DPP
DAILY PRACTICE PROBLEMS

Class : XIth **Subject : Maths**
Date : **DPP No. :2**

Topic :-Application of Derivatives

1. In the mean value theorem $\frac{f(b)-f(a)}{b-a} = f'(c)$, if $a = 0, b = \frac{1}{2}$ and $f(x) = x(x-1)(x-2)$, then value of c is

a) $1 - \frac{\sqrt{15}}{6}$ b) $1 + \sqrt{15}$ c) $1 - \frac{\sqrt{21}}{6}$ d) $1 + \sqrt{21}$

2. If $f(x) = \frac{1}{4x^2+2x+1}$, then its maximum value is

a) $4/3$ b) $2/3$ c) 1 d) $3/4$

3. The diameter of a circle is increasing at the rate of 1cm/sec. When its radius is π, the rate of increase of its area is

a) π cm^2/sec b) 2π cm^2/sec c) π^2 cm^2/sec d) $2\pi^2$ cm^2/sec^2

4. The minimum value of $2x + 3y$, when $xy = 6$, is

a) 9 b) 12 c) 8 d) 6

5. The equation of the normal to the curve $y^4 = ax^3$ at (a, a) is

a) $x + 2y = 3a$ b) $3x - 4y + a = 0$ c) $4x + 3y = 7a$ d) $4x - 3y = 0$

6. The value of c in Rolle's theorem when

$f(x) = 2x^3 - 5x^2 - 4x + 3, x \in [1/3, 3]$, is

a) 2 b) $-1/3$ c) -2 d) $2/3$

7. Suppose the cubic $x^3 - px + q$ has three distinct real roots where $p > 0$ and $q > 0$. Then,

which one of the following holds?

a) The cubic has maxima at both $\frac{p}{3}$ and $-\frac{p}{3}$ b) The cubic has minima at $\frac{p}{3}$ and maxima at $-\frac{p}{3}$

c) The cubic has minima at $-\frac{p}{3}$ and maxima at $\frac{p}{3}$ d) The cubic has minima at both $\frac{p}{3}$ and $-\frac{p}{3}$

8. The chord joining the points where $x = p$ and $x = q$ on the curve $y = ax^2 + bx + c$ is

parallel to the tangent at the point on the curve whose abscissa is

a) $\frac{p+q}{2}$ b) $\frac{p-q}{2}$ c) $\frac{pq}{2}$ d) None of these

9. n is a positive integer. If the value of c prescribed in Rolle's theorem for the function

$f(x) = 2x(x-3)^n$ on the interval $[0, 3]$ is $3/4$, then the value of n is

a) 5 b) 2 c) 3 d) 4

10. The shortest distance between the line $y - x = 1$ and the curve $x = y^2$ is

a) $\frac{3\sqrt{2}}{8}$ b) $\frac{2\sqrt{3}}{8}$ c) $\frac{3\sqrt{2}}{5}$ d) $\frac{\sqrt{3}}{4}$

11. If the distance s covered by a particle in time t is proportional to the cube root of its velocity, then the acceleration is

a) A constant b) $\propto s^3$ c) $\propto \frac{1}{s^3}$ d) $\propto s^5$

12. The distance travelled s(in meteres) by a particle in t second is given by, $s = t^3 + 2t^2 + t$.The speed of the particle after 18 will be

a) 8 cm/s b) 6 cm/s c) 2 cm/s d) None of these

13. Using differentials, the approximate value of $(627)^{1/4}$ is

a) 5.002 b) 5.003 c) 5.005 d) 5.004

14. The length of the subtangent at any point (x_1, y_1)on the curve $y = a^x, (a > 0)$ is

a) $2 \log a$ b) $\frac{1}{\log a}$ c) $\log a$ d) $a^{2x_1} \log a$

15. Using differentials the approximate value of $\sqrt{401}$ is

a) 20.100 b) 20.025 c) 20.030 d) 20.125

16. A ladder 10 m long rests against a vertical wall with the lower end on the horizontal ground. The lower end of the ladder is pulled along the ground away from the wall at the rate of 3 cm/s. The height of the upper end while it is descending at the rate of 4cm/s, is

a) $4\sqrt{3}$m b) $5\sqrt{3}$m c) 6m d) 8m

17. A cubic $f(x)$ vanishes at $x = -2$ and has relative minimum/maximum at $x = -1$ and $x = \frac{1}{3}$ such that $\int_{-1}^{1} f(x)dx = \frac{14}{3}$. Then, $f(x)$ is

a) $x^3 + x^2 - x$ b) $x^3 + x^2 - x + 1$ c) $x^3 + x^2 - x + 2$ d) $x^3 + x^2 - x - 2$

18. The different between the greatest and least values of the function $f(x) = \cos x \frac{1}{2}\cos 2x - \frac{1}{3}\cos 3\,x\ is$

a) $\frac{2}{3}$ b) $\frac{8}{7}$ c) $\frac{3}{8}$ d) $\frac{9}{4}$

19. The number of real roots of the equation $e^{x-1} + x - 2 = 0$

a) 1 b) 2 c) 3 d) 4

20. If $f(x) = \sin^6 x + \cos^6 x$, then which one of the following is false?

a) $f(x) \leq 1$ b) $f(x) \leq 2$ c) $f(x) > \frac{1}{4}$ d) $f(x) \leq \frac{1}{8}$