



CLASS: XII
DATE: 23/05/22

MAX. MARKS: 20
TIME: 45 MINUTES

General Instructions:

1. This question paper contains three sections – A, B and C. Each part is compulsory.
2. Section - A has 5 Multiple Choice Questions of 1 mark each.
3. Section – B has 3 short answer type questions of 2 marks each.
4. Section - C has 3 long answer type questions of 3 marks each.
5. There is an internal choice in some of the questions.

SECTION – A		
1.	Which of the following function from Z into Z bijection? (a) $f(x) = x^3 + 1$ (b) $f(x) = x - 5$ (c) $f(x) = 2x - 3$ (d) $f(x) = x^2$ OR If the set A contains 5 elements and the set B contains 6 elements, then number of one-one and onto mappings from A to B is a) 0 b) 30 c) 5 d) 120	MARKS 1
2	Find the principal value of $\tan^{-1} \sqrt{3} - \sec^{-1} (-2)$. a) $\frac{\pi}{3}$ b) $-\frac{\pi}{6}$ c) $-\frac{\pi}{3}$ d) π	1
3	If $\Delta = \begin{vmatrix} 5 & 3 & 8 \\ 2 & 0 & 1 \\ 1 & 2 & 3 \end{vmatrix}$, write the minor of the element a_{23} a) -7 b) 7 c) -1 d) 1	1
4	If A is any square matrix of order 3 x 3 such that $ A = 4$, then $ \text{adj}A $ is equal to a) 16 b) 4 c) 8 d) 9	1
5	For what value of x, the matrix $\begin{bmatrix} 5-x & x+1 \\ 2 & 4 \end{bmatrix}$ is singular? a) 0 b) 3 c) 2 d) -1	1

SECTION – B		
6.	Find the value of x if the area of triangle is 35 square units with vertices (x, 4), (2, -6) and (5, 4).	2
7.	Write the value of $\sin \left[\frac{\pi}{3} - \sin^{-1} \left(-\frac{1}{2} \right) \right]$ OR Write the principal value of $\cos^{-1} \left(\frac{1}{2} \right) - 2 \sin^{-1} \left(-\frac{1}{2} \right)$.	2
8.	From the following matrix equation, find the value of x : $\begin{pmatrix} 1 & 3 \\ 4 & 5 \end{pmatrix} \begin{pmatrix} x \\ 2 \end{pmatrix} = \begin{pmatrix} 5 \\ 6 \end{pmatrix}$	2
SECTION – C		
9.	Show that the function $f : Z \rightarrow Z$ defined by $f(x) = x^2$ for all $x \in R$, is neither one-one nor onto. OR Show that the relation R in the set R of real numbers, defined as $R = \{(a, b) : a - b \text{ is a multiple of } 4\}$, is an equivalence relation.	3
10.	If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 7I = O$. Hence find A^{-1} .	3
11.	Using matrices, solve the following system of linear equations: $3x - 2y + 3z = -1$ $2x + y - z = 6$ $4x - 3y + 2z = 5$	3

-----THE END-----

MATHS UNIT TEST -2022-23
SCORING KEY
STD XII

1)	b OR a	1
2)	C $= \tan^{-1} \left(\tan \frac{\pi}{3} \right) - \sec^{-1} \left(-\sec \frac{\pi}{3} \right)$ $= \frac{\pi}{3} - \sec^{-1} \left[\sec \left(\pi - \frac{\pi}{3} \right) \right] = \frac{\pi}{3} - \sec^{-1} \left(\sec \frac{2\pi}{3} \right)$ $= \frac{\pi}{3} - \frac{2\pi}{3} = -\frac{\pi}{3}$	1
3)	b	1
4)	a	1
5)	b	1
6)	$35 = \frac{1}{2} x(-10) - 4(-3) + 1(38) $ $\Rightarrow 35 = \frac{1}{2} -10x + 12 + 38 $ $\Rightarrow 70 = -10x + 50 $ $70 = -10x + 50 \quad \left \quad -70 = -10x + 50 \right.$ $10x = -20 \quad \left \quad 10x = 120 \right.$ $x = -2 \quad \left \quad x = 12 \right.$ $\therefore x = -2, x = 12 \quad \text{ans.}$	2
7)	$\sin \left[\frac{\pi}{3} - \sin^{-1} \left(-\frac{1}{2} \right) \right] = \sin \left[\frac{\pi}{3} - \left(-\frac{\pi}{6} \right) \right]$ $= \sin \left(\frac{\pi}{3} + \frac{\pi}{6} \right) = \sin \left(\frac{2\pi + \pi}{6} \right)$ $= \sin \frac{3\pi}{6} = \sin \frac{\pi}{2} = 1$ <p>Or</p> <p>We have, $\cos^{-1} \left(\frac{1}{2} \right) = \cos^{-1} \left(\cos \frac{\pi}{3} \right)$ $= \frac{\pi}{3}$ [</p> <p>Also $\sin^{-1} \left(-\frac{1}{2} \right) = \sin^{-1} \left(-\sin \frac{\pi}{6} \right)$ $= \sin^{-1} \left(\sin \left(-\frac{\pi}{6} \right) \right)$ $= -\frac{\pi}{6}$]</p> $\therefore \cos^{-1} \left(\frac{1}{2} \right) - 2 \sin^{-1} \left(-\frac{1}{2} \right) = \frac{\pi}{3} - 2 \left(-\frac{\pi}{6} \right)$ $= \frac{\pi}{3} + \frac{\pi}{3} = \frac{2\pi}{3}$	2
8)	$x + 6 = 5 \quad \Rightarrow \quad x = -1$ $4x + 10 = 6$ $4x = -4 \quad \text{or} \quad x = -1$	2
9)	Proper steps	3
10)	$\frac{1}{7} \begin{pmatrix} 2 & -1 \\ 1 & 3 \end{pmatrix}$	3

11)	$A^{-1} = \frac{1}{-17} \begin{bmatrix} -1 & -5 & -1 \\ -8 & -6 & 9 \\ -10 & 1 & 7 \end{bmatrix}$ $X - A^{-1}B = \frac{1}{17} \begin{bmatrix} -1 & -5 & -1 \\ -8 & -6 & 9 \\ -10 & 1 & 7 \end{bmatrix} \begin{bmatrix} -1 \\ 6 \\ 5 \end{bmatrix}$ $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = -\frac{1}{17} \begin{bmatrix} -34 \\ 17 \\ 51 \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ -3 \end{bmatrix}$	3
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MATHS UNIT TEST -2022-23

STD XII

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Sl.no	CHAPTER	1 MARK	2 MARKS	3 MARKS	Total
1	Relation and Function	1		1	2(4 marks)
2	Inverse Tri	1	1		2(3marks)
3	Matrices	1+1	1	1	4 (7 marks)
4	Determinants	1	1	1	3(6 marks)
					11(20 marks)