

2) The differential equation of the family of curves,  $x^2 = 4b(y+b)$ ,  
 $b \in \mathbb{R}$ , is: [Main - Jan. 8, 2020 (II)]

(a)  $x(y')^2 = x + 2yy'$

(b)  $x(y')^2 = 2yy' - x$

(c)  $xy'' = y'$

(d)  $x(y')^2 = x - 2yy'$

solution: (a)

Since,  $x^2 = 4b(y+b)$

$x^2 = 4by + 4b^2$

$2x = 4by'$

$\Rightarrow b = \frac{x}{2y'}$

So, differential equation is

$x^2 = \frac{2x}{y'} \cdot y + \left(\frac{x}{y'}\right)^2$

$x(y')^2 = 2yy' + x$