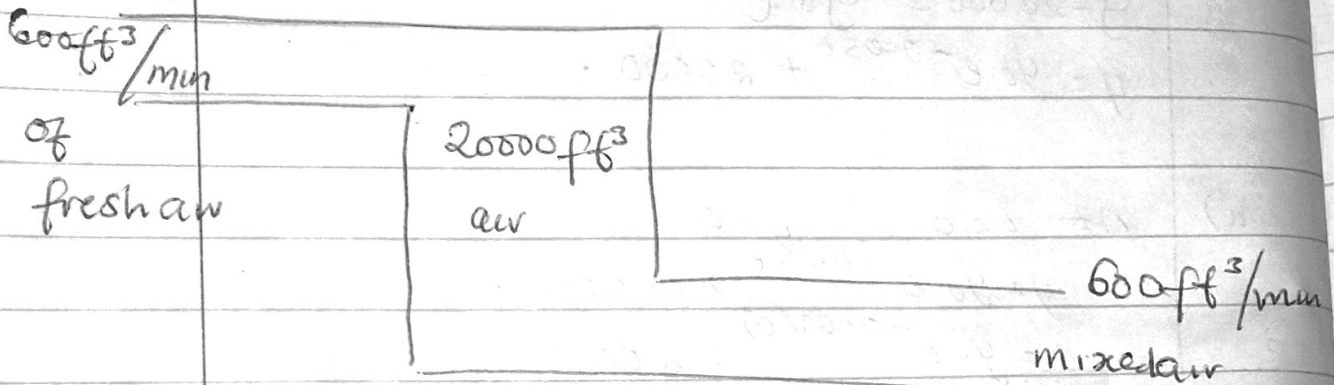


OKOLOCHA RENEALD 940

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$$\frac{dy}{dt} = y_{in} - y_{out}$$

$$= 600 - \frac{600}{20000} \times y$$

$$\frac{dy}{dt} = 600 - 0.03y$$

$$\frac{dy}{dt} = -0.03(y - 20000)$$

$$\int \frac{dy}{(y - 20000)} = \int -0.03 dt$$

$$\ln(y - 20000) = \mathbb{R} - 0.03t + C$$

$$y - 20000 = e^{-0.03t + C}$$

$$y - 20000 = y_0 e^{-0.03t}$$

$$y = 20000 + y_0 e^{-0.03t}$$

①  $t = 0, y = 0$

$$0 = 20000 + y_0 e^0$$

$$y_0 = -20000$$

$$y = 20000 - 20000 e^{-0.03t} \leftarrow \text{Particular solution}$$

②  $90\% \times 20000 = 18000$

$$y = 18000$$

$$18000 = 20000 - 20000 e^{-0.03t}$$

$$-2000 = -20000 e^{-0.03t}$$

$$0.1 = e^{-0.03t}$$

$$\ln(0.1) = \mathbb{R} - 0.03t$$

$$t = \frac{\ln(0.1)}{-0.03} = 76.8 \text{ hrs}$$

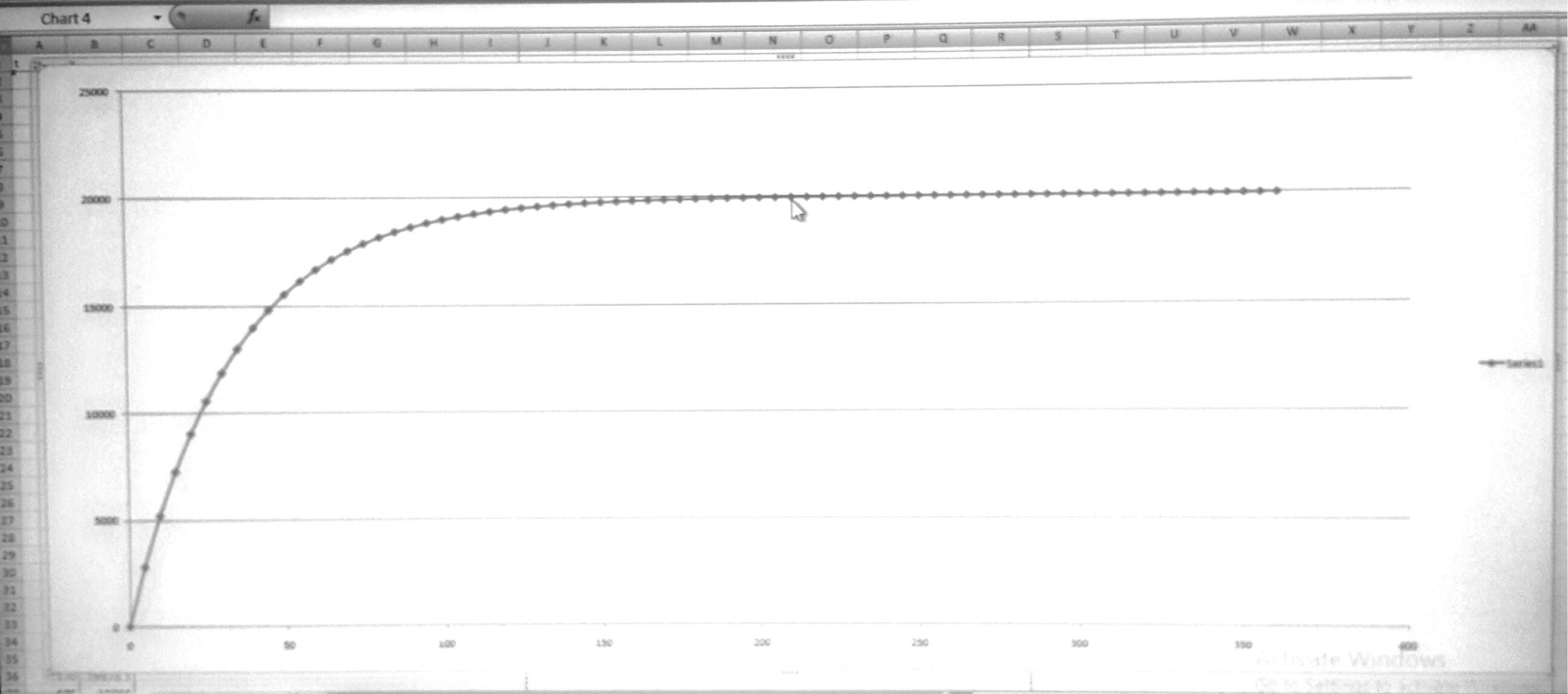
Book1 - Microsoft Excel

Chart Tools: Design, Layout, Format

View: Design, Layout, Format

Ruler     Formula Bar  
 Gridlines     Headings  
 Message Bar

Zoom 100%    Zoom to Selection  
 New Window    Arrange All    Freeze Panes  
 Split    Hide    Unhide  
 View Side by Side    Synchronous Scrolling    Reset Window Position  
 Save Workspace    Switch Windows    Macros



1] The steady state value is when, the curve starts turning inward,  $(210, 20000)$