FORMULAE SHEET

(a) Area bounded by a curve with x – axis: $\text{Area} = \int_a^b y\,dx = \int_a^b f(x)dx$

(b) Area bounded by a curve with y – axis: $\text{Area} = \int_c^d x\,dy = \int_c^d f(y)dy$

(c) Area of a curve in parametric form: $\text{Area} = \int_a^b y\,dx = \int_{t_2}^{t_1} g(t)f'(t)dt$

(d) Positive and Negative Area: $A = \left|\int_a^c f(x)dx\right| + \left|\int_c^b f(x)dx\right|$;

(e) Area between two curves:

(i) Area enclosed between two curves intersecting at two different points.

$$\text{Area} = \int_a^b (y_1 - y_2)dx = \int_a^b [f_1(x) - f_2(x)]dx$$

(ii) Area enclosed between two curves intersecting at one point and the x – axis.

$$\text{Area} = \int_a^\alpha f_1(x)dx + \int_\alpha^b f_2(x)dx$$

(iii) Area bounded by two intersecting curves and lines parallel to y – axis.

$$\text{Area} = \int_a^c (f(x) - g(x))dx + \int_c^b (g(x) - f(x))dx$$

(a) Standard Areas:

(i) Area bounded by two parabolas $y^2 = 4ax$ and $x^2 = 4by$; $a > 0, b > 0$: $\text{Area} = \frac{16ab}{3}$

(ii) Area bounded by Parabola $y^2 = 4ax$ and Line $y = mx$: $\text{Area} = \frac{8a^2}{3m^3}$

(iii) Area of an Ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$: Area = πab