



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.	<p>Which of the following function from <math>Z</math> into <math>Z</math> bijection?</p> <p>(a) <math>f(x) = x^3</math> (b) <math>f(x) = x + 2</math> (c) <math>f(x) = 2x + 1</math> (d) <math>f(x) = x^2 + 1</math></p> <p><b>OR</b></p> <p>If the set <math>A</math> contains 7 elements and the set <math>B</math> contains 8 elements, then number of one-one and onto mappings from <math>A</math> to <math>B</math> is</p> <p>(a) 24 (b) 120 (c) 0 (d) 7</p>	MARKS 1
2.	<p>Find the principal value of <math>\tan^{-1} \sqrt{3} - \sec^{-1} (-2)</math>.</p> <p>a) <math>\frac{\pi}{3}</math> b) <math>-\frac{\pi}{6}</math> c) <math>-\frac{\pi}{3}</math> d) <math>\pi</math></p>	1
3.	<p>If <math>A = (a_{ij}) = \begin{pmatrix} 2 &amp; 3 &amp; -5 \\ 1 &amp; 4 &amp; 9 \\ 0 &amp; 7 &amp; -2 \end{pmatrix}</math> and <math>B = (b_{ij}) = \begin{pmatrix} 2 &amp; 1 &amp; -1 \\ -3 &amp; 4 &amp; 4 \\ 1 &amp; 5 &amp; 2 \end{pmatrix}</math>, then find <math>a_{22} + b_{21}</math>.</p> <p>a) -3 b) 2 c) -1 d) 1</p>	1
4.	<p>If <math>A</math> is any square matrix of order <math>3 \times 3</math> such that <math> A  = 2</math>, then <math> adj A </math> is equal to</p> <p>a) 4 b) 2 c) 8 d) 9</p>	1
5.	<p>If <math>\begin{vmatrix} 2 &amp; 3 &amp; 2 \\ x &amp; x &amp; x \\ 4 &amp; 9 &amp; 1 \end{vmatrix} + 3 = 0</math>, then the value of <math>x</math> is</p> <p>a) 0 b) -1 c) 2 d) 1</p>	1

<b>SECTION – B</b>		
6.	Find the value of k so that the points (1,-5), (-4,5) and (k,7) are collinear.	2
7.	<p>What is the principal value of <math>\cos^{-1}\left(\cos \frac{2\pi}{3}\right) + \sin^{-1}\left(\sin \frac{2\pi}{3}\right)</math>?</p> <p style="text-align: center;"><b>OR</b></p> <p>Write the principal value of <math>\cos^{-1}\left(\frac{1}{2}\right) - 2\sin^{-1}\left(-\frac{1}{2}\right)</math>.</p>	2
8.	If $2 \begin{bmatrix} x & 5 \\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & 4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 14 \\ 15 & 14 \end{bmatrix}$ then find the values of x and y.	2
<b>SECTION – C</b>		
9.	<p>Show that the function <math>f : \mathbb{R} \rightarrow \mathbb{R}</math> defined by <math>f(x) = x^2</math> for all <math>x \in \mathbb{R}</math>, is neither one-one nor onto.</p> <p style="text-align: center;"><b>OR</b></p> <p>Show that the relation R in the set R of real numbers, defined as <math>R = \{(a, b) :  a - b  \text{ is a multiple of } 3\}</math>, is an equivalence relation.</p>	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.	<p>Using matrices, solve the following system of linear equations:</p> $x + y + z = 4$ $2x + y - 3z = -9$ $2x - y + z = -1$	3

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1)	b OR c	1
2)	c	1
3)	d	1
4)	a	1
5)	b	1
6)	K=-5	2
7)	$\cos^{-1}\left(\cos\frac{2\pi}{3}\right) + \sin^{-1}\left(\sin\frac{2\pi}{3}\right) = \cos^{-1}\left(\cos\frac{2\pi}{3}\right) + \sin^{-1}\left(\sin\left(\pi - \frac{\pi}{3}\right)\right)$ $= \cos^{-1}\left(\cos\frac{2\pi}{3}\right) + \sin^{-1}\left(\sin\frac{\pi}{3}\right)$ $= \frac{2\pi}{3} + \frac{\pi}{3}$ <p>= # Or</p> <p>We have, <math>\cos^{-1}\left(\frac{1}{2}\right) = \cos^{-1}\left(\cos\frac{\pi}{3}\right)</math>  <math>= \frac{\pi}{3}</math> [</p> <p>Also <math>\sin^{-1}\left(-\frac{1}{2}\right) = \sin^{-1}\left(-\sin\frac{\pi}{6}\right)</math>  <math>= \sin^{-1}\left(\sin\left(-\frac{\pi}{6}\right)\right)</math>  <math>= -\frac{\pi}{6}</math> ]</p> <p><math>\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)</math>  <math>= \frac{\pi}{3} + \frac{\pi}{3} = \frac{2\pi}{3}</math></p>	2
8)	X= 2, y = 9	2
9)	Proper steps	3
10)	$\frac{1}{7} \begin{pmatrix} 2 & -1 \\ 1 & 3 \end{pmatrix}$	3
11)	$.X = A^{-1}B$ $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{1}{14} \begin{bmatrix} 2 & 2 & 4 \\ 8 & 1 & -5 \\ 4 & -3 & 1 \end{bmatrix} \begin{bmatrix} 4 \\ -9 \\ -1 \end{bmatrix}$ $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{1}{14} \begin{bmatrix} 8 + (-18) + (-4) \\ 32 + (-9) + 5 \\ 16 + 27 + (-1) \end{bmatrix}$ $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{1}{14} \begin{bmatrix} -14 \\ 28 \\ 42 \end{bmatrix} = \begin{bmatrix} -1 \\ 2 \\ 3 \end{bmatrix}$	3

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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)