

Integrating factor helps to convert the equation into exact form. So take option D

$$(x dy + y dx) \times \frac{1}{xy} = 0$$

$$\Rightarrow \frac{1}{x} dx + \frac{1}{y} dy = 0$$

Comparing with  $M dx + N dy = 0$  we get

$$M = \frac{1}{x} \quad ; \quad N = \frac{1}{y}$$

$$\underline{\text{So}} \quad \frac{\partial M}{\partial y} = 0 \quad ; \quad \frac{\partial N}{\partial x} = 0$$

So it is an exact diff equation hence

$\left(\frac{1}{xy}\right)$  is an integrating factor.

now for option a

take  $n=2$  then it becomes

so  $(x dy + y dx) \times \frac{1}{x^2 y^2} = 0 \Rightarrow \frac{1}{x^2 y} dx + \frac{1}{x y^2} dy = 0$

$M = \frac{1}{x^2 y}$  ;  $N = \frac{1}{x y^2}$

$\frac{\partial M}{\partial y} = -\frac{1}{x^2 y^2}$  ;  $\frac{\partial N}{\partial x} = -\frac{1}{x^2 y^2}$

$\therefore \frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$  so eq<sup>n</sup> is an exact solution form

|   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|
| 4 | 8 | 7 | 3 | 5 | 9 | 2 | 6 | 1 |
| 9 | 3 | 1 | 2 | 6 | 4 | 7 | 5 | 8 |
| 5 | 2 | 6 | 8 | 7 | 1 | 3 | 9 | 4 |
| 7 | 5 | 9 | 4 | 1 | 3 | 6 | 8 | 2 |
| 2 | 1 | 4 | 5 | 8 | 6 | 9 | 3 | 7 |
| 3 | 6 | 8 | 9 | 2 | 7 | 4 | 1 | 5 |
| 1 | 4 | 3 | 7 | 9 | 8 | 5 | 2 | 6 |
| 6 | 7 | 5 | 1 | 3 | 2 | 8 | 4 | 9 |
| 8 | 9 | 2 | 6 | 4 | 5 | 1 | 7 | 3 |

$\Rightarrow \left(\frac{1}{xy}\right)^n$  ,  $n > 1$  is also an integrating factor