

**COE360 – Assignment # 5**  
**Dr. M. Elrabaa (051)**

Q1)

1. Design an NMOS inverter such that  $V_{OL} = 0.5V$ ,  $V_{OH} = 5V$  and the average DC power is 1.25mW.
2. If this inverter has a Fan out of three and a total wiring capacitance at the output of 50 fF, calculate its average propagation delay.
3. Calculate the input frequency at which the DC power will equal the dynamic power.

**Q2) Implement the following function in CMOS using minimum number of logic levels:**

$$F = (A + \bar{B}) \cdot C + D \cdot E$$

**Q3) Re-do Q2 above but with minimum number of transistors and assuming that the inputs are available as true and complement.**

**Q4) Complete the schematic of the CMOS circuit below (only the PMOS block is shown) and specify the Boolean function implemented by this gate using standard naming convention.**



