INPUT

V_D

COMPARATOR

$\varepsilon = V_D - V_H$

CONTROLLER

K_1

$I = \varepsilon K_1$

CONTROLLED ELEMENT

K_0

$T_0 = K_0 I$

T_0

DETECTING ELEMENT

K_t

$V_t = K_t T_0$
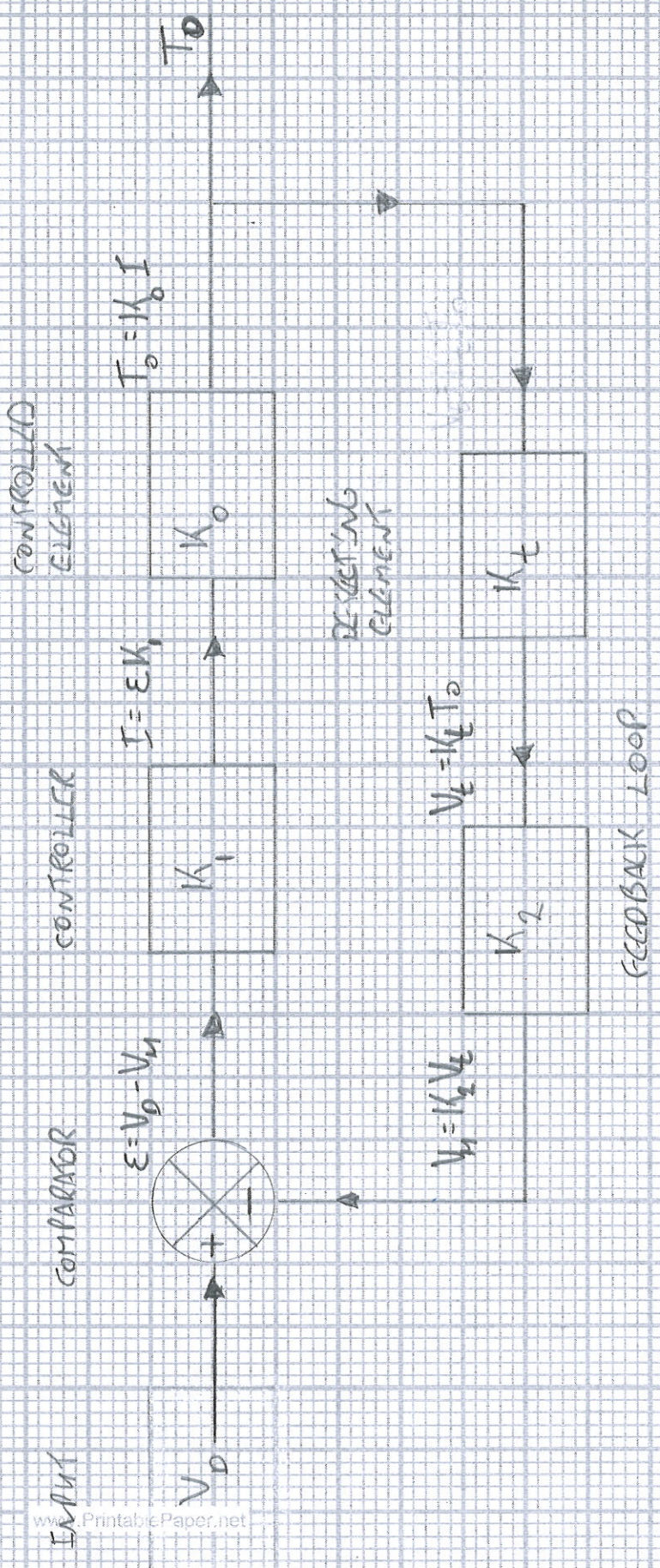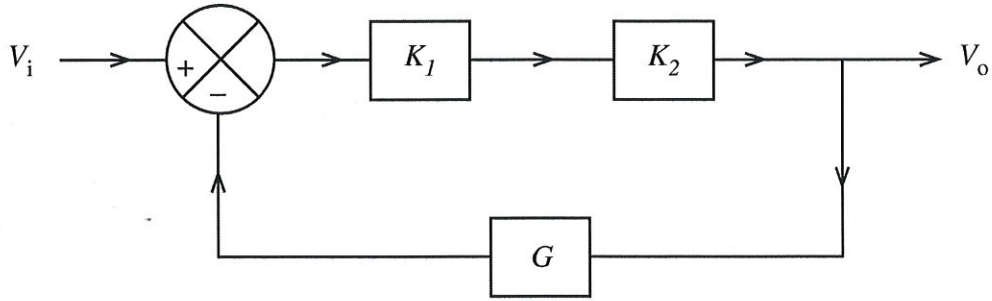
K_2

$V_H = K_2 V_t$

FEEDBACK LOOP

5.

FIG. 4

Derive the closed loop transfer functions for the system shown in FIGURE 4 and show that for large values of G the value of $\dfrac{V_o}{V_i}$ approaches unity.

6. FIGURE 5 shows an electrically heated oven and its associated control circuitry. The current, I, to the oven's heating element is fed from a voltage-controlled power amplifier such that $I = \varepsilon K_1$. A voltage, V_D, derived from a potentiometer, sets the desired oven temperature, T_D. The oven temperature is measured using a thermocouple that, for simplicity, is assumed to generate a constant emf of 10 μV per degree Celsius. The effect of the ambient temperature is ignored.
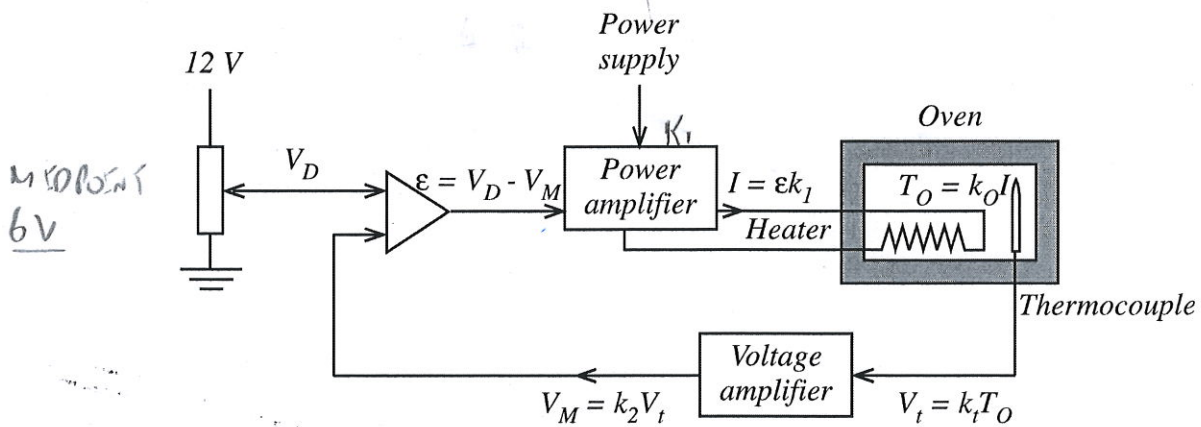

FIG. 5