

MM: 20 **Class Test XII B** Time: 30 min

Each Question Carries 5 marks

Q1. The volume of spherical balloon is increasing at the rate of $25 \text{ cm}^3 / \text{sec}$. Find the rate of change of its surface area at the instant when its radius is 5 cm.

Q2. Show that $y = \log(x+1) - \frac{2x}{2+x}$; $x > -1$ is an increasing function of x throughout its domain.

Q3. Find the equation of the tangent line to the curve $y = x^2 - 2x + 7$ which is perpendicular to the line $5y - 15x = 13$.

Q4. Using differentials, find the approximate value of $(15)^{1/4}$.

MM: 15 **Class Test XII B** Time: 30 min

Each question carries 5 marks.

Attempt any three:

1. Prove that the volume of the largest cone that can be inscribed in a sphere of radius R is $\frac{8}{27}$ of the volume of the sphere.
2. Of all the closed cylindrical cans of a given volume of 100 cm^3 , find the dimensions of the can which has the minimum surface area?
3. The sum of the perimeter of a circle and square is k , where k is some constant. Prove that the sum of their areas is least when the side of square is double the radius of the circle.
4. Find the largest possible area of a right angled triangle whose hypotenuse is 5 cm long.

MM: 15 **Class Test XII Class** Time: 30 min

Q 1-3 carry 1 mark, Q 4-6 carry 4 marks.

1. Find $\int (e^{x \log a} + e^{a \log x}) dx$

2. Find $\int \cos 2x \cos 4x dx$

3. Evaluate $\int \left(\frac{x+1}{x}\right)(x + \log x)^2 dx$

4. Evaluate $\int \frac{1}{1 + \cot x} dx$

5. Evaluate $\int \frac{1}{\sin(x-a)\cos(x-b)} dx$

MM: 20 **Class Test XII C** Time: 30 min

Each Question Carries 5 marks

Q1. Sand is pouring from a pipe at the rate of $12 \text{ cm}^3 / \text{s}$. The falling sand forms a cone on the ground in such a way that the height of the cone is always one-sixth of the radius of the base. How fast is the height of the sand cone increasing when the height is 4 cm?

Q2. Find intervals on which $f(x) = 5 + 36x + 3x^2 - 2x^3$ is (i) increasing (ii) decreasing:

Q3. Find the equation of the normals to the curve $y = x^3 + 2x + 6$ which are parallel to the line $x + 14y + 4 = 0$.

Q4. Using differentials, find the approximate value of $(29)^{1/3}$.

MM: 15 **Class Test XII C** Time: 30 min

Each question carries 5 marks.

Attempt any three:

1. A window is in the form of a rectangle surmounted by a semicircular opening. The total perimeter of the window is 10 m. Find the dimensions of the window to admit maximum light through the whole opening.
2. A wire of length 28 m is to be cut into two pieces. One of the pieces is to be made into a square and the other into a circle. What should be the length of the two pieces so that the combined area of the square and the circle is minimum?
3. Show that the right circular cone of least curved surface and given volume has an altitude equal to $\sqrt{2}$ time the radius of the base.
4. Show that maximum volume of cylinder which can be inscribed in the sphere of radius $5\sqrt{3} \text{ cm}$ is $500\pi \text{ cm}^3$.