Question = 4

(ii) what are the properties of double integeration ?

Ans Function of two variables : $f(x,y)$
$f(u,v), g(x,y)$

Independent variables : x, y, u, v
Small changes : $\Delta x, \Delta y$
Regions of integration : R, S
Real number : $a, b, c, d, \alpha, \beta$

Polar coordinates : r, θ
Area of a region : A
Surface area : S
Volume of a solid : V
Mass of a lamina : m
Density of a lamina : $\rho(x,y)$
First moments : M_x, M_y
Moments of inertia : I_x, I_y, I_0
Charge of a plate : Q
Charge density $= \sigma(x,y)$
Coordinates of the center of mass : $\bar{x}, \bar{y}$
Average of a function : M

Section - 4

Question
Q1: 1(i)

Evaluate $\int_0^1 \int_x^{0.5} x^2 + y^2 \, dx\,dy$

$$= \int_0^1 \left[x^2 y + \frac{y^3}{3} \right]_x^{0.5} dx$$

$$= \int_0^{.5} \left(x^2 a + \frac{a^3}{3} \right] dx$$

$$= \frac{1}{3} \left[x^3 a + \frac{a^3}{5} x \right]_x^{0.5}$$

$$= \frac{1}{3} ab^3 + \frac{1}{3} a^3 b =$$

$$= \frac{1}{3} ab(a^2 + b^2)$$ Ans