

PRACTICE PAPER:03
CLASS:XII
SUB:MATHEMATICS

SECTION:A

- 1 Find the number of all one-one functions from set $A = \{1, 1, 2, 3\}$ to itself.
- 2 Find the principle value of $\sin^{-1}(-1)$.
- 3 Construct a 2×2 matrix, $A = [a_{ij}]$ whose elements are given by $a_{ij} = i^2 + j$.
- 4 Find the transpose of a diagonal matrix $A = \text{diag}(a, b, c, d)$
- 5 If $A = \begin{pmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{pmatrix}$ then find A^3 .
- 6 If $x = ay^2 + x$, find dy/dx .
- 7 Evaluate $\int \frac{x^6 + 1}{x^2 + 1} dx$.
- 8 Find direction ratios of a line which is equally inclined on axes.
- 9 Find the projection of $2i - j$ on $(i + j + k)$.
- 10 Find Two lines have proportional direction ratios then lines are

SECTION:B

- 11 Show that the value relation R in set of all integers I defined as $R = \{(a, b) : a + b = \text{even integer}\}$ is an equivalence relation.
- 12 Prove that $\sin^{-1} x + \cos^{-1} x = 90^\circ$.
- 13 Using properties of determinants, find the solutions of following equation $\begin{vmatrix} x+1 & x+2 & x+3 \\ x+2 & x+3 & x+1 \\ x+3 & x+1 & x+2 \end{vmatrix} = 0$.
- 14 If $(\sin x)^y = (\cos x)^{\sin x}$ find dy/dx .
- 15 Find the intervals in which the function $f(x) = x^{\frac{1}{x}}$ is increasing or decreasing.
- 16 Find the equation of the tangent and normal to the parabola $y^2 = x$ at the point $(1, 1)$.
- 17 Evaluate : $\int \sin^{-1} \sqrt{\frac{x}{a+x}} dx$.
- 18 Solve the following differential equation $\frac{dy}{dx} = \sin(x+y) + \cos(x+y)$ when $y = 1, x = 0$.
- 19 Solve the differential equation $\frac{dy}{dx} = \frac{x+y}{x-y}$.
- 20 If \mathbf{a} , \mathbf{c} and \mathbf{b} are unit vectors and θ is the angle between \mathbf{a} and \mathbf{b} , then find $\sin \theta$.
- 21 Find the image of the point $(-1, -1, 3)$ in the plane $2x + 3y - 4z - 10 = 0$.

22 Evaluate: $\int_0^\pi \frac{x dx}{1 + \sin x}$.

SECTION:C

- 23 Find the area of the region enclosed between the circles $x^2 + y^2 \leq 1$ and $x + y \leq 1$.
- 24 Prove that the semi vertical angle of the cone of the maximum volume and of given slant height is $\tan^{-1} \sqrt{2}$.
- 25 Obtain the inverse of the matrix $A = \begin{pmatrix} 1 & 1 & 1 \\ 2 & 2 & 1 \\ 3 & -1 & 2 \end{pmatrix}$
 And hence solve the following system of linear equations : $x + 2y + 3z = 6$, $x + 2y - z = 2$ and $x + y + 2z = 4$.
- 26 Find the vector equation of a plane through the point $(2, -3, 0)$ and parallel to the lines $\mathbf{r} = 3i - 2j + 3k + t(-i + j - 2k)$ and $\mathbf{r} = 2i + k + s(3j + 4k)$
 Also convert the equation to its Cartesian form.
- 27 manufacturer makes two type of toys A and B. Three machines are needed for this purpose and the time (in minutes) required for each toy on the machine is given below.

Type of Toys	Machines		
	I	II	III
A	12	18	6
B	6	0	9

- Each machine is available for a maximum of 6 hours per day. If the profit on each toy of type A is Rs. 7.50 and that on each toy of type B is Rs. 5, show that 15 toys of type A and 30 of type B should be manufactured in a day to get maximum profit.
- 28 pair of dice are tossed and the random variable X denotes the sum of numbers obtained. Find the probability distribution for X . Find mean, variance and S.D. of X .
 - 29 For any vector \vec{a} , prove that $|\vec{a} \times \mathbf{i}|^2 + |\vec{a} \times \mathbf{j}|^2 + |\vec{a} \times \mathbf{k}|^2 = |\vec{a}|^2$

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