

$$Q2) D = 0.1 \quad \frac{N_1}{N_2} = 3$$

a)

$$\Delta_2 = D \frac{V_d}{V_{oe}} \frac{L_m}{L_m + L_l} \quad V_{oe} = \frac{N_1}{N_2} V_o \Rightarrow V_o = \frac{D V_d}{\frac{N_1}{N_2} \Delta_2} \frac{L_m}{L_m + L_l} = \boxed{8.79 V}$$

$$b) \Delta_1 = \frac{D V_d}{V_2 - V_{oe}} \frac{L_l}{L_m + L_l} \quad V_{oe} = 26.4 V \Rightarrow \boxed{V_2 = 103 V}$$

$$c) i_{peak} = \frac{D T_s V_d}{L_m + L_l} \quad P_z = \frac{1}{2 T_s} (i_{peak})^2 L_l \left(\frac{V_2}{V_2 - V_{oe}} \right) = \boxed{0.637 W}$$

$$d) I_d = \frac{i_{peak}}{2} \quad V_{A2d} = V_{o2} + P_z$$

$$I_A = 0.03 A \Rightarrow V_{A2d} = 6.15 W$$

$$V_{o2d} = V_{A2d} - P_z = 5.52 W$$

$$I_o = \frac{5.52 W}{V_o} = 0.63 A \quad \boxed{R = \frac{V_o}{I_o} = 13.95 \Omega}$$

$$Q1) i_L(0) = 0.7 A \quad \tau = \frac{L}{R} = 10^{-4}$$

$$a) \text{ for } 0 < t < 20 \mu s \quad i_L(t) = 12 - 11.3 e^{-10^4 t} \Rightarrow i_L(20 \mu s) = 7.35 A$$

$$\text{for } 20 \mu s < t < 40 \mu s \quad i_L(t) = \frac{-V_{D1}}{R} - 0.8 \quad i_{L, \text{peak}} = 7.35 A$$

$$\text{in PDS: } i_L(t) = -0.8 + 3.55 e^{-10^4 (t - 20 \mu s)}$$

$$i_L(0) = i_L(40 \mu s) = 0.7 A$$

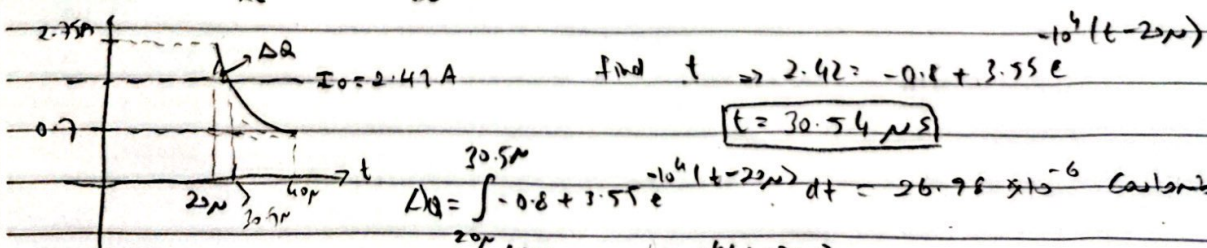
$$\Rightarrow S \text{ ON: } \sqrt{L} = V_d - \overset{0.7}{i_L(0)} \cdot R = 11.2 V \quad 11.2(0.5) + (12 - V_o)0.5 = 0$$

$$\Rightarrow S \text{ OFF: } \sqrt{L} = V_d - \underset{-0.8}{i_L(20 \mu s)} - 0.8 - V_o \quad \boxed{V_o = 23.3}$$

$$b) i_{D1} = i_{L, \text{OFF}} = i_L(t) = -0.8 + 3.55 e^{-10^4 (t - 20 \mu s)} \quad \text{for } 20 \mu s < t < 40 \mu s$$

$$i_{D, \text{average}} = \frac{1}{T_{\text{off}}} \int_{20 \mu s}^{40 \mu s} -0.8 + 3.55 e^{-10^4 (t - 20 \mu s)} dt = 2.42 A$$

$$i_{D, \text{avg}} = I_o \Rightarrow \frac{V_o}{R_L} \Rightarrow R_L = \frac{V_o}{I_o} = \boxed{9.59 \Omega}$$



$$\text{find } t \Rightarrow 2.42 = -0.8 + 3.55 e^{-10^4 (t - 20 \mu s)} \Rightarrow \boxed{t = 30.54 \mu s}$$

$$Q = \int_{20 \mu s}^{40 \mu s} -0.8 + 3.55 e^{-10^4 (t - 20 \mu s)} dt = 26.78 \times 10^{-6} \text{ Coulombs}$$

$$i_{D1} \times R_{ESR, \text{AVG}} = \frac{1}{20 \mu s} \int_{20 \mu s}^{40 \mu s} -0.8 + 3.55 e^{-10^4 (t - 20 \mu s)} dt = I_o = 2.42 A$$

$$\Delta V_{ESR} = 0.01 \times 2.42 = 0.0242 V$$