

Parma:

$$4) W = QV = 16C(3V)$$

$$W = 48J$$

$$15) T_K = 20 + 273 = 293$$

$$K = 11.600/n = 11.600/2$$

$$K = 5800$$

$$I_D = I_S \left( \frac{KVP}{e^{T_K} - 1} \right) \Rightarrow 50 \times 10^{-9} \left( \frac{5800 \times 0,6}{e^{293} - 1} \right)$$

$$\Rightarrow 50 \times 10^{-9} (e^{11,877} - 1) = 7.197 \text{ mA}$$

28)

$$a) r_d = \frac{\Delta V_D}{\Delta I_D} = \frac{0,79V - 0,76V}{15 \text{ mA} - 5 \text{ mA}} = \frac{0,03V}{10 \text{ mA}} = 3 \Omega$$

$$b) r_d = \frac{26 \text{ mV}}{I_D} = \frac{26 \text{ mV}}{10 \text{ mA}} = 2,6 \Omega$$

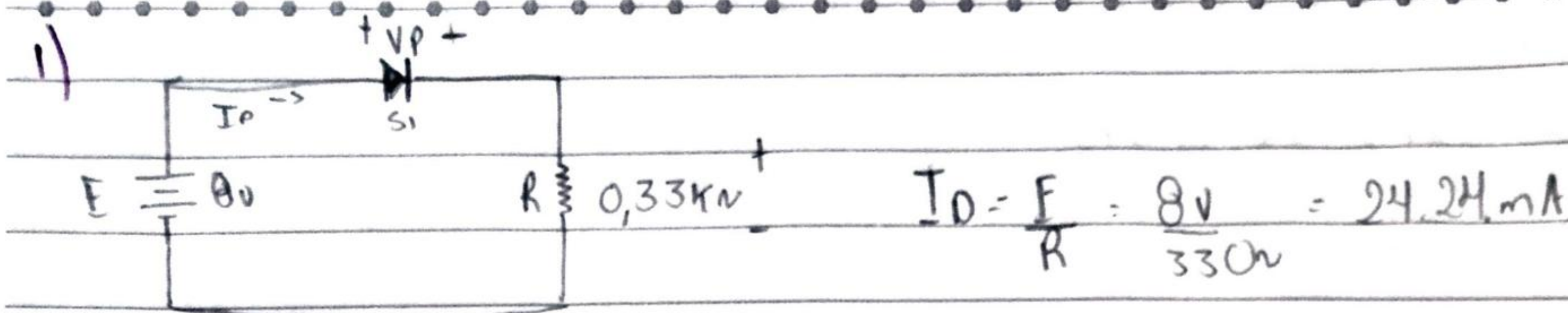
29)

$$I_D \Rightarrow 10 \text{ mA}, V_D = 0,76V$$

$$R_{DC} = \frac{V_D}{I_D} = \frac{0,76V}{10 \text{ mA}} = 76 \Omega$$

$$r_d = \frac{\Delta V_D}{\Delta I_D} \approx \frac{0,79V - 0,76V}{15 \text{ mA} - 5 \text{ mA}} = \frac{0,03V}{10 \text{ mA}} = 3 \Omega$$

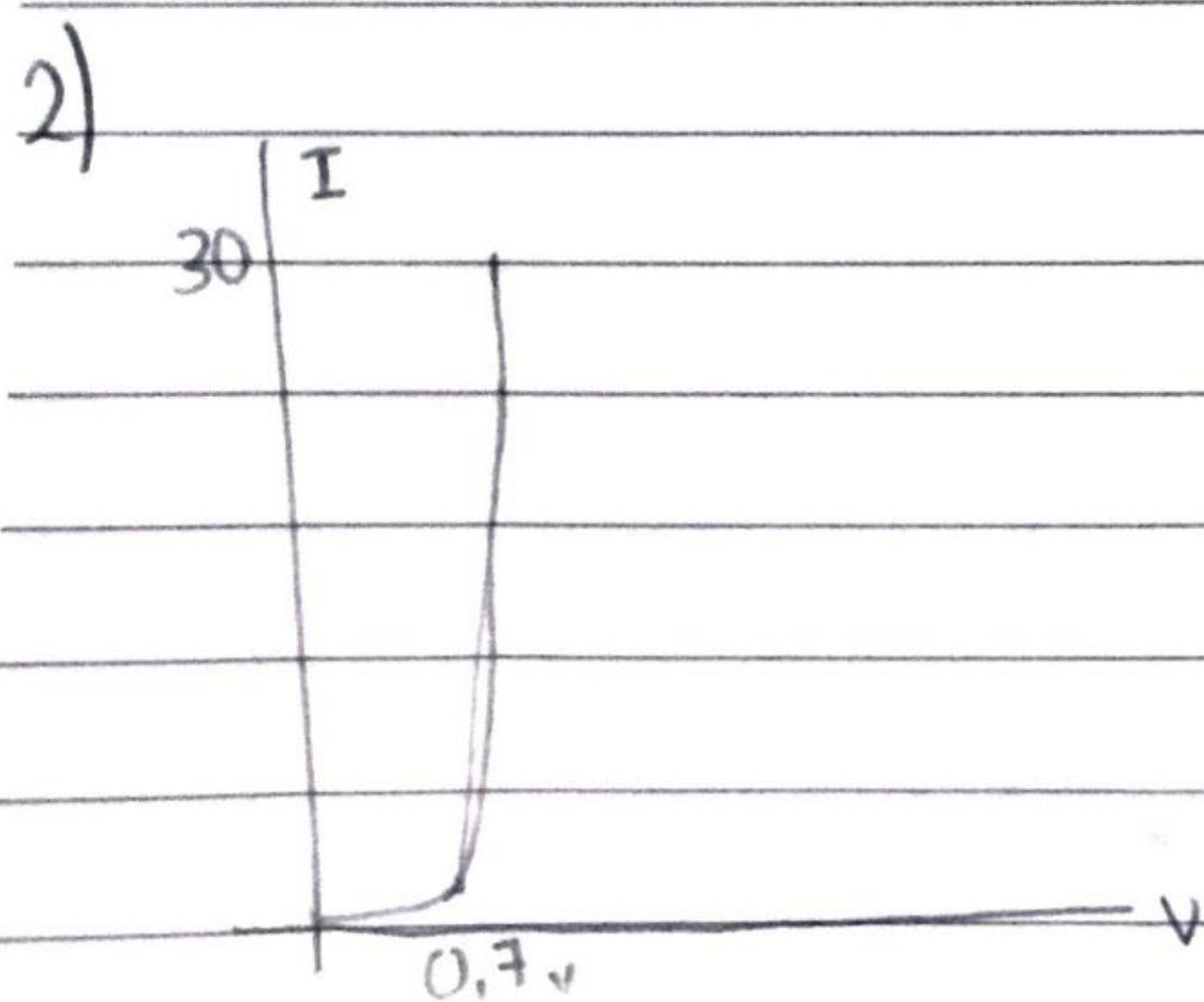




a)  $V_{DQ} = 0,92V$   
 $I_{DQ} = 21,5mA$   
 $V_R = E - V_{DQ} = 8V - 0,92V = 7,08V$

b)  $V_D = 0,7V$   
 $I_D = 22,2mA$   
 $V_R = E - V_D = 8V - 0,7V = 7,3V$

c)  $V_D = 0V$   
 $I_D = 24,24mA$   
 $V_R = E - V_D = 8V - 0V = 8V$



a)  $I = \frac{E}{R} = \frac{5V}{2,2k\Omega} = 2,27mA$

$V_D = 0,7V, I_D = 2mA$

b)  $I_D = \frac{5V}{0,47k\Omega} = 10,64mA$

$V_D = 0,8V, I_D = 9mA$

c)  $I_D = \frac{5V}{0,18k\Omega} = 27,78mA$

$V_D = 0,93V$   
 $I_D = 22,5mA$

c =

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