



In The Service of Student Community

MM 25

Application of Derivatives

Time 45 Minutes

Section A 1 Mark Each

Paper prepared by

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1. Prove that the function $f(x) = x^3 + x^2 + x + 1$ does not have a maxima or minima.
2. A function 'f' attains local maximum at $x=a$. Write the nature of $f'(x)$ in the neighbourhood of a.
3. Find the approximate change in volume of a cube when side increases by 1%.

Section B 4 Marks Each

4. Find the value of $\sqrt{25.2}$, using differentials.
5. Find the maximum slope of the curve $f(x) = 2x + 3x^2 - x^3 - 27$.
6. A large spherical balloon is inflated by pumping in $16 \text{ m}^3/\text{sec}$ of gas. At the instant when the balloon contains $36\pi \text{ m}^3$ of gas, how fast is the radius increasing.
7. A point on the hypotenuse of a right-angled triangle is at distances a and b from the sides. Show that the length of the hypotenuse is at least $(a^{\frac{2}{3}} + b^{\frac{2}{3}})^{\frac{3}{2}}$

Section C 6 Marks Each

8. A jet of an enemy is flying along the curve $y = x^2 + 2$. A soldier is placed at the point (3, 2). What is the nearest distance between the soldier and the jet?

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