



INDIAN SCHOOL AL WADI AL KABIR

Final Assessment 2022-23

SUB: Mathematics (041)

Date: 28/02/2023

Time Allowed :3 hours

Class: XI

Maximum Marks: 80

General Instructions:

1. This Question paper contains - five sections A, B, C, D and E. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 18 MCQ's and 02 Assertion-Reason based questions of 1 mark each.
3. Section B has 5 Very Short Answer (VSA)-type questions of 2 marks each.
4. Section C has 6 Short Answer (SA)-type questions of 3 marks each.
5. Section D has 4 Long Answer (LA)-type questions of 5 marks each.
6. Section E has 3 source based/case based/passage based/integrated units of assessment (4 marks each) with sub parts.

Q.No	SECTION A (MCQ)	Mark
1.	If $A = \{x: x \in \mathbb{N}, 0 < x < 5\}$, $B = \{y: y \text{ is a prime number less than } 8\}$, then $B - A = \underline{\hspace{2cm}}$. A $\{1, 4\}$ B $\{5, 7\}$ C $\{1, 2, 4\}$ D $\{2, 4, 5, 7\}$	1
2.	In a class of 70 students, 30 students play cricket and 20 students play tennis, and 10 students play both the games. Then, the number of students who play neither is _____. A 10 B 20 C 30 D 40	1
3.	If $(2x + 1, 2x + y) = (1, 4)$, then $(x, y) =$ A $(0, 2)$ B $(4, 0)$ C $(1, 2)$ D $(0, 4)$	1
4.	$\tan \frac{\pi}{12} = \underline{\hspace{2cm}}$ A $2 + \sqrt{3}$ B $2 - \sqrt{3}$ C $\sqrt{3} - 2$ D $\sqrt{2} - 1$	1
5.	The solution of inequality $\frac{x}{2} + \frac{x}{3} + \frac{x}{4} \leq 13$ A $x \in [12, 13]$ B $x \in [12, \infty)$ C $x \in (-\infty, 12]$ D $x \in (-\infty, 13]$	1
6.	$1 + i^2 + i^3 + i^4 = \underline{\hspace{2cm}}$. A 1 B $1 - i$ C $1 + i$ D 0	1

7. $\frac{\sin(\pi+\theta)\cos(\frac{\pi}{2}+\theta)}{\cos(\frac{3\pi}{2}+\theta)\sin(\pi-\theta)} = \underline{\hspace{2cm}}$. 1
- A** 1 **B** -1 **C** $\tan\theta$ **D** $\cot\theta$
8. The number of three-digit numbers with no digits repeated is _____. 1
- A** 999 **B** 990 **C** 720 **D** 648
9. If $\frac{2+i}{2-i} = x + iy$, where x and y are real values, then $x - y = \underline{\hspace{2cm}}$. 1
- A** $-\frac{1}{5}$ **B** $\frac{2}{5}$ **C** $-\frac{3}{5}$ **D** $\frac{4}{5}$
10. Ravi obtained 70 and 75 marks in first two unit test. The minimum marks he should get in the third test to have an average of at least 60 marks is _____. 1
- A** 30 **B** 35 **C** 40 **D** 45
11. If $nC_7 = nC_3$, then $nC_3 = \underline{\hspace{2cm}}$. 1
- A** 10 **B** 45 **C** 120 **D** 720
12. The coefficient of x^3 in the expansion of $(3 + x)^{12} = \underline{\hspace{2cm}}$ 1
- A** $12C_4(3)^8$ **B** $12C_3(3)^9$ **C** $12C_9(3)^3$ **D** $12C_8(3)^4$
13. If nine times 9th term of an AP is five times 5th term, then 14th term = ____ 1
- A** 9 **B** 5 **C** 14 **D** 0
14. If (3, 5), (4, 7) and (2, k) are collinear $k = \underline{\hspace{2cm}}$ 1
- A** 3 **B** 2 **C** 1 **D** 0
15. What is the distance between the straight lines whose equations are $3x + 4y = 1$ and $6x + 8y = 12$? 1
- A** 1 **B** 2 **C** 3 **D** 4
16. $\lim_{x \rightarrow 2} \frac{x^5 - 32}{x - 2} = \underline{\hspace{2cm}}$ 1
- A** 2 **B** 16 **C** 32 **D** 80
17. The derivative of $x \cdot \sin x$ with respect to x is ____ 1
- A** $\cos x$ **B** $\sin x$ **C** $x \cdot \cos x + \sin x$ **D** $x \cdot \sin x + \cos x$
18. The midpoint of $A(3, 4, 1)$ and $B(-5, -2, 1)$ lies in _____ octant. 1
- A** I **B** II **C** III **D** IV

ASSERTION-REASON BASED QUESTIONS

In the following questions (19 and 20), a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

- 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 but R is true.

19. (A) $\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 5x} = \frac{3}{5}$ 1

(R) $\frac{\sin ax}{\sin bx} = \frac{a}{b}, \forall x \in R$

A B C D

1

20. (A) Consider the experiment of rolling a die. If A be the event “the number appears on die is a prime number” and B be the event “number appears on the die is an even number”, then A and B are mutually exclusive events.

(R) If A and B are mutually exclusive, then $A \cap B$ is a nullset.

A B C D

SECTION B

21. If $A = \{0, 1, 2, 3\}$, $B = \{2, 3, 5, 7\}$ and $C = \{3, 4, 5, 6, 7\}$ 2
write $(A \cap B) \cup (B \cap C)$ in roster form.

22. Two finite sets have m and n elements ($m > n$). The total number of subsets of the first set is 96 more than the total number of subsets of the second set. Find the values of m and n . 2

23. Write domain and range of the real valued function $f(x) = \sqrt{16 - x^2}$ 2

OR

Write the relation $R = \{(x, y) : x + 3y = 15, x, y \in N\}$ in roster form.

24. Evaluate: $\lim_{x \rightarrow 0} \frac{\cos 2x - 1}{\cos x - 1}$ 2

OR

If $f(x) = \frac{x^{10}}{10} + \frac{x^9}{9} + \frac{x^8}{8} + \dots + x + 1$, then evaluate $f'(0)$.

25. There are two rods. The length of one rod is three meters longer than the other, each of the rods is shorter than 19m, and the sum of the two rods is longer than 23m. Find a possible range of length of the shorter rod. 2

SECTION C

26. Evaluate: $2\sin^2 \frac{3\pi}{4} + \tan \frac{7\pi}{4} + 4\cos \left(\frac{19\pi}{3}\right)$ 3

OR

If $\sin A = -\frac{4}{5}$, $A \in$ III quadrant, then evaluate $\cos \frac{A}{2}$.

27. Find the value of x, if 17th and 18th term of the expansion $(2 + x)^{50}$ are equal. 3

OR

There are four numbers such that the first three are in AP and the last three are in GP. The sum of the first and third is 2 and that of second and the fourth is 26. Find the numbers.

28. Find the number of permutations of the letters of the word 'ALLAHABAD'. In how many of these arrangements
a) do the words start with L and end with L?
b) do all the vowels occur together? 3

OR

A group consists of 4 girls and 7 boys. In how many ways can a team of 6 members be selected if the team has

- i) equal number of boys and girls
- ii) at least 3 girls?
- iii) at most 2 girls?

29. Find mean deviation about median: 3

x	4	6	8	10	12
f	4	5	6	3	2

30. If $y = \frac{\sec 2x - 1}{\sec 2x + 1}$, prove that $\frac{dy}{dx} = 2 \tan x \sec^2 x$. 3

OR

Using first principle, find the derivative of $\sin x$ with respect to x.

31. A bag contains 9 discs of which 4 are red, 3 are blue and 2 are yellow. 3
 The discs are similar in shape and size.
- i) If a disc is drawn at random from the bag, calculate the probability that it will be either red or blue.
 - ii) If two discs are drawn at random from the bag, calculate the probability that it will be both are red or both are blue.

SECTION D

32. Prove: $\frac{\sin 3x + \sin 5x + \sin 7x + \sin 9x}{\cos 3x + \cos 5x + \cos 7x + \cos 9x} = \tan 6x$ 5

OR

Prove: $\frac{\cos 8x \cos 5x - \cos 12x \cos 9x}{\sin 8x \cos 5x + \cos 12x \sin 9x} = \tan 4x$

33. The coefficients of three consecutive terms say $(r-1)^{\text{th}}$, r^{th} and $(r+1)^{\text{th}}$ in the expansion of $(1+x)^n$ are in the ratio 1:7:42. Find n and r. 5

OR

Consider the terms of the expansion of $\left(x^2 + \frac{1}{x}\right)^{12}$ and answer the following.

- a) Find the term independent of x.
 - b) Find the middle term(s).
34. Find the foot of perpendicular from P (1, 2) to the line $x - y + 5 = 0$ and hence find the image of P with respect to the given line. 5
35. Find mean, variance and standard deviation for the following frequency distribution: 5

Class	20-30	30-40	40-50	50-60	60-70	70-80	80-90
f	2	5	10	12	6	3	2

SECTION E Case study-based Questions

4

36. In a class of 140 students, 60 play football, 65 play hockey and 75 play cricket, 30 play hockey and cricket, 18 play football and cricket, 32 play football and hockey and 8 play all the three games.



Based on the above answer the following:

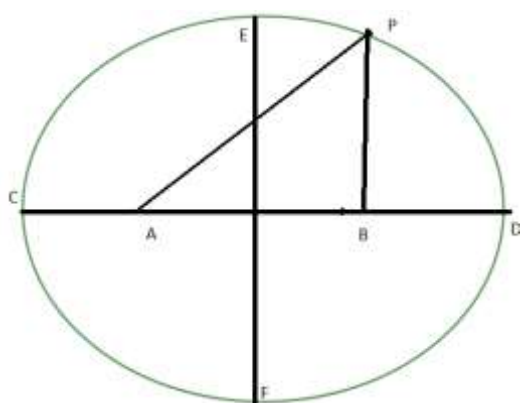
- i) How many students play none of the three given games?
- ii) How many students play at least one game?
- iii) How many students play exactly one game? OR
How many students play exactly two games?

37. A sport authority wants to design a field as given in the figure. P is any point on the curve such that the sum of distances from two fixed points A and B on horizontal axis CD is 100m and $AB = 60m$.

Answer the following questions:

- i) What is the length of major axis CD?
- ii) If E and F are points on the curve and lie on the vertical axis find the length of EF.
- iii) Write equation of the curve. OR

Find the distance PB if PB is perpendicular to CD .

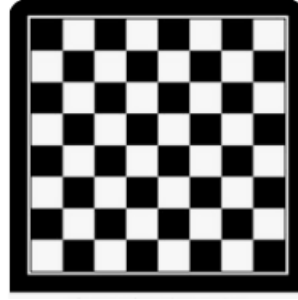


38. Consider the collection of two sets of squares as follows:

Set 1: Squares of dimensions 1cm, 2cm, 3cm, 4cm etc.

Set 2: Squares of dimensions 1cm, 2cm, 4cm, 8cm etc.

Based on the above answer the following:



- i) Write the perimeters of the squares in set 1 as a sequence and hence find the sum of perimeters of first 20 squares.
- ii) Write areas of the squares in set 2 as a sequence and hence find the sum of areas of first n squares.
