PRACTICE PAPER (SESSION 2023 – 24) ANNUAL EXAMINATION CLASS XI MATHEMATICS (CODE: 041)

Time Allowed: 3 HOURS

Maximum Marks: 80

General Instructions:

- 1. This question paper contains **FIVE sections A, B, C, D & E**. Each part 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.

Ea	SECTION – A (Multiple Choice Questions) Each question carries 1 mark Each MCQ has four options with only one correct option, choose the correct option.							
1.	For all sets	$s A \& B, A \cap (A \cup B)$)=		1			
	(a) A	(b) B	(c) $A \cup B$	$(d) A \cap B$				
2.	The value of the expression $\frac{4\cos^3 10^0 - 3\cos 10^0}{3\sin 20^0 - 4\sin^3 20^0}$ is							
	(<i>a</i>) 1	<i>(b)</i> 0	(c) -1	(<i>d</i>) 2				
3.	Range of fu	$nction f(x) = \frac{x - 2024}{ x - 2024 }$	-is		1			
	(a) R	$(b) R - \{2024\}$	(c) {1}	(d) {1,-1}				
4.	If $A = \{2023, 2024\}$ & $B = \{x : x^2 - x = 0, x \in R\}$, then $n(A \times B) =$							
	(<i>a</i>) 4	(b) 6	(c)8	(d) 16				

5.
If
$$n(A) = 2$$
 and $n(B \times B \times B) = 8$, then $n(A \times B) =$
1

(a) 2
(b) 4
(c) 8
(d) 16
1

6.
Value of $\frac{\cos 3\pi + \sin 2\pi + \tan \pi}{\sec 2\pi}$ is
1
1

(a) 0
(b) 1
(c) -1
(d) not defined
1

7.
If $i + i^2 + i^3 + \dots + i^{2024} = a + ib$, then $a + 2b =$
1

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

8.
If $-3x + 2 \ge 2 + 3x$, then $x \in$
1
1

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

9.
Value of ($^4C_0 + ^4C_1 + ^4C_2 + ^4C_3 + ^4C_4$) is
1
1

(a) 5
(b) 8
(c) 16
(d) 32
1

10.
Number of terms in the expansion of $(2x^2 + 3 + 2\sqrt{6x})^{10}$ is (a) 10
1
1

(a) 10
(b) 11
(c) 20
(d) 21
1

11.
If $L = \lim_{x \to 1} \frac{1 - x^2}{x - 1}$, then $L^t =$
1
1

(a) 2
(b) - $\frac{1}{4}$
(c) 4
(d) $\frac{1}{4}$
1

12.
The distance of the point $P(-3, -4, -6)$ from z-axis is
1
1

(a) 2
(b) 4

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16.	Mean deviation of 1, 3, 2, 5, 4 about mean is						
	(a) 1	<i>(b)</i> 0.8	(<i>c</i>) 1.2	(<i>d</i>) 1.1			
17.	In a leap year, the probability of having 53 Sundays or						
	53 Wednesdays is						
	$(a) \frac{4}{7}$	$(b)\frac{1}{7}$	$(c)\frac{2}{7}$	$(d)\frac{3}{7}$			
18.	If $P(A \cup$	$B\big) = P\big(A \ \cap \ B$	B) for any two a	events A and B, then	1		
	(a) $P(A) =$	= P(B)	(b) $P(A)$	(b) $P(A) < P(B)$			
	(c) P(A) >	P(B)	(d) P(d)	(A) + P(B) = 0			
	A	SSERTION-REASON	N BASED QUESTION	S (Q.19 & Q.20)			
	In the following questions, 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 i	s the correct explan	nation of A.			
	(c) A is true bu	it R is false.	s not the correct ex				
19.	(d) A is false but R is true. ASSERTION(A) · If $a < b$ · $c < 0$ then $ac > bc$						
	<i>REASONING(R)</i> : If both sides are multiplied by same $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$						
	negative quantity then inequality is reversed.						
20.							
					1		
		Fi	gure (A)				
	ASSERTIC	$\mathcal{D}N(A)$: Numbe	r of rectangles i	in figure (A) is 36.			
	REASONII	VG(R): In orde	er to form a Rec	etangle we have to			
	select any two of the horizontal line and						
	any two of the vertical lines.						

SECTION B					
This section comprises of very short answer type-questions (VSA) of 2 marks each					
21.	Draw the graph of $f(x) = \begin{cases} \frac{x}{ x }, & \text{when } x \neq 0\\ 0, & \text{when } x = 0 \end{cases}$.	2			
	OR				
	Find the value of $\tan\left(\frac{13\pi}{12}\right)$.				
22.	Solve for <i>x</i> : $-2 < 4-x \le 1$	2			
23.	In a class, there are 27 boys and 14 girls. The teacher wants	2			
	to select 1 boy and 1 girl to represent the class for a function.	Z			
	In how many ways can the teacher make this selection?				
	OR				
	In how many ways can 5 children be arranged in a line such				
	that two particular children of them are always together.				
24.	If the third term of G.P. is 4, then find product of its first	2			
	5 terms.	2			
25.	If $y = \frac{x-1}{x-2}$, then find the value of $\frac{dy}{dx}$.	2			
(This section comprises of short answer type questions (SA) of 3 marks each)					
26.	If $x - iy = \frac{2023 + i2024}{2024 - i2023}$, then find the value of $x^2 + y^2$.	3			
	OR				
	Find the Modulus, Conjugate & multiplicative inverse of				
	the complex number $Z = -5 + 12i$.				

27.	If $A = \{x : x^4 - x = 0, x \in R\}$ & $B = \{x : x^2 + x = 0, x \in R\},$					2			
	then verify					5			
	(a) (A	$\cup B)' = A' \cap A$	<i>B</i> '						
	(<i>b</i>) (<i>A</i>	$\cap B)' = A' \cup B$	<i>B</i> '						
28.	Prove	that :							2
	tan 20	$24x - \tan 202$	23x - ta	n x = 1	tan 202	24 <i>x</i> . tai	n 2023 <i>x</i>	tan <i>x</i>	5
				0	R				
	If $\tan\left(\frac{x}{2}\right) = \frac{-3}{4}$, where $x \in (\pi, \frac{3\pi}{2})$, then find the value								
	of sin	2 <i>x</i> .							
29.	Evaluate: $I = \lim_{x \to \infty} \sqrt{3} \sin x - \cos x$				3				
	Evaluate: $L = \lim_{x \to \frac{\pi}{6}} \frac{x - \frac{\pi}{6}}{x - \frac{\pi}{6}}$								
		Ŭ		6					
	OR								
	Prove that $\frac{d}{dx} \left[\cos^4\left(\frac{x}{2}\right) - \sin^4\left(\frac{x}{2}\right)\right] = -\sin x$								
20	Find the equation of the lines which passes through the					2			
50.	point ((3, 4) and cuts	s off int	ercept	s from	the coc	ordinate		5
	axes such that their sum is 14.								
31.	Find the equation of a circle passing through the point $(7, 3)$				2				
	having radius 3 units and whose centre lies on the line $y = x - 1$.								
	(This soo	tion comprises of	SE) o guastik	one (LA) e	f E marks	aach)	
32.	Find th	e Mean and Va	riance 1	for the	followi	ng Dist	ribution	:	
		Class interval 0.4 4.8 8 12 12 16 16 20					5		
		Citabo interi var	0 1	1 0	0 12	12 10	10 20		
		Frequency	4	6	8	5	2		

33.	Find the Domain & Range of the following functions:	F		
	(a) $f(x) = \frac{x-1}{x-1}$	С		
	(u) f(x) = x - 2			
	(b) $f(x) = \sqrt{25 - x^2}$			
	OR			
	Prove that: $4\sin x \cdot \sin\left(\frac{\pi}{3} - x\right) \cdot \sin\left(\frac{\pi}{3} + x\right) = \sin 3x$			
	Hence, find the value of $\sin 20^{\circ}$. $\sin 40^{\circ}$. $\sin 80^{\circ}$.			
34.	(a) What is the number of ways of choosing 4 cards from a pac	F		
	of 52 playing cards?	С		
	In how many of these			
	(i) four cards are of the same suit,			
	(ii) four cards belong to four different suits,			
	(iii) two are red cards and two are black cards,			
	(iv) cards are of the same colour?			
	OR			
	(b) Using Binomial Theorem, Find the Expansion of			
	$(a+b)^4 - (a-b)^4$.			
	Use it to find the value of $(\sqrt{3} + \sqrt{2})^4 - (\sqrt{2} - \sqrt{3})^4$.			
35.	If <i>a</i> and <i>b</i> are the roots of $x^2 - 3x + p = 0$ and <i>c</i> , <i>d</i> are	1		
	roots of $x^2 - 12x + q = 0$, where a, b, c, d form a G.P.	-		
	Prove that $(q + p): (q - p) = 17:15$.			







38.



Surender observe that angle of elevation from the Ground (D) to B and A are 15° & 75° respectively. If he is standing at a distance of $10(2 + \sqrt{3})$ m from the building (CD), then answer the following on the basis of this information:

- (*a*) Find the height of top of the window (from the ground) of his classroom.
- (*b*) Find the height of top of the window (from the ground) of his math-lab.

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