UNIT-VII

(Application of Derivatives)

Group – A

Answer the following questions. **1 X 20 = 20**

1. Find the min. value of $|x+5|$ where x € R

2. Write the equation of the tangent for the function y = f (x) at the point (x_1, y_1).

3. For a curve y = f (x), if f' (x) = 3x – 2 then find the slope of the tangent. When x = -1.

4. What should be the value of f' (a) for f (x) to have maximum or minimum value at x = a.

5. Find the minimum value if any of the function f (x) = x^2 where x € R.

6. Find the slope of the tangent to the curve $y = x^3 – x$ at x = 2.

7. A line is parallel to x-axis. What is the slope of the line ?

8. If two lines (with slope m_1 & m_2) are perpendicular to each other than write the relation between their slopes.

9. Find the maximum value of the function f (x) = $|\sin x + 5|$

10. If A is the area and r is the radius of the circle then find the rate of change of area with respect to r.

11. Define monotonic function ?

12. Write the equation of the normal for the function y = f (x) at the point (x_1, y_1).

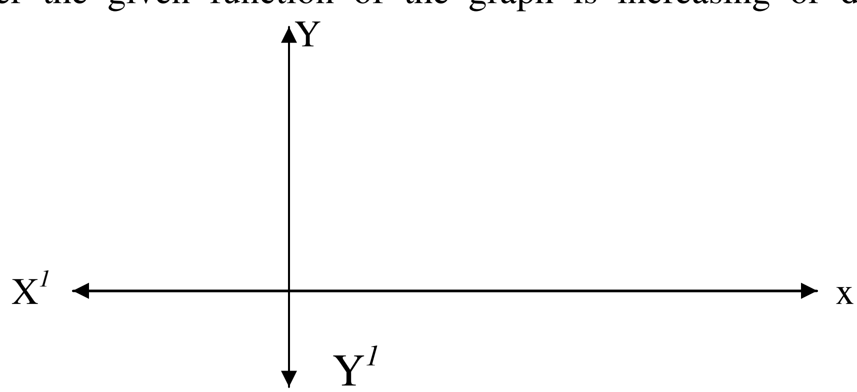
13. Define increasing function ? if f (x) = 3x, V x ЄN than f (x) is increasing function or not ?

14. Prove that f (x) = sinx is increasing in [0, π/2]

15. Define decreasing function ?

16. What is the slope of the line y = -3x + ½

17. State whether the given function of the graph is increasing or decreasing.



18. If $x_1 < x_2 \implies f(x_1) < f(x_2)$ for all x_1, x_2 € R then that function is called ?

19. If two lines (with slope m_1 & m_2) parallel to each other then what is the relation between their slopes.

20. If the slope of the tangent of the function y = f (x) at any point (x_1, y_1) is -2 then what will be the slope of the normal at the same point.

GROUP – B **15 X 4 = 60**

1. For the given function f (x) = x^2 + 2x – 8, x € [-4.2]
Using property
(a) Check continuity at [-4, 2].
(b) Check Differentiability at] -4, 2 [.
(c) Show – f (-4) = f (2)
(d) State the above function f (x) satisfy or does not Satisfy Rolle's theorem

2. For the given function y = x^2 – 2x + 7
(a) Find dy/dx
(b) Find $[dy/dx]_{(2, 1)}$
(c) Find equation of tangent at point (2, 1)
(d) Find equation of normal at point (2, 1)

3. The volume of a cube is increasing at the rate of 9 cubic centimeter/sec. How fast is the surface area increasing when the length of edge is 10 c.m.

4. The volume of spherical balloons is increasing at the rate of 27 cm^3/sec. Find the rate of change of its surface area when its radius is 8 cm.

5. Verify Lagrange's mean value theorem for f (x) = x^2 + x – 1 on [0, 4]

6. Find the interval in which the function f (x) = x^2 – 4x + b is –
(a) Strictly increasing
(b) Strictly decreasing

7. Show that the function f (x) = x – 1/x is increasing for x Є R (1+1½+1½)

8. Prove that the curves x = y^2 , xy = K Cut at right angle if $8K^2$ = 1.
(1+1+2)

9. Find the approximate value of $(25)^{1/3}$ Using differentiation. (1+1+2)

10. Find the local maxima on local minima of the function f (x) = x3 – 6x2 + 9x + 15
(1+1+2)

11. If f (x) = $3x^2$ + 15x + 5 find the approximate value of f (3.02) Using differentiation. (1+1+1+1)

12. Find two number whose sum is 24 and whose product is as large as possible.
(1+1+1+1)

13. Find the maximum profit that a company can make if the profit function is given by p (x) = 41 -72x – $18x^2$ (1+1+1+1)

14. Verify Rolle's theorem for the function f (x) = sinx + Cosx in $[0, \pi/2]$ (1+1+1+1)

15. Find the equation of the tangent and normal to the curve $y = x^2 + 4x + 1$ at the point x = 3 (1+1+1+1)

Group - C 6 X 10 = 60

1. For a given function y = f (x) = Sinx + Cosx, $0<x<\pi/2$

i.	Find dy/dx	1
ii.	Find the point at which dy/dx = 0	1
iii.	Find d^2y/dx^2	
iv.	Find d^2y/dx^2 when dy/dx = 0	1
v.	Find the point of maxima if exist	1
vi.	Find the point of minima if exist	1

2. If $y = x^x$ then find

i.	dy/dx	1
ii.	The point at which dy/dx = 0	1
iii.	Find d^2y/dx^2	1
iv.	Evaluate d^2y/dx^2 at the point where dy/dx = 0	1
v.	Find the point of local maxima or local minima if exist	1
vi.	Find the value of local maxima or local minima if exit	1

3. Find the interval on which the function $y = f(x) = (x + 1)^3.(x - 3)^3$ is
(a) increasing (b) decreasing

4. Find the coordinates of the point on the curve $y = x^2 + 3x + 4$, the tangent at which passes through origin.

5. Show that all the rectangles inscribed in a given fixed circle the square has the maximum area.

6. Prove that the volume of the largest cone that can be inscribed in a sphere of a radius r is 8/27 of the volume of the Sphere.

7. Find the equations of the tangent and normal to the curve x = □ + Sin □, y = 1 + Cos □ at □ = $\pi/4$

8. Prove that the curve $(x/a)^n + (y/b)^n = 2$ touches the straight line x/a + y/b = 2 at the point (a, b) what even the value of n.

9. Find the intervals in which function f (x) = sinx + Cosx, $0 \le x \ge 2\pi$ is strictly increasing or strictly decreasing.

10. If the length of the simple pendulum is decreased by 2% find the percent decreased in its period T where T is equal to :-

$$T = 2\pi \sqrt{l / g}$$