CLASS XII
SAMPLE PAPER
MATHS

THE VELAMMAL INERNATIONAL SCHOOL

SECTION – A (10 X 1 = 10 MARKS)

1. *Find fog and gof if* $f(x) = 8x^3$ and $g(x) = x^{\frac{1}{3}}$.

2. Find x if $\tan^{-1} x + \cot^{-1}(1/4) = \pi/2$.

3. If A is a square matrix of order 3 such that $|AadjA| = 64$. Find $|A|$.

4. If A is of order 2x3 and $(AB)^T$.is of order 4x2 then find the order of B

5. If $A = \begin{pmatrix} 1 & a \\ 0 & 1 \end{pmatrix}$ then What is the value of A^{50}.

6. $\int \sqrt{x^2 + 4x - 5}\ dx$

7. $\int \dfrac{\sin x}{1 - \cos x} dx$

8. Find the projection of $7\vec{i} + \vec{j} - 4\vec{k}$ on $2\vec{i} + 6\vec{j} + 3\vec{k}$.

9. Find the angle between the planes $\vec{r} \cdot (2\vec{i} - \vec{j} - \vec{k}) = 15$ and $\vec{r} \cdot (-\vec{i} + \vec{j} - 3\vec{k}) = 3$.

10. Find the vector of magnitude 5 units measured parallel to the resultant of sum of the vectors $3\vec{i} + \vec{j} - \vec{k}$ and $\vec{i} - 3\vec{j} + 4\vec{k}$-

SECTION – B (12X 4 = 48 MARKS)

11. Let A = NxN and $*$ be the binary operation on A defined by $(a,b) * (c, d) = (a+c, b+d)$. Show that (i) (A, $*$) is associative, (ii) (A,$*$) is commutative (iii) Find the identity element if exists.

12. Show that $\sin^{-1}(2x\sqrt{1 - x^2}) = 2\sin^{-1} x$

13. Prove without expanding $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc + ab + bc + ca = abc\left(1 + \dfrac{1}{a} + \dfrac{1}{b} + \dfrac{1}{c}\right)$.

14. Find k so that $f(x) = \begin{cases} \dfrac{\cos^2 x - \sin^2 x - 1}{\sqrt{x^2 + 1} - 1}; & x \neq 0 \\ k & ; x = 0 \end{cases}$ is continuous at x = 0.

15. Find $\dfrac{dy}{dx}$, if $x = \dfrac{\sin^3 t}{\sqrt{\cos 2t}}, \ y = \dfrac{\cos^3 t}{\sqrt{\cos 2t}}$

16. Find the intervals in which the functions f(x) = sinx + cosx. are increasing or decreasing

17. Form the differential equation for the curve $\dfrac{x^2}{a^2 + \lambda} + \dfrac{y^2}{b^2 + \lambda} = 1$ where λ is parameter

18. Evaluate $\int \dfrac{dx}{\cos(x+a)\cos(x+b)}$ (OR) $\int \dfrac{\tan^4 \sqrt{x} \sec^2 \sqrt{x}}{\sqrt{x}} dx$

19. Solve $x\dfrac{dy}{dx} = y(\log y - \log x + 1)$

20. With usual notation prove that $a^2 = b^2 + c^2 - 2bc\cos A$.

21. A variable plane is at a constant distance 3p from the origin and meets the axes in A,B,C respectively, then show that locus of the centroid of triangle ABC is
$\dfrac{1}{x^2} + \dfrac{1}{y^2} + \dfrac{1}{z^2} = \dfrac{1}{p^2}$

22. Three balls are drawn one by one without replacement from a bag containing 5 white and 4 green balls. Find the probability distribution of number of white balls drawn.

SECTION – C (7X 6 = 42 MARKS)

23. If $A = \begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$ find AB. Use this to solve the following

system of equations. x−y+2z=1, 2y−3z = 1 and 3x−2y+4z = 2.

24. Find the area of the greatest isosceles triangle that can be inscribed in a given ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ having its vertex coincident with one end of the major axis.

25. Compute the area bounded by $y = \dfrac{3x^2}{4}$ and 3x−2y+12=0..

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26. Evaluate $\int\limits_{0}^{\frac{\pi}{2}} \log \sin x \, dx$.

27. Find the equation of the line parallel to the line of intersection of planes $\vec{r}.(\vec{i} + 3\vec{j} - \vec{k}) = 5$ and $\vec{r}.(2\vec{i} - \vec{j} + \vec{k}) = 3$ and passing through (2,1,-2).

28. A dietician has to develop a special diet using two foods P and Q. Each packet (containing 30 g) of food P contains 12 units of calcium, 4 units of iron, 6 units of cholesterol and 6 units of vitamin A. Each packet of the same quantity of food Q contains 3 units of calcium, 20 units of iron, 4 units of cholesterol and 3 units of vitamin A. The diet requires atleast 240 units of calcium, atleast 460 units of iron and at most 300 units of cholesterol. How many packets of each food should be used to minimise the amount of vitamin A in the diet? What is the minimum amount of vitamin A?

29. Find the probability distribution of the number of sixes in three tosses of a die. Also find the mean and standard deviation of the distribution.

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