MA'AM
5:30PM	MATHS - PROFIT & LOSS	NAVJYOTI SIR

Q) On the set Z of integers, relation R is defined as "a R b $\Leftrightarrow$ a + 2b is an integral multiple of 3". Which one of the following statements is correct for R ?

(a) R is only reflexive ✓
(b) R is only symmetric
(c) R is only transitive
(d) R is an equivalence relation

Reflexive : ✓

Let $a \in Z$

$a + 2(a) = 3a = 3 \times a$ → multiple of 3

Symmetric : ✗

Let $(a, b) \in R$

$a + 2b = 3m$

$b + 2a$

$b + 2(3m - a) \neq 3n$ → not a multiple of 3,

Q) On the set Z of integers, relation R is defined as "a R b $\Leftrightarrow$ $a+2b$ is an integral multiple of 3". Which one of the following statements is correct for R ?

(a) R is only reflexive
(b) R is only symmetric
(c) R is only transitive
(d) R is an equivalence relation

Ans: (a)

Q) A function f is defined by $f(x) = x + \frac{1}{x}$. Consider the following.

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

(2) $(f(x))^3 = f(x^3) + 3f(x)$

Which of the above is/are correct?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

(1) $LHS = (f(x))^2 = \left(x + \frac{1}{x}\right)^2 = \left(x^2 + \frac{1}{x^2}\right) + 2 = f(x^2) + 2 = RHS$ ——— ✓

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

$= f(x^3) + 3f(x) = RHS$ — ✓

Q) A function f is defined by $f(x) = x + \frac{1}{x}$. Consider the following.

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

(2) $(f(x))^3 = f(x^3) + 3f(x)$

Which of the above is/are correct?

(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1 nor 2

Ans: (c)

Q) $f:\{1,2,3\}\to\{4,5\}$ is not a function if it is defined by which one of the following?

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

(b) $\{(1,4),(2,4),(3,4)\}$

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

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

$\{1,2,3\}$ — D

$\{4,5\}$ — C

(a,b)

$a \in D$ & $b \in C$ → a should only come once in ordered pairs

Q) $f:\{1,2,3\}\to\{4,5\}$ is not a function if it is defined by which one of the following?

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

(b) $\{(1,4),(2,4),(3,4)\}$

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

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

Ans: (d)

Q) If $N_a = \{ax \mid x \in N\}$, then what is $N_{12} \cap N_8$ equal to?

(a) N_{12}
(b) N_{20}
(c) N_{24}
(d) N_{48}

$N_{12} = \{12x\} = \{12, 24, 36, 48, 60, 72 \ldots\}$

$N_8 = \{8x\} = \{8, 16, 24, 32, 40, 48 \ldots\}$

$N_{12} \cap N_8 = \{24, 48, 72 \ldots\}$

$= \{24x\} = N_{24}$

Q) If $N_a = \{ax \mid x \in N\}$, then what is $N_{12} \cap N_8$ equal to?

(a) N_{12}
(b) N_{20}
(c) N_{24}
(d) N_{48}

Ans: (c)

Q) 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) $A \subseteq R$
(b) $A \supseteq R$ } ✗

(c) $A = \{x + iy | x^2 \in R | x, y \in R\}$ ✗

(d) $A = \{iy | y \in R\}$ ✓

$\sqrt{-4}$ } all imaginary numbers,

$A \cap R = \phi \Rightarrow A \not\subseteq R$, or $R \not\subseteq A$

$2i$ }

will always be of form $iy, y \in R$.

Q) 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) $A \subseteq R$

(b) $A \supseteq R$

(c) $A = \{x + iy | x^2 \in R | x, y \in R\}$

(d) $A = \{iy | y \in R\}$

Ans: (d)

Q) A relation R is defined on the set Z of integers as follows :

$mRn \Leftrightarrow m+n$ is odd.

Which of the following statements is/are true for R ?

1. R is reflexive
2. R is symmetric
3. R is transitive

Select the correct answer using the code given below :

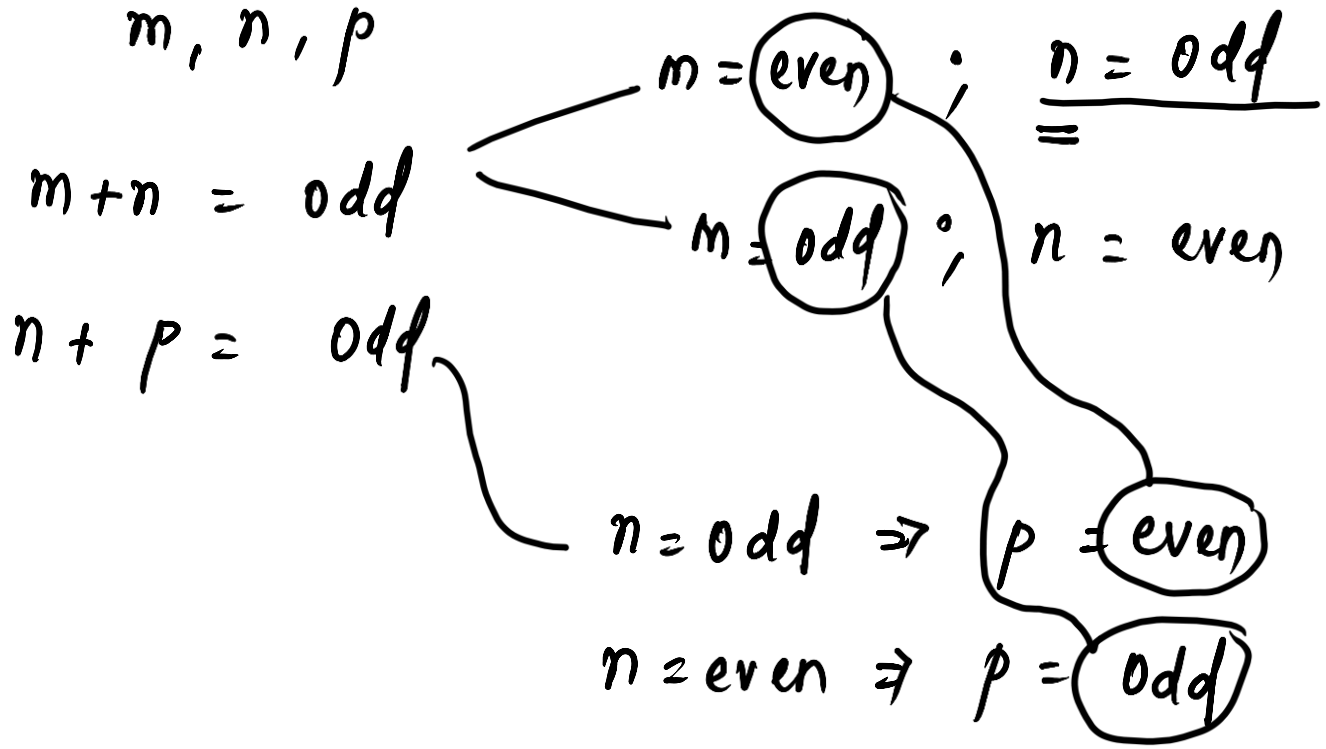
(a) 2 only
(b) 2 and 3
(c) 1 and 2
(d) 1 and 3

Reflexive : $m + m = 2m \Rightarrow$ not odd —— X

Symmetric : $m + n =$ odd | $n + m$ — odd —— ✓

If even + odd
If odd + even

Transitive



$m + p \Rightarrow$ even + even = even
odd + odd = even
$\Rightarrow$ not Transitive

Q) A relation R is defined on the set Z of integers as follows :

$mRn \Leftrightarrow m+n$ is odd.

Which of the following statements is/are true for R ?

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2. R is symmetric
3. R is transitive

Select the correct answer using the code given below :

(a) 2 only
(b) 2 and 3
(c) 1 and 2
(d) 1 and 3

Ans: (a)

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

(a) $S = \{x \in R | x^3 - 8x^2 + 19x - 12 = 0\}$ —— $x = 1, -, -$

(b) $S = \{x \in R | x^3 - 9x^2 + 23x - 15 = 0\}$ —— $x = 1$

(c) $S = \{x \in R | x^3 - 7x^2 + 14x - 8 = 0\}$ —— $x = 1$

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

(a) $x - 1 \overline{)\, x^3 - 8x^2 + 19x - 12}$

$x^2 - 7x + 12$

$x^3 - x^2$

$-7x^2 + 19x$

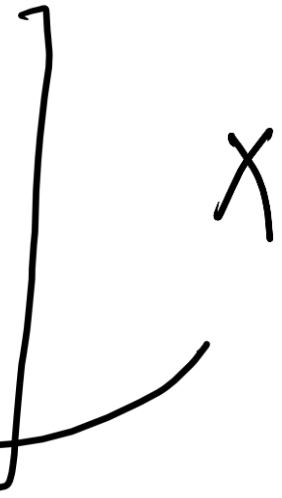
$-7x^2 + 7x$

$12x - 12$

$(x-1)(x^2 - 7x + 12) = 0$

$(x-1)(x-3)(x-4) = 0$

$x = 1, 3, 4$ even



(6) ✓

$$
\begin{array}{r|l}
 & x^2 - 8x + 15 \\
\hline
x-1 & x^3 - 9x^2 + 23x - 15 \\
 & x^3 - x^2 \\
\hline
 & -8x^2 + 23x \\
 & -8x^2 + 8x \\
\hline
 & 15x - 15
\end{array}
$$

$$x^3 - 9x^2 + 23x - 15 = (x-1)(x^2 - 8x + 15) = 0$$

$$\Rightarrow (x-1)(x-3)(x-5) = 0$$

$$x = 1, 3, 5$$

all odd

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

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

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

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

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

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

$A = \{a, b, c\}$

$B = \{a, b, c, 1, 2, 3\}$

$A \subset B$

$A \cap B = A$

$A \cup B = B$

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

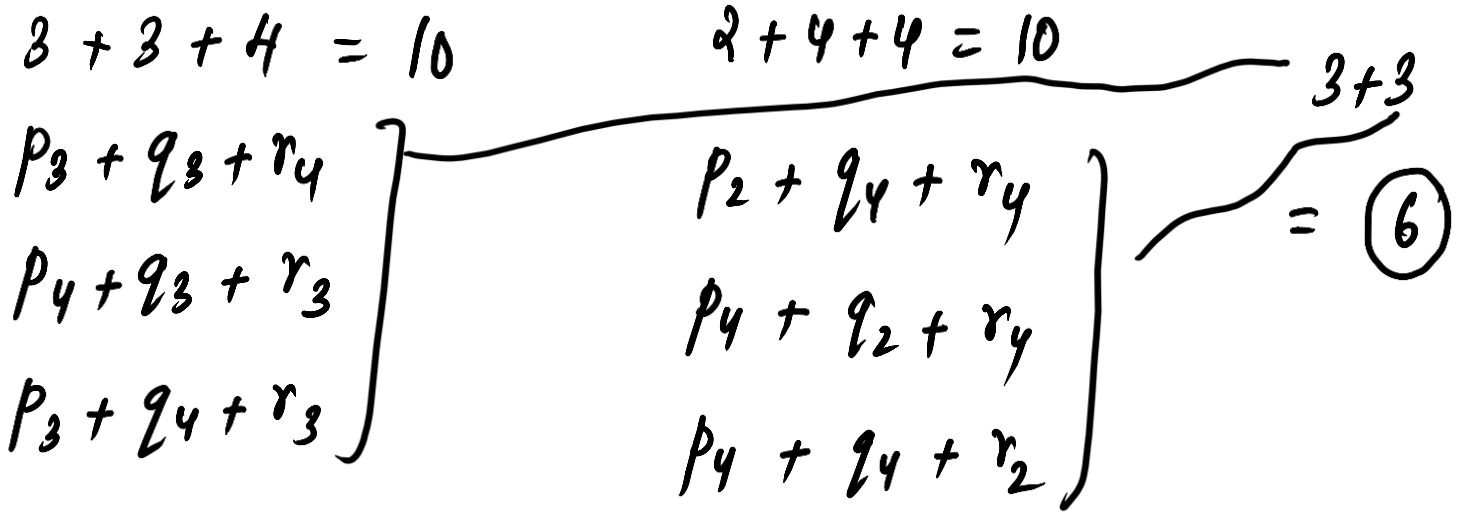
Q) If a set A contains 3 elements and another set B contains 6 elements, then what is the minimum number of elements that $(A \cup B)$ can have?

(a) 3
(b) 6
(c) 8
(d) 9

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 $P = \{p_1, p_2, p_3, p_4\}$
$Q = \{q_1, q_2, q_3, q_4\}$ 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

Ans: (c)

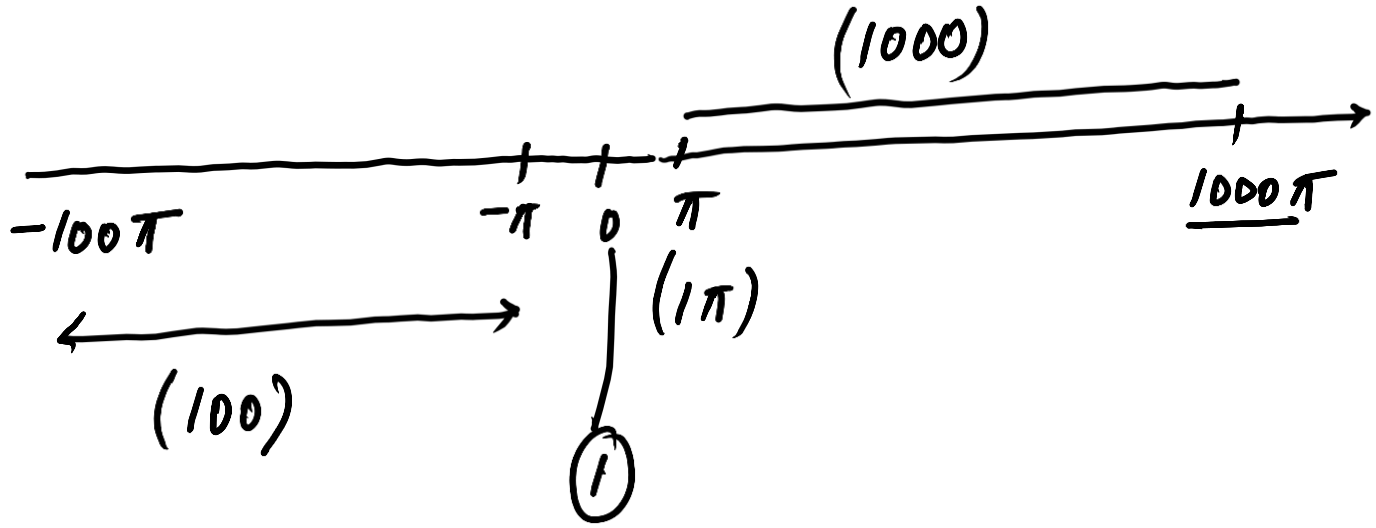
Q) Let f: $[-100\pi, 1000\pi] \to [-1, 1]$ be defined by $f(\theta) = \sin\theta$.
Then what is the number of values of $\theta \in [-100\pi, 1000\pi]$ for which $f(\theta) = 0$?

(a) 1000 (b) 1101
(c) 1100 (d) 1110

$\sin\theta = 0$

$\theta = n\pi$

$n \in Z$



$1000 + 1 + 100 = 1101$

Q) Let $f: [-100\pi, 100\pi] \to [-1, 1]$ be defined by $f(\theta) = \sin\theta$. Then what is the number of values of $\theta \in [-100\pi, 1000\pi]$ for which $f(\theta) = 0$?

(a) 1000
(b) 1101
(c) 1100
(d) 1110

Ans: (b)

Q) Consider the following statements:

For non empty sets A, B and C

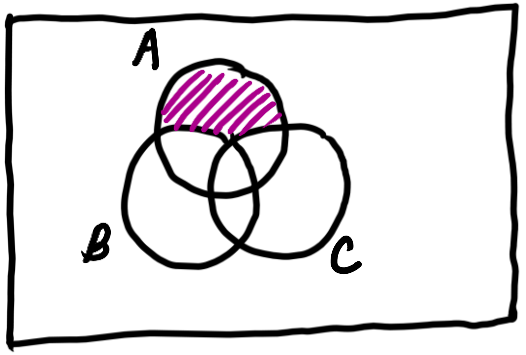
1. $A-(B-C)=(A-B)\cup C$ ✗
2. $A-(B\cup C)=(A-B)-C$ ✓

Which of the statements given above is/are correct?

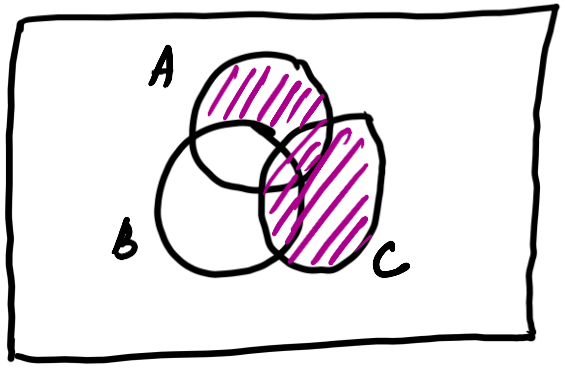
(a) 1 only (b) 2 only

(c) Both 1 and 2 (d) Neither 1nor 2

(1)



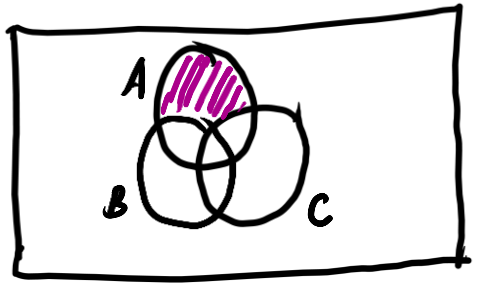
(LHS) $A-(B-C)$



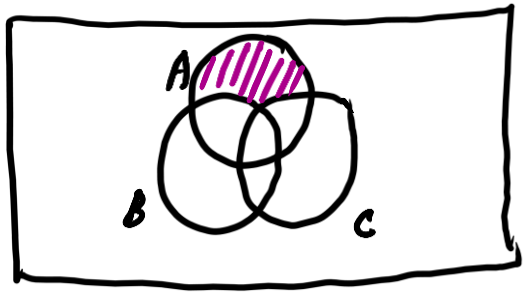
$(A-B)\cup C$

(not equal)

$A - (B \cup C)$



$(A - B) - C$



(equal)

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 1nor 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) $(\sqrt{11}, 5), (2, 4\sqrt{2}), (5\sqrt{11}), (4\sqrt{2}, 2)\}$ ✗

→ 1, 2, 3, 4 . . . . .

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) $\{(0,6)\}$

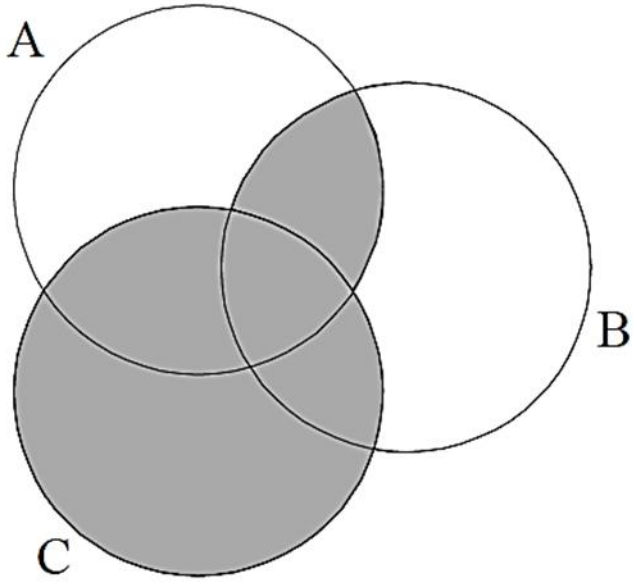
(b) $\{(6,0), (\sqrt{11},5), (3,3,\sqrt{3})$

(c) $\{(6,0), (0,6)\}$

(d) $(\sqrt{11},5), (2,4\sqrt{2}), (5\sqrt{11}), (4\sqrt{2},2)\}$

Ans: (c)

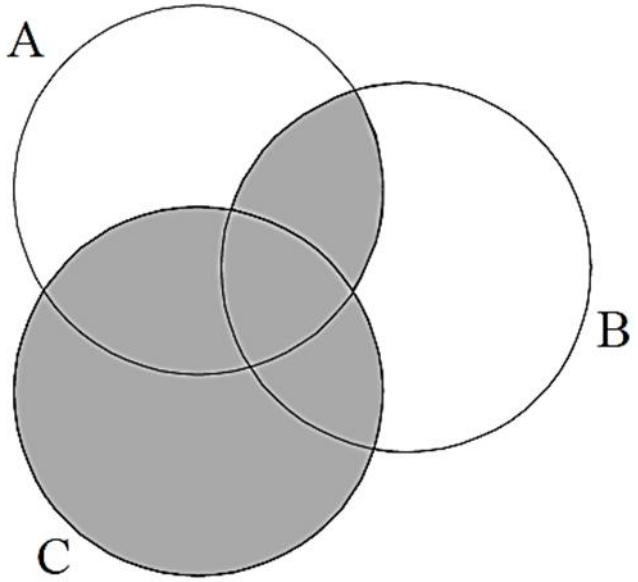
Q) What does the shaded region in the Venn diagram given below represent ?



(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.

$x = \alpha x \Rightarrow \alpha = 1$

Reflexive ✓

Symmetric ✓

$\rightarrow x = \alpha y$

$\rightarrow y = \alpha x$

$x = \left(\frac{1}{\alpha}\right) y$

If α is rational, $\frac{1}{\alpha}$ is also rational,

$(x, y) \longrightarrow x = \alpha y$

$(y, z) \longrightarrow y = \alpha z$

$(x, z) \longrightarrow x = \alpha z$

Transitive — ✓

$\alpha y = \alpha z$

$\alpha(\alpha z) = \alpha z$

$\alpha^2 z - \alpha z = 0$

$\alpha z(\alpha - 1) = 0 \Rightarrow \alpha z = 0 \quad (\alpha = 0)$ ✓ | $\alpha = 1$ ✓ (rational)

Q) Let R be the set of real numbers.

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

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

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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: (a)

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LIVE

MATHS

TRIGONOMETRY - 1

MCQS

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