MAXIMUM POWER TRANSFER THEOREM :

$$I = \frac{V}{R_L + R_{TH}}$$

Power is maximum, when slope is zero.

$$P = I^2 R = \left(\frac{V}{R_L + R_{TH}}\right)^2 R_L = V^2 \left(\frac{1}{(R_L + R_{TH})^2}\right) R_L$$

$$\frac{dP}{dR_L} = V^2 \left[\frac{(R_L + R_{TH})^2 (1) - R_L\, 2 (R_L + R_{TH})}{(R_L + R_{TH})^4}\right] = 0$$

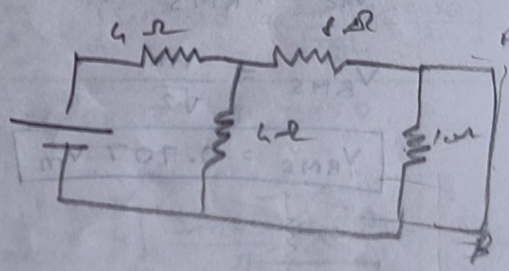
$$= V^2 \left[\frac{1}{(R_L + R_{TH})^2} - 2 R_L \left(\frac{1}{(R_L + R_{TH})^3}\right]\right. = 0$$

$$\frac{1}{(R_L + R_{TH})^2} = \frac{2 R_L}{(R_L + R_{TH})^3}$$

$$2 R_L = R_L + R_{TH}$$

$$2 R_L - R_L = R_{TH}$$

$$\boxed{R_L = R_{TH}}$$



$$20 - 4i_1 - 4(i_1 - i_2) = 0$$

$$-8i_2 - 10i_2 - 4(i_2 - i_1) = 0$$

$$-8i_2 - 10(i_2 - i_3) - 4(i_2 - i_1) = 0.$$

$$-10(i_3 - i_2)$$