



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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