

**Subjective Sheet No 2**

**DIFFERENTIATION**

Q1) Find the derivative of the following :

a)  $(x^3 - 3x^2 + 4)(4x^5 + x^2 - 1)$       b)  $\frac{9x^5}{x-3}$       c)  $\frac{1}{\sqrt{x}}$       d)  $\frac{x+1}{(x+2)^2}$       e)  $\frac{x^2+1}{x-1}$

Q2) Differentiate  $(x^2 + 3)(x^4 - 9)$  w.r.t x.

Q3) Differentiate  $\frac{\sqrt{x+2} - \sqrt{x-2}}{\sqrt{x+2} + \sqrt{x-2}}$  w.r.t x.

Q4) Differentiate  $(4x^2 - 7)^{\frac{1}{2}}$  w.r.t x.

Q5) Differentiate  $(3 + 2x^3)\sqrt{x}$  w.r.t x.

Q6) Find the derivative y with respect to x of the following :

(i)  $y = \sqrt{x} + 2x^{\frac{2}{3}} + \frac{4}{x^2} + 5$

(ii)  $y = \frac{1}{x} - \frac{2}{x^2} + \frac{2}{x^3} + 10x + 5$

(iii)  $y = \frac{1}{\sqrt{x}} + \frac{2}{x^3} - \frac{4}{x^{\frac{2}{3}}}$

(iv)  $y = \frac{\sin(x)}{x}$

(v)  $y = \frac{1 + \tan(x)}{1 - \tan(x)}$

(vi)  $y = \sin(x^3)$

(vii)  $Y = \sin(\cos(x))$

Q7) Differentiate the following : a) 1037      b)  $e^3$

Q8) Given  $S = ut + \frac{1}{2}at^2$ , where u and a are constants . Obtain the value of  $\frac{dS}{dt}$

Q9) The area of a blot of ink is growing such that after t seconds , its area is given by  $A = (3t^2 + 7) \text{cm}^2$  .Calculate the rate of increase of area at t = 5 seconds.

Q10) If  $x = at^2$  and  $y = bt^3$  , then find  $\frac{dy}{dx}$

Q11) If  $x = a(\theta + \sin\theta)$  and  $y = a(1 - \cos\theta)$  then find  $\frac{dy}{dx}$

Q12) Differentiate a)  $\sin x^3$       b)  $\sqrt{\sin \sqrt{x}}$

Q13) Differentiate  $\log (x - 3 + \sqrt{x^2 - 6x + 1})$  w.r.t x.

Q14) If  $y = \frac{\sin x}{\log x + e^X}$  then find  $\frac{dy}{dx}$

Q15) Find  $\frac{dy}{dx}$        $x+y = x y^3$

Q16)

1.  $y = 3x^5 + 3x^3 - 5$ , Find  $dy/dx$

2.  $y = \sqrt{x} + 2x^{\frac{3}{2}} + \frac{4}{x^2} + 5$ , Find  $dy/dx$

3.  $\frac{1}{x} - \frac{2}{x^2} + \frac{3}{x^3} + 10x + 5$  Find  $dy/dx$

4.  $\frac{1}{\sqrt{x}} + \frac{2}{x^{\frac{3}{2}}} - \frac{4}{x^{\frac{5}{2}}}$  Find  $dy/dx$

Q17)

$y = \frac{\sin(x)}{x}$ , Find  $\frac{dy}{dx}$

Q18)  $y = \sqrt{x^2 + ax + 1}$ , Find  $dy/dx$

Q19)  $y = \cos \sqrt{\sin \sqrt{x}}$ , Find  $dy/dx$

Q20) If  $y = x^4$ , find  $\frac{d^2y}{dx^2}$  and  $\frac{d^3y}{dx^3}$

Q21) If  $y = A \sin(\omega t)$  where A and  $\omega$  are constants, find rate of change of y. Also find  $\frac{d^2y}{dt^2}$ .

Q22) If  $S = \frac{t^3}{3} + t^2 - 1$ . Find rate of change of S. Also find  $\frac{d^2S}{dt^2}$  at  $t = 2$  secs.

Q23) If Displacement of a body is given by  $S = t^3 + t^2 + 1$ . Find **instantaneous velocity** at time  $t = 1$  secs.

Q24) If  $S = t^2 + t$ . Find **average velocity** from time  $t = 1$  sec to  $t = 3$  secs.