<u>**Problem statement Mini Project, Analog IC Lab (ECP316)**</u>
**Two-Stage Operational Amplifier at 1 um technology.**

If $K_N' = 120\mu A/V^2$, $K_P' = 25\mu A/V^2$, $VTN = |VTP| = 0.5$, $\lambda n = 0.06V^{-1}$, and $\lambda p = 0.08V^{-1}$, Design a two-stage, CMOS op amp that meets the following specifications. Assume the channel length is to be 1μm and the load capacitor is $CL = 10pF$.

Note: For 1um design consider the standard model used in the lab.

$Av > 3000V/V$	$VDD = 2.5V$	$GB = 5MHz$	$SR > 10V/\mu s$
60° phase margin	0.5V<$Vout$ range < 2V	$ICMR = 1.25V$ to 2V	$Pdiss$ 2mW

The useful formula and tentative circuit diagram for calculation unknown parameters is described below:
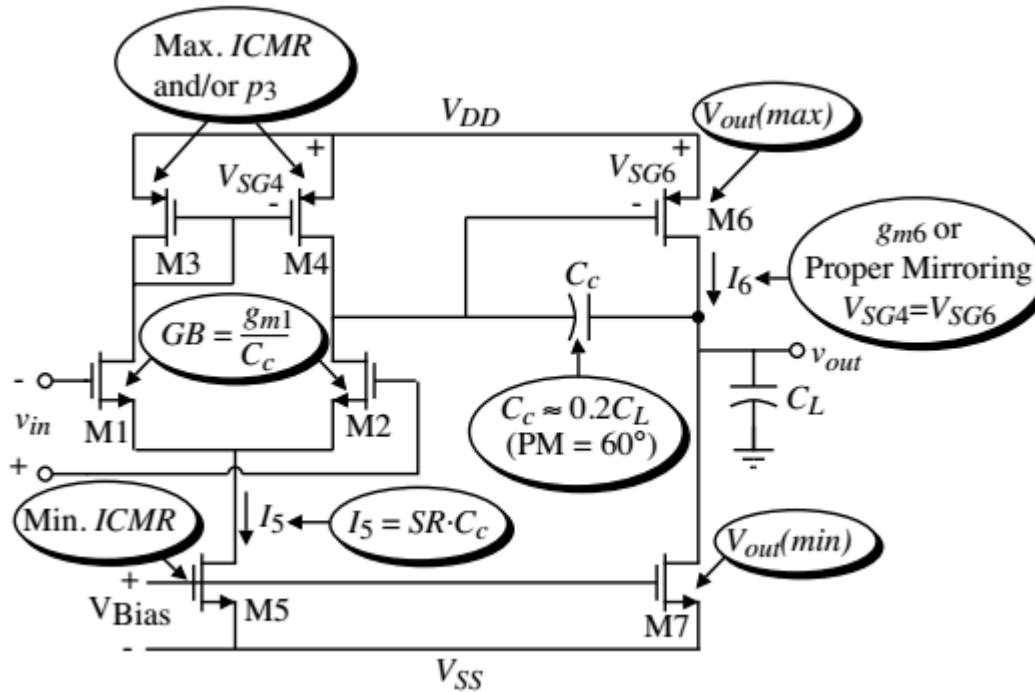
(A) Calculate sizing of each transistor and mention the values in the final circuit.

(B) AC Response (dB vs Frequency)

(C) Transient Response

(D) Prepare the table for obtained simulated results vs given specification.