



CLASS: XII

DATE: 22/05/2023

MAX. MARKS: 20

TIME: 40 MINUTES

General Instructions:

1. This Question paper contains - four sections A, B, C and D. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 4 MCQ's and 1 Assertion-Reason based questions of 1 mark each.
3. Section B has 2 Very Short Answer (VSA)-type questions of 2 mark each.
4. Section C has 2 Short Answer (SA)-type questions of 3 mark each.
5. Section D has 1 Long Answer (LA)-type questions of 5 marks .

SECTION – A (Multiple Choice Questions) Each question carries 1 mark	
1.	The function $f(x) = 5^x + 5^{ x }$ is (a) One-one and onto (b) many one and onto (c) many one and into (d) One-one and into OR If $A = \{a, b, c, d\}$, then relation $R = \{(a, b), (b, a), (a, a)\}$ on A is (a) Symmetric and transitive only (b) reflexive and transitive only (c) symmetric only (d) transitive only
2.	The domain of the function defined by $f(x) = \sin^{-1} \sqrt{x-1}$ is (a) $[1, 2]$ (b) $[-1, 1]$ (c) $[0, 1]$ (d) $(-1, 1)$
3.	If X and Y are two matrices of order $3 \times p$ and $3 \times q$ respectively and $p = q$, then the order of matrix $(8X - 5Y)$ is (a) $p \times 3$ (b) $3 \times q$ (c) $p \times q$ (d) 3×3
4.	If A and B are matrices of same order, then $(AB' - BA')$ is a (a) identity matrix (b) null matrix (c) skew symmetric matrix (d) symmetric matrix
5.	Given $A = \begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$ Assertion (A): $2A^{-1} = 9I - A$ Reason (R): $A^{-1} = \frac{1}{ A }(\text{adj } A)$ Select the correct answer from the codes (a), (b), (c) and (d) as given below (a) Both A and R are true and R is the correct explanation of A (b) Both A and R are true and but R is not the correct explanation of A (c) A is true and R is false. (d) A is false and R is true.

SECTION – B

[This section comprises of very short answer type questions (VSA) of 2 marks each]

6.	Show that the function $f : \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = 1 + x^2$ for all $x \in \mathbb{R}$, is neither injective nor surjective.
7.	Solve: $\sin\left(\cot^{-1}\frac{1}{x}\right) = \cos\left(\tan^{-1}\frac{4}{3}\right)$ OR Find the principal value of $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) - 2\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

SECTION – C

[This section comprises of short answer type questions (SA) of 3 marks each]

8.	Check whether the relation R on the set R of real numbers, defined as $R = \{(a, b) : a \leq b^2\}$, is reflexive, symmetric or transitive.
9.	If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$, then show that $A^3 - 23A - 40I = O$ OR If $A = \begin{bmatrix} -2 \\ 4 \\ 5 \end{bmatrix}$, $B = [-1 \quad 3 \quad -6]$, verify that $(AB)' = B'A'$.

SECTION – D

[This section comprises of long answer type question (LA) of 5 marks]

10.	If $A = \begin{bmatrix} 1 & 2 & 0 \\ -2 & -1 & -2 \\ 0 & -1 & 1 \end{bmatrix}$, find A^{-1} . Using A^{-1} , solve the system of linear equations: $x - 2y = 10$, $2x - y - z = 8$, $-2y + z = 7$ OR Using matrices, solve the following system of linear equations: $4x + 3y + 2z = 60$, $x + 2y + 3z = 45$, $6x + 2y + 3z = 70$
-----	---

-----o0o-----



CLASS: XII

DATE: 22/05/2023

MAX. MARKS: 20

TIME: 40 MINUTES

General Instructions:

1. This Question paper contains - four sections A, B, C and D. Each section is compulsory. However, there are internal choices in some questions.
2. Section A has 4 MCQ's and 1 Assertion-Reason based questions of 1 mark each.
3. Section B has 2 Very Short Answer (VSA)-type questions of 2 mark each.
4. Section C has 2 Short Answer (SA)-type questions of 3 mark each.
5. Section D has 1 Long Answer (LA)-type questions of 5 marks .

SECTION – A (Multiple Choice Questions) Each question carries 1 mark	
1.	<p>For real numbers a and b, define aRb if and only if $a - b + \sqrt{7}$ is an irrational number. Then the relation R is</p> <p>(a) Reflexive (b) Symmetric (c) transitive (d) none of these</p> <p style="text-align: center;">OR</p> <p>If $A = \{1, 2, 3, 4\}$, then relation $R = \{(1, 2), (2, 1), (1, 1)\}$ on A is</p> <p>(a) Symmetric and transitive only (b) reflexive and transitive only (c) symmetric only (d) transitive only</p>
2.	<p>The value of the expression $\sin\left(\frac{\pi}{3} - \sin^{-1}\left(-\frac{1}{2}\right)\right)$ is</p> <p>(a) $\frac{\pi}{2}$ (b) $\frac{-\pi}{2}$ (c) 1 (d) 0</p>
3.	<p>If $A = \begin{bmatrix} x & y \\ z & -x \end{bmatrix}$ is such that $A^2 = I$, then</p> <p>(a) $1 + x^2 + yz = 0$ (b) $1 - x^2 + yz = 0$ (c) $1 - x^2 - yz = 0$ (d) $1 + x^2 - yz = 0$</p>
4.	<p>If X and Y are matrices of same order, then $(XY' - YX')$ is a</p> <p>(a) skew symmetric matrix (b) null matrix (c) symmetric matrix (d) identity matrix</p>
5.	<p>Assertion (A) : If $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 0 & 0 & 4 \end{bmatrix}$, then $3A = 9 A$</p> <p>Reason (R): If A is a square matrix of order n then $kA = k^n A$</p> <p>Select the correct answer from the codes (a), (b), (c) and (d) as given below</p> <p>(a) Both A and R are true and R is the correct explanation of A (b) Both A and R are true and but R is not the correct explanation of A (c) A is true and R is false. (d) A is false and R is true.</p>

SECTION – B [This section comprises of very short answer type questions (VSA) of 2 marks each]	
6.	Show that the function $f : \mathbb{N} \rightarrow \mathbb{N}$ defined by $f(x) = x^2 + x + 1$ is one-one but not on to.
7.	Solve: $\sin(\cot^{-1} x) = \cos\left(\tan^{-1} \frac{4}{3}\right)$ OR Express $\cos^{-1}\left(\frac{\cos x - \sin x}{\sqrt{2}}\right)$, $-\frac{\pi}{4} < x < \frac{\pi}{4}$, in the simplest form.
SECTION – C [This section comprises of short answer type questions (SA) of 3 marks each]	
8.	Check whether the relation R on the set R of real numbers, defined as $R = \{(a, b) : a \leq b^3\}$, is reflexive, symmetric or transitive.
9.	If $A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$, then find X such that $A^2 - 5A + 4I + X = O$ OR If $A = \begin{bmatrix} 2 \\ -4 \\ 6 \end{bmatrix}$, $B = [1 \quad -3 \quad 5]$, verify that $(AB)' = B'A'$.
SECTION – D [This section comprises of long answer type question (LA) of 5 marks]	
10.	Use product $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix} \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$ to solve the system of equations: $x - y + 2z = 1$, $2y - 3z = 1$, $3x - 2y + 4z = 2$ OR Using matrices, solve the following system of linear equations: $4x + 3y + 2z = 60$, $x + 2y + 3z = 45$, $6x + 2y + 3z = 70$

-----oOo-----