D.A.V. PUBLIC SCHOOL, NEW PANVEL

I UNIT TEST(SAMPLE PAPER)

2025-2026

Std:-XII

Sub:- Mathematics **Time:- 2 Hours**

Date :- **Max. Marks:- 50**

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 10 **MCQ's and 02** Assertion-Reason based questions of 1 mark each.
3. **Section B** has 4 **Very Short Answer** (VSA)-type questions of 2 marks each.
4. **Section C** has 4 **Short Answer** (SA)-type questions of 3 marks each.
5. **Section D** has 2 **Long Answer** (LA)-type questions of 5 marks each.
6. **Section E** has 2 **source based/case based/passage based/integrated units of assessment** (4 marks each) with sub parts.

SECTION – A

This section comprises multiple choice questions (MCQs) of 1 mark each

1. If $\begin{bmatrix} 7 & 7y-13 \\ y & x+6 \end{bmatrix} = \begin{bmatrix} 2x+y & 4x \\ 5x-7 & 4x \end{bmatrix}$, then x+y is

   (a) 5 (b) 6 (c) 9 (d)-2

2. The principal value of $2\,sec^{-1}2 + \sin^{-1}\frac{1}{2}$ is

   (a)$\frac{\pi}{6}$ (b)$\frac{5\pi}{6}$ (c)$\frac{7\pi}{6}$ (d)1

3. Which among the following statement is true?
   (a)A determinant exists for all matrices
   (b) The minor of an element is a matrix
   (c) Adjoint of a matrix is the transpose of a cofactor matrix
   (d)Every matrix have an inverse matrix

4. The matrix of order 2x3 obtained under the condition $a_{ij} = \frac{2i-j}{4}$ is

   (a) $\begin{bmatrix} \frac{1}{4} & \frac{1}{4} & -\frac{1}{2} \\ \frac{3}{2} & \frac{1}{2} & \frac{1}{4} \end{bmatrix}$ (b) $\begin{bmatrix} \frac{1}{4} & 0 & -\frac{1}{4} \\ \frac{3}{4} & \frac{1}{2} & \frac{1}{4} \end{bmatrix}$ (c) $\begin{bmatrix} -\frac{1}{4} & 0 & -\frac{1}{2} \\ \frac{3}{2} & \frac{1}{2} & \frac{1}{4} \end{bmatrix}$ (d)$none\ of\ these$

5. The domain of the function defined by $f(x) = sin^{-1}\sqrt{x-1}$ is

   (a)$[-1,1]$ (b) $[1,\ 2]$ (c)$[0,1]$ (d)$none\ of\ these$

6. If $A = \begin{bmatrix} 5 & 2 \\ 4 & -2 \end{bmatrix}$, then the value of $|3A^{-1}|$ is

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

7. The relation between a and b ,if the function $f(x) = \begin{cases} ax+1, & x \leq 3 \\ bx+3, & x > 3 \end{cases}$ is continuous,is

(a)$a+b=\frac{2}{3}$ (b) $a+b=\frac{3}{2}$ (c)$a-b=\frac{2}{3}$ (d) $a-b=\frac{3}{2}$

8. For the curve $\sqrt{x}+\sqrt{y}=1$, find $\frac{dy}{dx}$ at $\left(\frac{1}{4},\frac{1}{4}\right)$

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

9. The value of $M_{23}+M_{13}+M_{32}$ from the determinant $\begin{vmatrix} 2 & 1 & 3 \\ -4 & -2 & 1 \\ 3 & 0 & 1 \end{vmatrix}$ is

(a)17 (b)20 (c)23 (d)35

10. The value of x, when the matrix $A=\begin{bmatrix} 1 & 1 & 3 \\ 1 & -2 & x \\ -1 & 1 & -5 \end{bmatrix}$ is singular

(a) 6 (b) 12 (c) $-\frac{25}{13}$ (d) $none\ of\ these$

Questions number **11** and **12** are Assertion-Reason based questions. Two statements are given, one labeled Assertion(A) and the other labeled Reason (R). Select the correct answer from the codes (a), (b), (c) and (d) as given below.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).

(c) Assertion (A) is true and Reason (R) is false.

(d) Assertion (A) is false and Reason (R) is true.

11. **Assertion (A):** The condition BI= IB is true for any square matrices B and an Identity matrix I.

Reason (R): The product AB of matrix exists if the number of rows in the first matrix A, is equal to the number of columns in the second matrix B.

12. **Assertion (A):**The function $f(x)=[x]$ is differentiable at all integers.

Reason (R): If $f(x)$ is differentiable point, then f(x) is continuous at the point.

SECTION B

This section comprises of **4** very short answer type-questions (VSA) of 2 marks each

13. Find the minimum value of n, for which $tan^{-1}\left(\frac{n}{\pi}\right) > \frac{\pi}{4}$

OR

Evaluate $\sin^{-1}\left(\cos\frac{13\pi}{5}\right)+\cos^{-1}\left(\sin\frac{7\pi}{5}\right)$

14. Find $(A+B)^{-1}$, if $A=\begin{bmatrix} 3 & 4 \\ 2 & 3 \end{bmatrix}$ and $B=\begin{bmatrix} -2 & -2 \\ 0 & -1 \end{bmatrix}$.

15. If $A=\begin{bmatrix} 1 & -2 & 4 \\ 2 & -1 & 3 \\ 4 & 2 & 0 \end{bmatrix}$ is the adjoint of square matrix B, then find B^{-1}

16. Show that the function $f(x)=|x|-|x-1|$ is continuous.

SECTION C

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

17. Find the sum of values of a, which makes the $\Delta = \begin{vmatrix} 1 & -2 & 5 \\ 2 & a & -1 \\ 0 & 4 & 2a \end{vmatrix} = 86$

18. Simplify : $\tan^{-1}\left(\frac{\cos x}{1-\sin x}\right)$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$

19. If $y = e^{ax} cosbx$, then prove that $y_2 - 2ay_1 + (a^2 + b^2)y = 0$

20. Find the matrix A, if $\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix} A = \begin{bmatrix} -1 & -8 & -10 \\ 1 & -2 & -5 \\ 9 & 22 & 15 \end{bmatrix}$

SECTION D

This section comprises 2 of long answer-type questions (LA) of 5 marks each

21. Using Matrix Method, solve the system of equations $\begin{aligned} x - y + z &= 4 \\ 2x + y - 3z &= 0 \\ x + y + z &= 2 \end{aligned}$

OR

If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$ and $A^3 - 6A^2 + 7A + kI = 0$, find the value of 'k'?

22. If $x = \tan\left(\frac{1}{a}\log y\right)$, then show that $(1 + x^2)\frac{d^2y}{dx^2} + (2x - a)\frac{dy}{dx} = 0$.

SECTION E

This section comprises of **2** case-study/passage-based questions of 4 mark each

23. **Case Study 1:** To control a crop disease, it is necessary to use 8 units of chemical A, 14 units of chemical B and 13 units of chemical C. One barrel of spray P contains 1 unit of A, 2 units of B and 3 units of C. One barrel of spray Q contains 2 units of A, 3 units of B and 2 units of C. One barrel of R contains 1 unit of A, 2 units of B and 2units of C.Based on the above information answer the following questions:

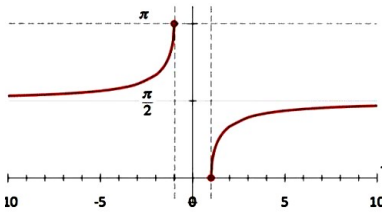
(i) Express the statement in matrix fom? 1
(ii) Is the coefficient matrix singular? 1
(iii) (a) How many barrels of spray P are used to just meet the requirement?. 2

OR

(iii) (b) How many barrels of spray R are used to meet the requirement? 2

24. **Case Study 2:** The inverse of trigonometric function exists, if the trigonometric function is one- one and onto. The range under which the inverse defined are called principal branches .Based on this data, answer the following questions:

(i) The given graph represents which inverse function



(ii) Write the simplified form of $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$

(iii) (a) The domain of $\cos^{-1} x$ is $[-1, 1]$, then what is the domain of $\cos^{-1}[x]$?

OR

(iii) (b)The principal value of $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) + \sec^{-1}(-2) - \tan^{-1}(-1)$

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