

$$Q-1. (2x+3y+1) dx + (4x+6y+1) dy = 0$$

$$\frac{dy}{dx} = \frac{-(2x+3y+1)}{4x+6y+1}$$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \quad \therefore \frac{2}{4} = \frac{3}{6}$$

$$\text{Method iv (B)} \quad \frac{dy}{dx} = \frac{-(2x+3y+1)}{2(2x+3y)+1}$$

$$\text{Let } 2x+3y = v$$

$$2+3 \frac{dy}{dx} = \frac{dv}{dx}$$

$$\frac{1}{3} \left[\frac{dv}{dx} - 2 \right] = \frac{-(v+1)}{2v+1}$$

$$\frac{dv}{dx} = \frac{-(3v+3)}{2v+1} + 2$$

$$\frac{dv}{dx} = \frac{1}{2} \left[\frac{dv}{dx} - 2 \right]$$

$$\frac{dv}{dx} = \frac{-3v-3+4v+2}{2v+1}$$

$$= \frac{v-1}{2v+1}$$

$$\int \frac{2v+1}{v-1} dv = \int dx$$

$$\int \frac{2v-2+2+1}{v-1} dv = \int dx$$

$$\int \left(\frac{2(v-1)}{v-1} + \frac{3}{v-1} \right) dv = \int dx$$

$$\int \left(2 + \frac{3}{v-1} \right) dv = \int dx$$

$$2v + 3 \log(v-1) = x + C$$

$$2(2x+3y) + 3 \log(2x+3y-1) = x + C \quad \underline{\text{Ans.}}$$

$$Q-2. (x+2y+3) dx + (2x+4y-1) dy = 0$$

$$\frac{dy}{dx} = \frac{-(x+2y+3)}{2x+y-1}$$

$$x+2y = v$$

$$1 + 2 \frac{dy}{dx} = \frac{dv}{dx}$$

$$\frac{1}{2} \left[\frac{dv}{dx} - 1 \right] = - \frac{(v+3)}{2v-1}$$

$$\frac{dy}{dx} = \frac{1}{2} \left[\frac{dv}{dx} - 1 \right]$$

$$\frac{dv}{dx} = \frac{-2(v+3)}{2v-1} + 1$$

$$\frac{dv}{dx} = \frac{-2v-6+2v-1}{2v-1}$$

$$\int (2v-1) \frac{dv}{dx} = \int -7 dx$$

$$x \cdot \frac{v^2}{2} - v = -7x + C$$

$$v^2 - v = -7x + C$$

$$(x+2y)^2 - (x+2y) = -7x + C$$

$$(x+2y)^2 + 6x - 2y = C$$

Method iv c) $\frac{dy}{dx} = \frac{a_1x + b_1y + C_1}{a_2x + b_2y + C_2}$

& diagonal entries are numerically same. Then use
comparing & dividendo thm

Q. 1.

$$\frac{dy}{dx} = \frac{x+2y+3}{2x+y+4}$$

$$\frac{a}{b} = \frac{c}{d} \Rightarrow \frac{a+b}{a-b} = \frac{c+d}{c-d}$$

$$\frac{dy+dx}{dy-dx} = \frac{(x+2y+3) + (2x+y+4)}{(x+2y+3) - (2x+y+4)}$$

$$\frac{d(y+x)}{d(y-x)} = \frac{3x+3y+7}{-x+y-1} \Rightarrow \frac{3(y+x)+7}{(y-x)-1}$$

$$\frac{d(y+x)}{3(y+x)+7} = \frac{d(y-x)}{(y-x)-1}$$

$$y+x = t$$

$$y-x = w$$

$$\int \frac{dt}{3t+7} = \int \frac{dw}{w-1}$$

$$\frac{1}{3} \log(3t+7) = \log(w-1) + \log C$$

$$\frac{1}{3} \log(3x+3y+7) = \log(y-x-1)$$

$$\log(3x+3y+7) = 3 \log [C(y-x-1)]$$

$$\log(3x+3y+7) = \log [C^3 (y-x-1)^3]$$

$$3x+3y+7 = C_1 (y-x-1)^3 \quad \underline{\text{Ans.}}$$