7) The differential equation representing the family of curves $y^2 = 2c(x+\sqrt{c})$, where c is a positive parameter, is of

(a) order 1 (b) order 2 (c) ~~order~~ degree 3 (d) degree 4 [1999 -3 Marks]

Solution: (a, c) $y^2 = 2c(x+\sqrt{c}) = 2yy_1 = 2c \Rightarrow c = yy_1$,

Eliminating c, we get

$$y^2 = 2yy_1(x+\sqrt{yy_1}) \text{ or } (y-2xy_1)^2 = 4yy_1^3$$

It involves only 1st order derivative, its order is 1 but its degree is 3 as y_1^3 is there.