TOPIC: "APPLICATION OF DERIVATIVES"

1. Find the approximate value of $\tan^{-1}(0.999)$.

2. Find the approximate value of,

$f(x) = 2x^3 + 7x^2 - 2x + 3$, **when** $x = 2.002$.

3. Find approximately $\sin 31^0$, **given that** $1^0 = 0.0175^0$ **and** $\cos 30^0 = 0.8660$.

4. Find the approximate value of $\sqrt{8.95}$

5. Using differentials, find the approximate value of $(82)^{1/4}$ **up to three places of decimal.**

6. Verify Role's theorem for the function $f(x) = x^2 - 5x + 9$ **on [1,4].**

7. Verify Lagrange's mean value theorem for the function. $f(x) = x + \frac{1}{x}, x \in [1,3]$.

7. Find the intervals on which the function $f(x) = (x + 2)e^{-x}$ **is**

(a) increasing **(b) decreasing.**

8.Find the intervals on which the function $f(x) = \frac{x}{(x^2+1)}$ **is**

(a) increasing **(b) decreasing.**

9.Find the intervals on which the function $f(x) = \log(1 + x) - \frac{x}{(1+x)}$**is**

(a) increasing **(b) decreasing.**

10. Separate $\left[0, \frac{\pi}{2}\right]$ **into subintervals in which** $f(x) = \sin 3x$ **is**

(a) increasing **(b) decreasing.**

11. A man of 2 maters height walks at a uniform speed of 6 km/hr away from a lamp post of 6 meters high. Find the rate at which the length of his shadow increases.

12. The radius of a soap bubble increases at the rate of 1 cm/sec. find the rate at which its volume increases when the radius is 4cm.

13. The radius of soap bubble is increasing at the rate of 0.2 cm/sec. If its radius is 5cms, find the rate of increase of its volume.

14. The surface area of a spherical balloon is increasing at the rate of $2cm^2$/sec. At What rate is the volume of the balloon is increasing when the radius of the balloon is 6cm.

15. A point source of light is hung 30 feet directly above a straight horizontal path on which a man of 6 feet in height is walking. How fast will the man's shadow length and how fast will the tip of shadow move when he is walking away from the light at the rate of 100 ft/min.

16. Sand is pouring from a pipe at the rate of $12\ cm^3/sec$. The falling sand forms a cone on the ground in such a way that the height of the cone is always one-sixth of the radius of the base. How fast is the height of the sand-cone increasing when the height is 4 cm?

17. Find the equation of tangent to the curve , $y = 3x^2 - x + 1$ at $P(1,3)$.

18. Find the co-ordinates of the point on the curve $y = x - \frac{4}{x}$, when the tangents are parallel to the line $y = 2x$.

19. Find the equations of the tangent and normal to the curve $x = a\ sin\ 3t, y = cos\ 2t$ at $t = \frac{\pi}{4}$

20.Find the equations of the tangent and the normal at the point 't' on the curve $x = a\ sin^3 t, y = b\ cos^3 t$.

21. Examine the maxima and minima of the function $f(x) = 2x^3 - 21x^2 + 36x - 20$.

Also, find the maximum and minimum values of $f(x)$.

22. An open box is to be made out of a piece of square card board of side 18 cms by cutting off equal squares form the corners and turning up the sides.

Find the maximum volume of the box.

23. Divide 20 into two parts so that their product is maximum.

24. Function $f(x) = x^2 - 3x + 4$ **has minimum value at** $x = ...$

(a) 0 **(b)** $-\frac{3}{2}$

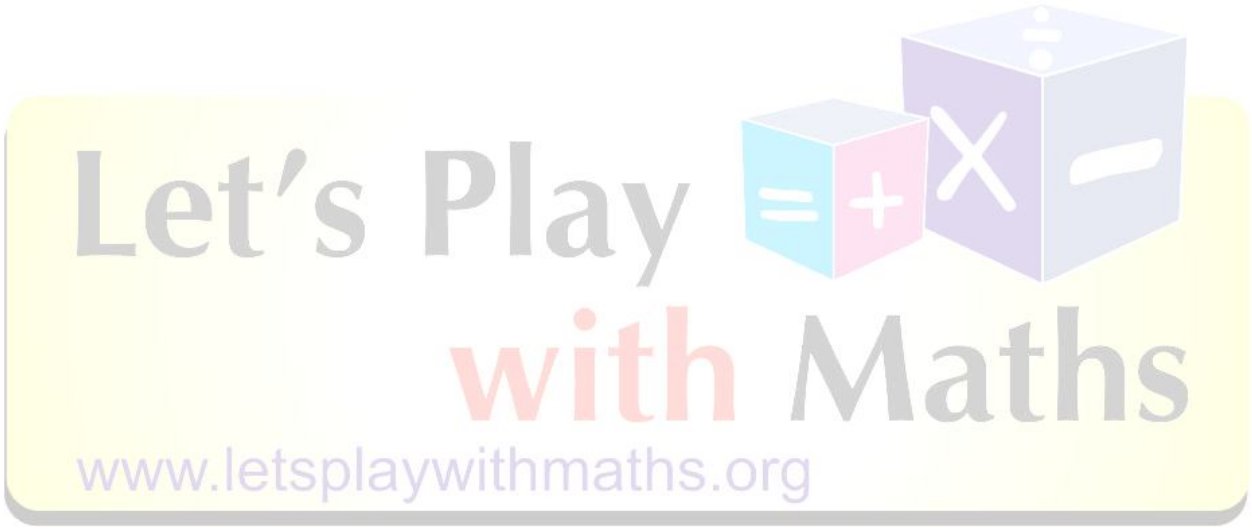
(c) 1 **(d)** $\frac{3}{2}$

25. Examine the function : $f(x) = 2x^3 - 9x^2 + 12x + 5$ **for maxima and minima.**

26. A window is in the shape of a rectangle surmounted by a semicircle. If its perimeter is 20 ft. then find the dimensions of the window so that it may admit maximum light

27. A wire of length 28 m is to be cut into two pieces. One of the pieces is to be made into a square and the other into a circle. What should be the length of the two pieces so that the combined area of the square and the circle is minimum?

28. Find two positive numbers x and y such that $x + y = 60$ and xy^3 is maximum.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