DPP

DAILY PRACTICE PROBLEMS

Class : XIth **Subject : Maths**

Date : **DPP No. :5**

Topic :-Application of Derivatives

1. A population $p(t)$ of 1000 bacteria introduced into nutrient medium grows according to the relation$p(t) = 1000 + \frac{1000t}{100 + t^2}$. The maximum size of this bacterial population is

a) 1100 b) 1250 c) 1050 d) 5250

2. If $f'(x) = (x - a)^{2n}(x - b)^{2m+1}$ where $m, n \in N$, then

a) $x = b$ is a point of minimum
b) $x = b$ is a point of maximum
c) $x = b$ is a point of inflexion
d) None of these

3. A point is moving on$y = 4 - 2x^2$. The $x -$ coordinate of the point is decreasing at the rate of 5 unit per second. Then, the rate at which y-coordinate of the point is changing when the point is at (1,2)is

a) 5 units b) 10 units c) 15 units d) 20 units

4. The point of the curve $y^2 = 2(x - 3)$ at which the normal is parallel to line $y - 2x + 1$=0

a) $(5, 2)$ b) $\left(-\frac{1}{2}, -2\right)$ c) $(5, -2)$ d) $\left(\frac{3}{2}, 2\right)$

5. The function $f(x) = \frac{x}{1+|x|}$ is

a) Strictly increasing
b) Strictly decreasing
c) Neither increasing nor decreasing
d) Not differential at $x = 0$

6. The function $f(x) = 2x^3 - 3x^2 + 90x + 174$ is increasing in the interval

a) $\frac{1}{2} < x < 1$
b) $\frac{1}{2} < x < 2$
c) $3 < x < \frac{59}{4}$
d) $-\infty < x < \infty$

7. Let $f(x) = \begin{cases} |x|, & for\ 0 < |x| \le 2 \\ 1, & for\ \ x = 0 \end{cases}$, then at $x = 0$, f has

a) A local maximum
b) A local minimum
c) No local extremum
d) No local maximum

8. The set of values of a for which the function $f(x) = x^2 + ax + 1$ is an increasing function on $[1, 2]$ is

a) $(-2, \infty)$
b) $[-4, \infty)$
c) $[-\infty, -2)$
d) $(-\infty, 2]$

9. 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 is

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

10. Given $P(x) = x^4 + ax^3 + bx^2 + cx + d$ such that $x = 0$ is the only real root of $P'(x) = 0$. If $P(-1) < P(1)$, then in the interval $[-1, 1]$

a) $P(-1)$ is the minimum and $P(1)$ is the maximum of P.
b) $P(-1)$ is not minimum but $P(1)$ is the maximum of P.
c) $P(-1)$ is the minimum and $P(1)$ is not the maximum of P.
d) Neither $P(-1)$ is the minimum nor $P(1)$ is not the maximum of P.

11. If the equation $a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x = 0$ has a positive root α, then the equation

$n\, a_n x^{n-1} + (n-1) a_{n-1} x^{n-2} + \ldots + a_1 = 0$ has

a) A positive root less than α
b) A positive root larger than α
c) A negative root
d) No positive root

12. If the error committed in measuring the radius of the circle is 0.05%, then the corresponding error in calculating the area is

a) 0.05% b) 0.0025% c) 0.25% d) 0.1%

13. The edge of a cube is equal to the radius of the sphere. If the rate at which the volume of the cube is increasing is equal to λ, then the rate of increase of volume of the sphere is

a) $\frac{4\pi\lambda}{3}$ b) $4\pi\lambda$ c) $\frac{\lambda}{3}$ d) None of these

14. Tangent is drawn to ellipse $\frac{x^2}{27} + y^2 = 1$ at $(3\sqrt{3}\cos\theta, \sin\theta)$ (where $\theta \in (0, \pi/2)$). Then the value of θ such that sum of intercepts on axes made by this tangent is minimum, is

a) $\pi/3$ b) $\pi/6$ c) $\pi/8$ d) $\pi/4$

15. Roll's theorem is not applicable to the function $f(x) = |x|$ for $-2 \leq x \leq 2$ because

a) f is continuous for $-2 \leq x \leq 2$ b) f is not derivable for $x = 0$
c) $f(-2) = f(2)$ d) f is not a constant function

16. The abscissa of the point on the curve

$y = a(e^{x/a} + e^{-x/a})$
Where the tangent is parallel to the x-axis, is

a) 0 b) a c) $2a$ d) $-2a$

17. The value of a in order that $f(x) = \sin x - \cos x - ax + b$ decreases for all real values of x is given by

a) $a \geq \sqrt{2}$ b) $a < \sqrt{2}$ c) $a \geq 1$ d) $a < 1$

18. Let $f(x) = 1 + 2x^2 + 2^2x^4 + \ldots\ldots + 2^{10}x^{20}$.Then, $f(x)$ has

a) More than one minimum b) Exactly one minimum
c) At least one maximum d) None of the above

19. If the subnormal at any point on $y = a^{1-n}x^n$ is of constant length, then the value of n, is

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

20. The normal to the curve $x = a(1 + \cos\theta)$, $y = a\sin\theta$ at θ always passes through the fixed point

a) $(a, 0)$ b) $(0, a)$ c) $(0, 0)$ d) (a, a)