# INDIAN SCHOOL AL WADI AL KABIR

**Unit Test – Model Paper (2024 - 2025)**

Class: XI Sub: MATHEMATICS (041) Max Marks: 30

Date: 28.05.2024 Time: 1 hr

**General Instructions:**

1. This question paper is divided in to 4 sections- A, B, C and D.
2. Section A comprises of 7 questions of 1 mark each.
3. Section B comprises of 3 questions of 2 marks each.
4. Section C comprises of 3 questions of 3 marks each.
5. Section D comprises of 2 case study-based questions
6. Internal choice has been provided for certain questions

## Section – A

1 The number of non-empty subsets of a set, containing n elements, is

(a) n (b) $n^2$ (c) $2^n$ (d) $2^n - 1$

2 Which of the following statement is false?

(a) $A - B = A \cap B'$ (b) $A - B = A - (A \cap B)$

(c) $A - B = A - B'$ (d) $A - B = (A \cup B) - B$

3 Let R be a relation on N defined by R = $\{(x, y): x + 2y = 8, x, y \in N\}$. Then domain of R is

(a) {2, 4, 8} (b) {2, 4, 6, 8} (c) {2, 4, 6} (d) {1, 2, 3, 4}

4 If $f(x) = x^3 - \frac{1}{x^3}$, then $f(x) + f\left(\frac{1}{x}\right)$ is equal to

(a) $2x^3$ (b) $\frac{2}{x^3}$ (c) 0 (d) 1

5 If (x + 3, 5) = (6, 2x + y) then x, y is equals to

(a) 3,-1 (b) 3,0 (c) 0,-1 (d) None of these

6 Which of the following is not correct?

(a) $\sin\theta = -\frac{1}{5}$ (b) $\cos\theta = 1$ (c) $\sec\theta = ½$ (d) $\tan\theta = 20$

7 **Assertion (A):** $\sin(-270)^\circ = 1$.

**Reason (R):** $\sin(180^\circ + \theta) = \sin\theta$

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is NOT the correct explanation of A

(C) A is true but R is false

(D) A is false and R is True

(a) $2\sqrt{3}$ (b) 4 (c) 1 (d) 0

## Section – B

8 If $\sin x = -\frac{5}{13}$, $x$ lies in III quadrant, find the values of $sin\frac{x}{2}$, $\cos\frac{x}{2}$ and $tan\frac{x}{2}$.

9 Let A = {1, 2, 3, 4, 5, 6}. Let R be a relation on A defined by R = {(a, b) : b is exactly divisible by a; a, b ∈A}, then
(i) Write R in roster form. (ii) Find the domain of R. (iii) Find the range of R.

10 If $A = \{x: x \in R, x \text{ is the root of the equation } x^3 - x = 0\}$, and
$B = \{x: x \in R, x \text{ is the root of } x^3 + 2x^2 - x - 2 = 0\}$
Then find the values of (i) $A \cup B$ (ii) $A \cap B$

## Section – C

11 Draw appropriate Venn diagrams for each of the following:
(i) A ∪ B (ii) A ∩ B (iii) (A – B) ∪ (B – A)

12 Prove that Prove: $\sqrt{2 + \sqrt{2 + 2cos4x}} = 2cosx$

13 Prove that if tan A= x tan B, then $\frac{Sin(A-B)}{Sin(A+B)} = \frac{x-1}{x+1}$

## Section – D

14 Students of Indian Public School was conducting a quiz. The questions for round was as follows. The participants are required to finish the task in five minutes


(i) If A = {-1, 1}, then the find the number of elements in A x A x A (2m)

(ii) Find the domain and range of the function

$f(x) = \sqrt{25 - x^2}$ (2m)

15 Salman and Amir are solving math question from chapter sets of class XI.

Given U = {x : x ≤ 25, x ∈ N},
A = {x : x ≤ 15, x ∈ N} and
B = {x: 10 < x ≤ 25, x ∈ N}.
In few questions they are not confident about their answer. Find the answer for the following questions and help Salman and Amir to verify their answers.

(i) Find B – A (1m)
(ii) Find A ∪ B (1m)
(iii) Find (A – B)' (2m)

- OR -

Find A'∩ B'

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**Answer Key**

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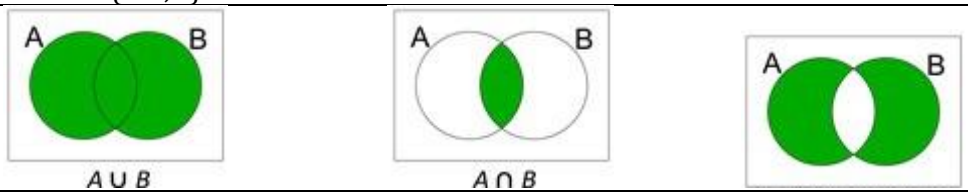
| | |
|---|---|
| 1 | (d) $2^n - 1$ |
| 2 | (c) A – B = A – B′ |
| 3 | (c) {2, 4, 6} |
| 4 | (c) 0 |
| 5 | (a) 3,-1 |
| 6 | (c) sec θ = ½ |
| 7 | (C) A is true but R is false |
| 8 | $\cos x = -12/13$<br>$\cos x = 2cos^2\frac{x}{2} - 1$<br>$-\frac{12}{13} = 2cos^2\frac{x}{2} - 1$<br>$\Rightarrow cos^2\frac{x}{2} = \frac{1}{26}$<br>$\Rightarrow cos\ \frac{x}{2} = -\frac{1}{\sqrt{26}}$<br>Similarly $sin\frac{x}{2} = \frac{5}{\sqrt{26}}$<br>And $\tan\frac{x}{2} = -5$ |
| 9 | (i) R = {(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 2), (2, 4), (2, 6), (3, 3), (3, 6), (4, 4), (5, 5), (6, 6)}<br>(ii) Domain = {1, 2, 3, 4, 5, 6}<br>(iii) Range = {1, 2, 3, 4, 5, 6} |
| 10 | $A = \{0, -1, 1\}\ and\ B = \{-2, -1, 1\}$<br>$A \cup B = \{0, -1, 1, -2\}$<br>$A \cap B = \{-1, 1\}$ |
| 11 |  |

| | |
|---|---|
| 12 | $\sqrt{2+\sqrt{2+2\cos 4x}} = \sqrt{2+\sqrt{2+2(2\cos^2 2x-1)}}$<br>{since, $\cos 2x = 2\cos^2 x - 1 \Rightarrow \cos 4x = 2\cos^2 2x - 1$}<br>$= \sqrt{2+\sqrt{2+4\cos^2 2x-2}}$<br>$= \sqrt{2+\sqrt{4\cos^2 2x}}$<br>$= \sqrt{2+2\cos 2x}$<br>$= \sqrt{2+2(2\cos^2 x-1)}$ {since, $\cos 2x = 2\cos^2 x - 1$}<br>$= \sqrt{2+4\cos^2 x-2}$<br>$= \sqrt{4\cos^2 x}$<br>$= 2\cos x$<br>= RHS |
| 13 | LHS$= \frac{Sin(A-B)}{Sin(A+B)} = \frac{SinA\ cosB - cosA\ sinB}{SinA\ cosB + cosA sinB}$<br>$= \frac{tanA - tanB}{tanA + tanB} = \frac{xtanB - tanB}{xtanB + tanB}$<br>$= \frac{x-1}{x+1}$ = RHS |
| 14 | (i) {(-1, -1, -1), (-1, -1, 1), (-1, 1, -1), (1, -1, -1), (-1, 1, 1), (1, 1, -1), (1, -1, 1), (1, 1, 1)}<br>(iii) $D_f$ = **[-5, 5]** **$R_f$ = [0 , 5]** |
| 15 | U={1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25}<br>A={1,2,3,4,5,6,7,8,9,10,11,12,13,14,15}<br>B={11,12,13,14,15,16,17,18,19,20,21,22,23,24,25}<br>(i) Find B – A - {**16,17,18,19,20,21,22,23,24,25}**<br>(ii) Find A ∪ B - U<br>- Find (A – B)' - B<br>- OR -<br>Find A'∩ B' - ∅ |