

RATE OF MEASURE

PREVIOUS EAMCET BITS

1. A stone thrown upwards, has its equation of motion $s = 490t - 4.9t^2$. Then the maximum height reached by it is [EAMCET 2005]

1) 24500 2) 12500 3) 12250 4) 25400

Ans: 3

Sol. $S = 490t - 4.9t^2$

$$v = \frac{ds}{dt} = 490 - 9.8t$$

at maximum height $v = 0$

$$\therefore t = 50$$

$$\therefore S = 12250$$

2. A particle moves along the curve $y = x^2 + 2x$. Then the point on the curve such that x and y coordinates of the particle change with the same rate: [EAMCET 2004]

1) (1, 3) 2) $\left(\frac{1}{2}, \frac{5}{2}\right)$ 3) $\left(-\frac{1}{2}, -\frac{3}{4}\right)$ 4) (-1, -1)

Ans: 3

Sol. $\frac{dy}{dt} = (2x + 2) \frac{dx}{dt}$

$$\Rightarrow x = \frac{-1}{2} \quad \left(\because \frac{dy}{dt} = \frac{dx}{dt} \right)$$

$$y = \frac{-3}{4}$$

$$\therefore (x, y) = \left(\frac{-1}{2}, \frac{-3}{4} \right)$$

69. A point is moving on $y = 4 - 2x^2$. The x -coordinate of the point is decreasing at the rate of 5 units per second. Then the rate at which 'y'-coordinate of the point is changing when the point is (1, 2) is [EAMCET 2004]

1) 5 units/sec 2) 10 units/sec 3) 15 units /sec 4) 20 units/ sec

Ans: 4

Sol. $y = 4 - 2x^2 \Rightarrow \frac{dy}{dt} = -4x \frac{dx}{dt}$

$$= 4(1)(-5) = 20 \text{ units / sec}$$

3. Gas is being pumped into a spherical balloon at the rate of $30 \text{ ft}^3/\text{min}$. Then the rate at which the radius increases when it reaches the value 15 ft is [EAMCET 2003]

1) $\frac{1}{30\pi} \text{ ft / min}$ 2) $\frac{1}{15\pi} \text{ ft / min}$ 3) $\frac{1}{20} \text{ ft / min}$ 4) $\frac{1}{25} \text{ ft / min}$

Ans: 1

Sol. $v = \frac{4}{3} \pi r^3 \Rightarrow \frac{dv}{dt} = 4\pi r^2 \frac{dr}{dt}$

$$30 = 4\pi(15)^2 \frac{dr}{dt} \Rightarrow \frac{dr}{dt} = \frac{1}{30\pi} \text{ ft / min}$$

4. The family of curves, in which the subtangent at any point to any curve is double the abscissa, is given by [EAMCET 2001]
 1) $x = cy^2$ 2) $y = cx^2$ 3) $x^2 = cy^2$ 4) $y = cx$
 Ans: 1

Sol. Let $x = cy^2 \Rightarrow \frac{dy}{dx} = \frac{1}{2cy}$
 \Rightarrow Subtangent $= \frac{y}{1/2cy} = 2cy^2 = 2x$

5. The distance moved by the particle in time t is given by $x = t^3 - 12t^2 + 6t + 8$. At the instant, when its acceleration is zero, the velocity is [EAMCET 2000]
 1) 42 2) -42 3) 48 4) -48
 Ans: 2

Sol. $S = t^3 - 12t^2 + 6t + 8$
 $V = \frac{ds}{dt} = 3t^2 - 24t + 6$
 $a = \frac{dv}{dt} = 6t - 24 = 0 \Rightarrow t = 4$
 $\therefore t = 4 \Rightarrow v = -42$



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