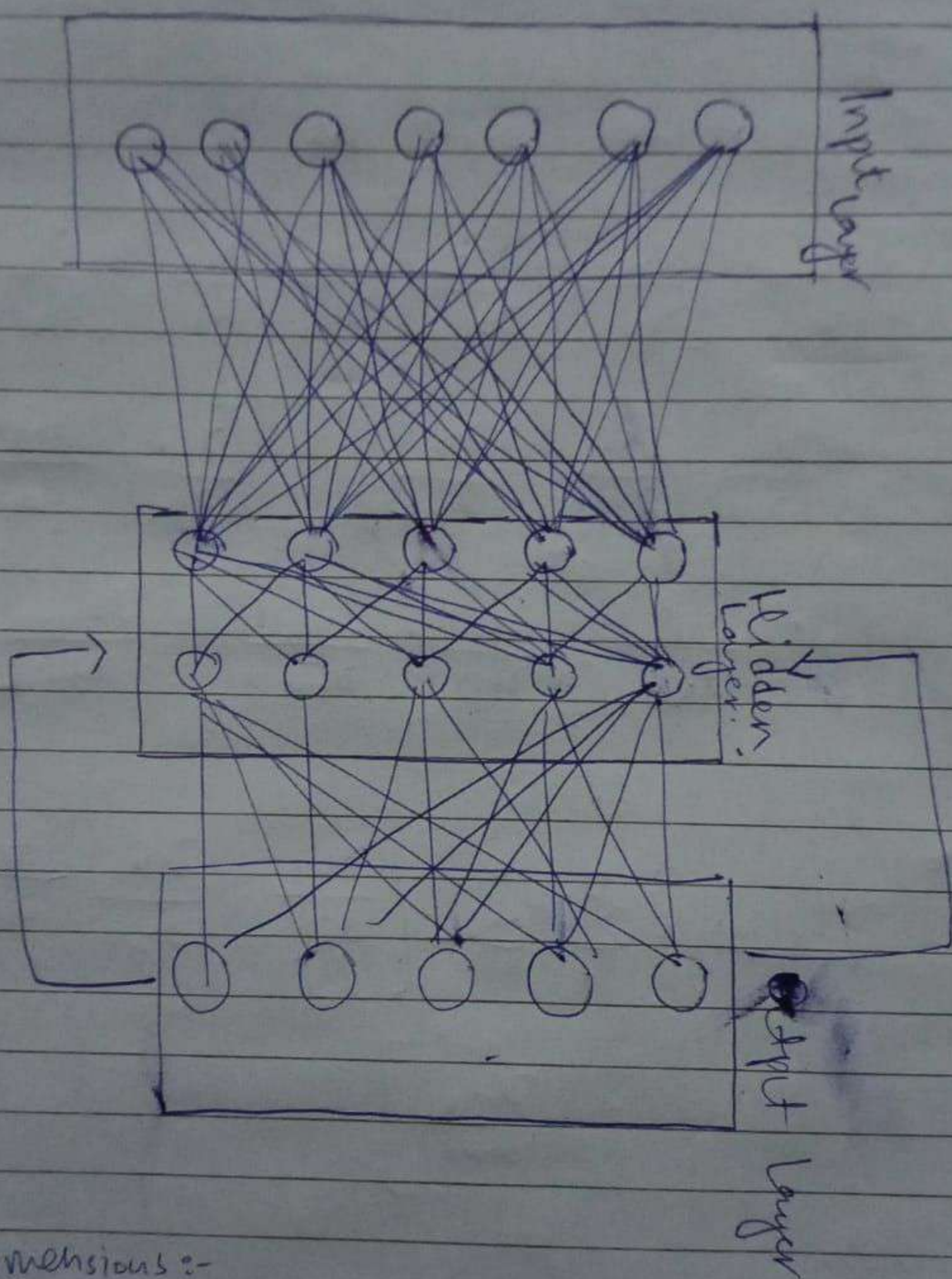


P1

RNN

21L-7276

Hamza
Mustafa



• Dimensions:-

$$x : 7 \times 1$$

$$w_x : 5 \times 7$$

$$h : 5 \times 5$$

$$w_y : 7 \times 5$$

Q#2

Solution:

→ Chain Rule w.r.t w_h

$$\frac{\partial E_t}{\partial w_h} = \left[\frac{\partial E_t}{\partial y_t} \cdot \frac{\partial \hat{y}_t}{\partial z_t} \cdot \frac{\partial z_t}{\partial h_t} \cdot \frac{\partial h_t}{\partial w_h} \right] + \left[\frac{\partial L_t}{\partial \hat{y}_t} + \frac{\partial \tilde{y}_t}{\partial u} \right]$$

$$\left[\frac{\partial z_t}{\partial h_t} \cdot \frac{\partial h_t}{\partial h_{t-1}} \cdot \frac{\partial h_{t-1}}{\partial w_h} \right]^+ \dots \left[\frac{\partial L_t}{\partial \hat{y}_t^n} \cdot \frac{\partial \hat{y}_t^n}{\partial z_t} \right]$$

$$\cdot \left[\frac{\partial z_t}{\partial h_t} \cdot \frac{\partial h_t}{\partial h_{t-1}} \cdot \frac{\partial h_{t-1}}{\partial h_{t-n}} \cdot \frac{\partial h_{t-n}}{\partial w_h} \right]$$

*

$$\frac{\partial E_{total}}{\partial w_h} = \sum_{t=1}^n \sum_{k=1}^n \left[\frac{\partial L_t}{\partial \hat{y}_t} \cdot \frac{\partial \hat{y}_t}{\partial z_t} \cdot \frac{\partial z_t}{\partial h_t} \cdot \frac{\partial h_t}{\partial w_h} \right]$$

$$\cdot \left[\frac{\partial L_{t-k}}{\partial w_h} \right]$$