CLASS XII
SAMPLE PAPER (2010-11)
MATHS

Time 3 Hours   Max Marks 100

General Instructions

1.   All questions are compulsory
2.   Q 1 – 10 carries 1 marks, Q 11 – 22 carries 4 marks Q-23to 29 carries 6 marks

1. Evaluate $\left\{ \begin{pmatrix} 1 & 3 \\ -1 & -4 \end{pmatrix} + \begin{pmatrix} 3 & -2 \\ -1 & 1 \end{pmatrix} \right\} \begin{pmatrix} 1 & 3 & 5 \\ 2 & 4 & 6 \end{pmatrix}$

2. Find a 2x2 matrix B such that $B \begin{pmatrix} 1 & -2 \\ 1 & 4 \end{pmatrix} = \begin{pmatrix} 6 & 0 \\ 0 & 6 \end{pmatrix}$

3.   Verify that the binary operation * defind by a * b = ab+1 on Q is commutative and associative.

4. Find the principle value of $\cot^{-1}[-1/\sqrt{3}]$

5. Find second derivative of $y = \log[x^2/e^x]$

6. The total revenue received from the sale of x units of a product is given by $R(x) = 13x^2+26x+15$. Find the marginal revenue at x = 7

7. Evaluate $\int \dfrac{1-\cot x}{1+\cot x} dx$

8. If a = 4i+3j+k b = i – 2k find |2bx a|

9. If a line makes angle 90º, 60º , 30º with positive direction of x, y and z axes respectively, Find the direction cosines.

10. Find the area of the parallelogram whose diagonals are i + 2k, 2j – 3k

11. Using properties Prove that $\begin{vmatrix} a-b-c & 2a & 2a \\ 2b & b-c-a & 2b \\ 2c & 2c & c-a-b \end{vmatrix} = (a+b+c)^3$

12. If the tangent to the curve $y = x^3+ax+b$ is parallel to the line y-x =5 at a point P(1,-6) Find the values of a and b(or) Using approximations evaluate $\sqrt{0.26}$

13. If $y = \log((\sqrt{x}-1) +(\sqrt{x}+1))$ show that $dy/dx = ½(\sqrt{x^2-1})$ (or)
Differentiate $\tan^{-1} \dfrac{\sqrt{1 + a^2 x^2} – 1}{ax}$ w.r.t $\tan^{-1} ax$

14. Evaluate $\int \dfrac{dx}{(1 + x^2)\sqrt{(1- x^2)}}$ (or) Evaluate $\int \dfrac{1\, dx}{5 + 2\cos x}$

15. Find $\int_0^{\pi/2} 2\log\sin x - \log\sin 2x \, dx$

16. Form the differential equation of the family of curves $(x+a)^2-2y^2 = a^2$

17. Solve $(1+e^{x/y})dx+e^{x/y}(1-(x/y))dy = 0$

18. Find the value of λ if f is continuous at x = $\pi/4$ if
$F(x) = \dfrac{\sec^2 x - 2}{\tan x – 1}$ when $x\neq\pi/4$
        λ   when $x=\pi/4$

19. If f be a real valued function such that f(x) = 4x+3. Find the real function g such that gof = fog = I_R

20. Find λ so that the four points with position vectors-j+k, 2i-j-k, i+ λj+k and 3i+3k are coplanar.

21. If a and b are unit vectors and θ is the angle between them, then show that sin(θ/2)=1/2|a – b |

22. Find the vector and Cartesian equation of the plane passing through the point A(2,-1,1) and perpendicular to the line joining the points B(-1,4,1) and C(1,2,2)

23. If A = $\begin{pmatrix} 1 & 2 & 1 \\ 1 & -1 & -2 \\ 1 & 1 & 3 \end{pmatrix}$ find A^{-1} . Hence solve the equations x+y+z = 6; 2x-y+z = 3; x-2y+3z =6

24. If A = $\begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$ Prove that A^2 – 4A – 5I = 0. Hence find A^{-1}

25. A rectangular window is surmounted by a equilateral triangle. Given the perimeter is 16m. Find the width of window, so that maximum light may enter.

26. Find the disjoint intervals in which f(x) = 2x^3 -9x^2-24x -5 is increasing and decreasing

27. Prove that   a) $\int_{-a}^{a} \sqrt{\dfrac{a - x}{a+x}}\, dx = a\pi$ (or) ∫ √tanx dx

28. Find the area bounded by the lines x+2y =2, y-x =1 and 2x+y = 7

29. Find the equation of the plane which is perpendicular to the plane 5x+3y+6z+8 = 0 and which contains the line of intersection of the planes x+2y+3z-4 = 0 and 2x+y-z+5 = 0

****