Assignment – 02

Proficiency Exercise:

Q1 Find $\frac{dy}{dx}$ for the following:

i) $y = x^5 + x^3 + 10$ ans: $5x^4 + 3x^2$

ii) $y = \sqrt{x} + \frac{1}{\sqrt{x}}$ ans $\frac{1}{2\sqrt{x}} - \frac{1}{2x\sqrt{x}}$

iii) $(3x^2 + 7)(6x + 3)$ ans $54x^2 + 18x + 42$

iv) $\sqrt{4x^2 - 7}$ ans $\frac{4x}{\sqrt{4x^2-7}}$

v) $\frac{x^2+1}{x-2}$ ans $\frac{x^2-4x-1}{(x-2)^2}$

vi) $\frac{\sin x}{1+\cos x}$ ans $\frac{1}{1+\cos x}$

Q2 Integrate the following:

i) $ax^2 + bx + c$ ans: $\frac{ax^3}{3} + \frac{bx^2}{2} + cx$

ii) $\left(x + \frac{1}{x}\right)^2$ ans: $\frac{1}{4}x^4 + \frac{3}{2}x^2 + 2\log x + \frac{1}{2x^2}$

iii) $\int_1^4 \sqrt{x}\, dx$ ans: 14/3

iv) $\int_2^3 \frac{1}{t}\, dt$ ans: $\log\left(\frac{3}{2}\right)$

v) $\int_{-90^0}^{90^0} \cos x\, dx$ ans: 2

Q7 If the velocity of a particle is $v = At + Bt^2$, where A and B are constants. Find the distance travelled by it in between 1s and 2s.

[NEET (Phase-I) 2016]

Q8 A body moves in a plane so that the displacement along x and y axes are $x = 3t^3$ and $y = 4t^3$. Find the velocity of the body.

formula used? $\sqrt{x^2+y^2}$

[ODJEE 2012]

Q9 The motion of a particle along a straight line is described by equation: $x = 8 + 12t - t^3$ where x is in metre and t is in second. Find the retardation of the particle when its velocity becomes zero.

[CBSE PMT 2012]

Q10 A particle moves along a straight line such that its displacement at any time t is given by: $S = t^3 - 6t^2 + 3t + 4$. Find its velocity when its acceleration is zero. **[WBJEE 2013]**

Q11 The displacement of a particle is given by $y = a + bt + ct^2 - dt^4$. Find the initial velocity and acceleration of the particle.

[WBJEE 2008, AMU 2012]