BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M.TECH. **SEMESTER : II**
BRANCH: ECE **SESSION : SP/2024**

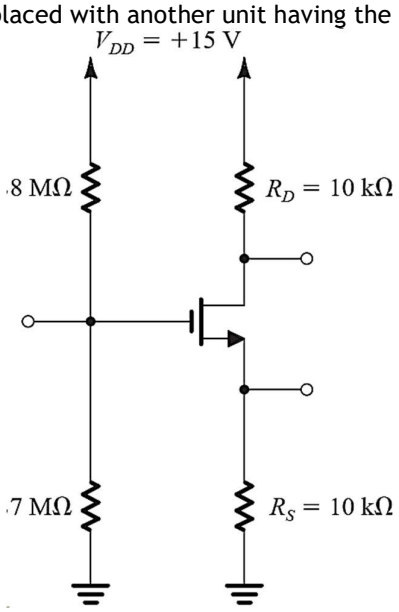
SUBJECT: EC581 ANALOG VLSI DESIGN

TIME: 3 Hours **FULL MARKS: 50**

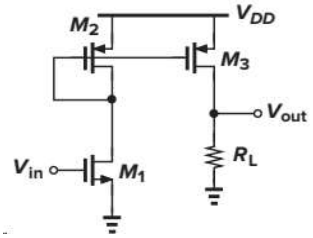
INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Determine the voltage gain for a CS Stage with Source Degeneration. [5]

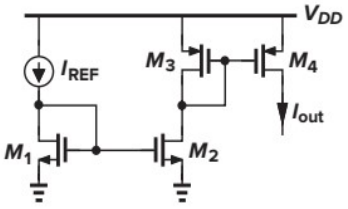
Q.1(b) It is required to design the circuit of Figure to establish a dc drain current I_D = 0.5 mA. The MOSFET is specified to have V_t = 1 V and for simplicity, neglect the channel-length modulation effect (i.e., assume λ = 0). Use a power-supply V_{DD} = 15 V. Calculate the percentage change in the value of I_D obtained when the MOSFET is replaced with another unit having the same but V_t = 1.5 V. [5]



Q.2(a) Calculate the small-signal voltage gain of the circuit shown in figure. [5]



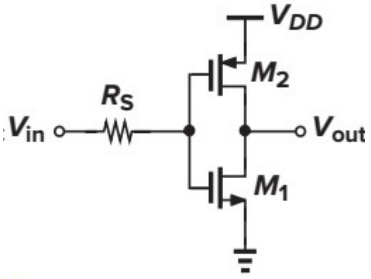
Q.2(b) Determine the drain current of M4 if all of the transistors are in saturation and W/L ratio is different for every transistor. [5]



PTO

Q.3(a) Determine the voltage gain of a Common Gate amplifier for high frequency application. [5]

Q.3(b) Determine the transfer function of the complementary CS stage shown in figure. [5]

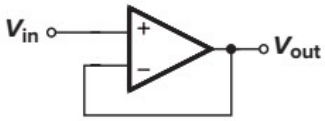


Q.4(a) Find out common-mode to differential-mode conversion ($A_{CM\text{-}DM}$) due to g_m mismatch for differential amplifier. [5]

Q.4(b) Determine ($V_{out1} - V_{out2}$) as a function of ($V_{in1} - V_{in2}$) for MOS differential pairs. [5]

Q.5(a) Draw and explain differential input-output characteristics of a MOS differential pair. [5]

Q.5(b) Calculate the input common-mode voltage range and the closed-loop output impedance of the unity-gain buffer depicted in figure. [5]



:::::23/04/2024 E:::::