INDIAN SCHOOL AL WADI AL KABIR
Unit Test (2024 - 2025)

Class: XI | Sub: MATHEMATICS (041) | Max Marks: 30
Date: 28.05.2024 | Set-I | 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 If the number of non-empty subsets of a set is 4095, the number of elements of the set is: (1m)

a) 9 b) 10 c) 11 d) 12

2 If A and B are two sets such that n(A) = 12, n(A - B) = 5 and n(A U B) = 23, then number of subsets of A ∩ B is (1m)

a) 16 b) 64 c) 128 d) 256

3 If $\left(\frac{x}{2}+1,\ y-\frac{2}{3}\right) = \left(\frac{3}{2},\ \frac{1}{3}\right)$, then the value of x and y are (1m)

a) x =1 & y = 1 c) x = 1 & y = -1

b) x = -1 & y = 1 d) x = -1 & y = -1

4 If a function $f(x) = \left\{\left(x, \frac{x^2}{1+x^2}\right) : x \in R\right\}$ is defined from R to R, then its range is (1m)

a) R b) $(-\infty, \infty)$ c) (0, 1) d) [0, 1)

5 If $f(x) = ax + b$, where a and b are integers, such that $f(-1) = -5$ and $f(3) = 3$, then a and b are equal to (1m)

(a) -3, -1 (b) 2, -3 c) 0, 2 d) 2, 3

6 If the minute hand of a clock is 3 cm long then the distance covered by its tip in 40 minutes is (use $\pi = 3.14$). (1m)

a) 3.14 cm b) 6.28 cm c) 12.56 cm d) 25.12cm

7 **Assertion (A):** If sin x = $\frac{-1}{3}$, then cos x = $\frac{2}{3}$ (1m)

Reason (R): If the value of cos x is positive and sin x is negative, then x ∈ $\left(\frac{3\pi}{2}, 2\pi\right)$

(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

SECTION – B

8 Two finite sets A and B have 'm' and 'n' elements. The total number of subsets of the first set is 56 more than the total number of subsets of the second set. Find the values of 'm' and 'n'. (2m)

9 If R = $\{(x, y): 2x + 3y = 30, x, y \in W\}$, then write R in roster form. (2m)
Hence write domain and range of R.

10 Show that tan 5x . tan 3x . tan 2x = tan 5x – tan 3x – tan 2x (2m)

- OR -

If $\cos x = -\frac{4}{5}$, x lies in second quadrant, find the value of $cos\frac{x}{2}$

SECTION – C

11 Prove that: $\tan 4x = \frac{4\, tanx\,(1 - tan^2x)}{1 - 6tan^2x + tan^4x}$ (3m)

12 Let U = {0, 1, 2, 3, 4, 5, 6, 8), A = {2, 3, 4}, B = {3, 4, 5, 6} and C= {0, 2, 4, 6}. Show that (3m)

(i) $A\, U(B \cap C) = (A \cup B) \cap (A \cup C)$

(ii) (A ∩ B)' = A' U B'

- **OR** -

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

13 Prove that: $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x}$ = cot 3x (3m)

SECTION – D (Case Study)

14 Students of ISWK was conducting a inter house math quiz. The questions for round 4 was as follows. The participants are required to finish the task within two minutes.

(i) What is the minimum value of sin2x? (1m)

(ii) If n(A) = 2 and n(B)= 3 then find the number of relations from A to B. (1m)

(iii) a) Find the domain and range of the function

$f(x) = \sqrt{9 - x^2}$ (2m)

-OR-

b) Find the domain of the function

$f(x) = \frac{x^2+2x+3}{x^2-2x-24}$

15 In a class of 100 students, 72 opted for NCC, 48 opted for NSS and 36 opted for both NCC and NSS. Based on the information find

(i) the number of students opted for NCC or NSS. (1m)

(ii) the number of students opted neither NCC nor NSS (1m)

(iii) a) the student has opted NSS but not NCC.

- OR -

b) the number of students has opted NCC but not NSS. (2m)
