DPP
DAILY PRACTICE PROBLEMS

Class : XIth **Subject : Maths**
Date : **DPP No. :1**

Topic :-Application of Derivatives

1. The maximum value of the function $f(x)$ given by $f(x) = x(x-1)^2$, $0 < x < 2$, is
   a) 0 b) $4/27$ c) -4 d) $1/4$
2. For a given integer k, in the interval $\left[2\pi k + \frac{\pi}{2}, 2\pi k - \frac{\pi}{2}\right]$ the graph of $\sin x$ is
   a) Increasing from -1 to 1 b) Decreasing from -1 to 0
   c) Decreasing from 0 to 1 d) None of the above
3. If θ is the semi vertical angle of a cone of maximum volume and given slant height, then $\tan\theta$is given by
   a) 2 b) 1 c) $\sqrt{2}$ d) $\sqrt{3}$
4. The value of b for which the function $f(x) = \sin x - bx + c$ is decreasing in the interval $(-\infty, \infty)$ is given by
   a) $b < 1$ b) $b \geq 1$ c) $b > 1$ d) $b \leq 1$
5. The function $f(x) = 2x^3 + 3x^2 - 12x + 1$ decreases in the interval
   a) (2, 3) b) (1, 2) c) (-2, 1) d) (-3, -2)
6. If $f(x) = 2x + \cot^{-1} x + \log\left(\sqrt{1+x^2} - x\right)$, then $f(x)$
   a) Increases on R
   b) Decreases in $[0, \infty)$
   c) Neither increases nor decreases in $(0, \infty)$
   d) None of these
7. The maximum value of $f(x) = 3\cos^2 x + 4\sin^2 x + \cos\frac{x}{2} + \sin\frac{x}{2}$, is
   a) 4 b) $3 + \sqrt{2}$ c) $4 + \sqrt{2}$ d) $2 + \sqrt{2}$
8. If $a^2x^4 + b^2y^4 = c^6$, then maximum value of xy is
   a) $\frac{c^2}{\sqrt{ab}}$
   b) $\frac{c^3}{ab}$
   c) $\frac{c^3}{\sqrt{2ab}}$
   d) $\frac{c^3}{2ab}$
9. A stone is dropped into a quiet lake. If the waves moves in circles at the rate of 30cm/sec when the radius is 50 m, the rate of increase of enclosed area is
   a) $30\ \pi\ m^2$/sec b) $30\ m^2$/sec c) $3\pi\ m^2$/sec d) None of these

10. The equation of the tangent to the curve $x = t\cos t, y = t\sin t$ at the origin is
a) $x = 0$ b) $y = 0$ c) $x + y = 0$ d) $x - y = 0$

11. The rate of change of the surface area of a sphere of a sphere of radius$r$,when the radius is increasing at the rate of 2 cm/sis proportional to
a) $\frac{1}{r}$ b) $\frac{1}{r^2}$ c) r d) r^2

12. The maximum value of $(1/x)^x$, is
a) e b) e^e c) $e^{1/e}$ d) $(1/e)^{1/e}$

13. If $f(x) = 2x^3 - 21x^2 + 36x - 30$, then which one of the following is correct
a) $f(x)$has minimum $at\ x = 1$ b) $f(x)$has maximum $at\ x = 6$
c) $f(x)$has maximum $at\ x = 1$ d) $f(x)$has maxima or minima

14. An edge of a variable cube is increasing at the rate of 10cm/s. How fast the volume of the cube will increase when the edge is 5 cm long?
a) 750 cm $^3/_s$ b) 75 cm $^3/_s$ c) 300 cm$^3/_s$ d) 150 cm$^3/_s$

15. The tangents to the curve $x = a(\theta - \sin\theta), y = a(1 + \cos\theta)$ at the points $\theta = (2k + 1)\pi, k \in Z$ are parallel to:
a) $y = x$ b) $y = -x$ c) $y = 0$ d) $x = 0$

16. The normal to the curve $5x^5 - 10x^3 + x + 2y + 6 = 0$ at $P(0, -3)$ meets the curve again at the point
a) $(-1, 1), (1, 5)$ b) $(1, -1), (-1, -5)$ c) $(-1, -5), (-1, 1)$ d) $(-1, 5), (1, -1)$

17. The normal to the curve represented parametrically by $x = a(\cos\theta + \theta\sin\theta)$ and $y = a(\sin\theta - \theta\cos\theta)$ at any point θ, is such that it
a) Makes a constant angle with x-axis
b) Is at a constant distance from the origin
c) Passes through the origin
d) Satisfies all the three conditions

18. If $f(x) = \begin{cases} 3x^2 + 12x - 1, & -1 \le x \le 2 \\ 37 - x, & 2 < x \le 3 \end{cases}$, then
a) $f(x)$ is increasing in $[-1, 2]$
b) $f(x)$ is continuous in $[-1, 3]$
c) $f(x)$ is maximum at $x = 2$
d) All the above

19. The value of c, in the Lagrange's Mean value theorem $\frac{f(b) - f(a)}{b - a} = f'(c)$, for the function $f(x) = x(x - 1)(x - 2)$ in the interval $[0, 1/2]$, is
a) $\frac{1}{4}$ b) $1 - \frac{\sqrt{21}}{6}$ c) $\frac{9}{8}$ d) $1 + \frac{\sqrt{21}}{6}$

20. If $f(x) = kx - \sin x$ is monotonically increasing, then
a) $k > 1$ b) $k > -1$ c) $k < 1$ d) $k < -1$