

Class – XI
MATH SAMPLE PAPERS

Time Duration: 3 hours

M.M.100

Section - A

(Question No 1 Compulsory and Attempt five other questions)

Question 1

(3*10 = 30)

1. Find the value of $x \log_{125} x = \frac{1}{6}$
2. Find the sum of the following series to infinity $8+4\sqrt{2}+4+\dots\infty$
3. Prove by the method of mathematical induction

$$1.3+2.4+3.5+\dots+n(n+2) = \frac{1}{6} n(n+1)(2n+7)$$

4. Solve the equation $\cos\theta + \cos 3\theta - 2\cos 2\theta = 0$
5. Find the angle between X-axis and the line joining the points (3,-1) and (4,-2)
6. Find the parametric equation of the circle $x^2+y^2-ax-by = 0$
7. Show that the vector $\vec{a} - 2\vec{b} + 3\vec{c}$, $\vec{a} - 3\vec{b} + 5\vec{c}$ and $-2\vec{a} + 3\vec{b} - 4\vec{c}$ are coplanar, where \vec{a} , \vec{b} , \vec{c} are non-coplanar
8. If the relation between the velocity v cm/sec and distance traversed s cm by a particle is given by $v = 10 + \frac{s}{15}$, find the acceleration when $s = 900$ cm

9. Evaluate $\lim_{x \rightarrow 4} \frac{3 - \sqrt{5+x}}{1 - \sqrt{5-x}}$

10. Find the sum of n terms of the series

$$1 + \frac{2}{3} + \frac{3}{5}$$

Question 2:

1. If $x = \log_c b + \log_b c$, $y = \log_c a + \log_a c$ and $z = \log_b a + \log_a b$, show that $xyz + 4 = x^2 + y^2 + z^2$ [5m]
2. Prove that $\frac{\log a^n}{\log a b n} = 1 + \log_a b$ [5m]

Question 3:

1. Show that a real value of x will satisfy the equation $\frac{1-ix}{1+ix} = a-ib$, if $a^2+b^2 = 1$, where a and b are real. [5m]
2. Express the complex number in the form of $r(\cos\theta + i\sin\theta)$ $\tan\alpha = i$ [3m]
3. Solve the equation $x^2 + \left(\frac{ax}{x+a}\right)^2 = 3a^2, x \neq -a$ [2m]

Question 4:

1. Find all real values of x satisfying : $x^2-9 \geq 0$ and $x^2-6x+8 \leq 0$ [3m]
2. If a, b, c, d are in H.P, prove that $ab+bc+cd = 3ad$ [5m]
3. Find the sum to n terms and hence the sum to infinity $1+4x+7x^2+10x^3+\dots$, when $x < 1$ [2m]

Question 5:

1. Prove by induction that the sum $S_n = n^3 + 3n^2 + 5n + 3$ is divisible by 3 for all n belongs to \mathbb{N} . [5m]
2. Find the coordinates of the center of the circle inscribed in a triangle whose vertices are $(-36,7)$, $(20,7)$ and $(0,-8)$ [3m]
3. Solve $2\sin_2x + \sin_22x = 2$ [2m]

Question 6:

1. Prove that $\tan\alpha + 2\tan 2\alpha + 4\tan 4\alpha + 8\cot 8\alpha = \cot\alpha$ [3m]
2. If $A+B = \frac{\pi}{4}$, prove that $(1+\tan A)(1+\tan B) = 2$ [4m]
3. Prove that $\sin(A+B)\sin(A-B) = \sin_2A - \sin_2B = \cos_2B - \cos_2A$ [3m]

Question 7:

1. Sketch the graph of $y = 5 \sin(3x+1)$ [3m]
2. Find the equation of the perpendicular bisector of the line segment joining the points $(1,1)$ and $(2,3)$ [4m]
3. Find the equation of the circle which passes through the intersection of $x^2+y^2-4 = 0$ and $x^2+y^2-2x-4y+4 = 0$ and touches the line $x+2y = 0$ [3m]

Question 8:

1. Find the equation of the normal to the curve $x^2 = 4y$ passes through the point $(3,5)$ [4m]
 2. Find the approximate value of (3.02) where $f(x) = 3x^2 + 5x + 9$ [3m]
 3. Find the intervals in which the function $f(x)$ is increasing and decreasing [3m]
- $f(x) = 2x^3 - 9x^2 + 12x + 15$

Section - B

(Attempt any two questions)

Question 9:

1. Prove that $ax^2 + by^2 = 1$ [5m]
2. Find the derivative of the function 1) $f(x) = \tan x$ at $x = 0$, 2) $(x-1)(x-2)$ [5m]

Question 10:

1. Find the angles between the lines whose direction cosine are given by the equations $3l+m+5n, 6m-2n+5l = 0$ [5m]
 2. Prove that the following vectors are non-coplanar [5m]
- $3\vec{i} + \vec{j} - \vec{k}$, $2\vec{i} - \vec{j} + 7\vec{k}$ and $7\vec{i} - \vec{j} + 23\vec{k}$

Question 11:

1. Find the average due date of four bills was 3rd March 2009. Three of these bills were of amount Rs 4000, Rs 2000, Rs 2000 payable on 1st Jan, 1st Feb, 1st March respectively. Four bills is for amount Rs 4000. When is it due? [5m]
 2. For the following data compute the values of various quartiles [5m]
- | | | | | | | | |
|----------------|----|----|----|----|-----|-----|-----|
| Age in year: | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| No of member : | 20 | 36 | 56 | 65 | 100 | 120 | 146 |