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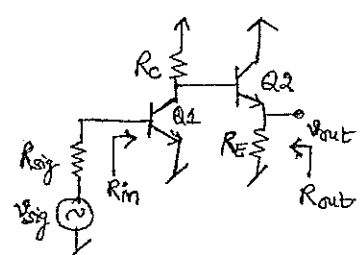
Degree: B.Tech. Semester: 3rd — Course work
MID-SEMESTER EXAMINATION, September, 2024

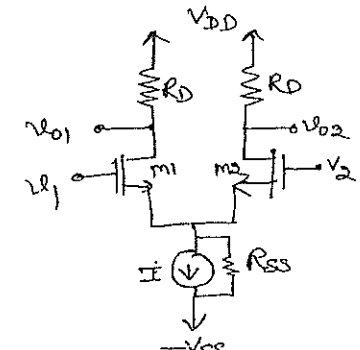
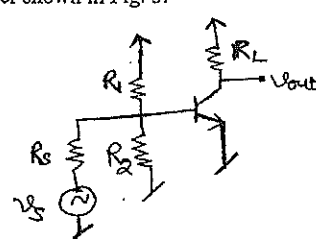
Course Title: Microelectronics Circuits and Applications
Course Code: ECECC304

Duration: 1:30 Hours

Max. Marks: 20

Note: - Attempt all questions in the given order only. Missing data/information (if any), maybe suitably assumed & mentioned in the answer.

Q. No.	Question	Marks	CO
1a	For the multistage amplifier shown in Fig. 1, draw its small signal equivalent circuit and Find the expressions for A_v , R_{in} and R_{out} . Consider $V_A = \infty$.	3	CO1
			
	Fig. 1		
1b	Draw the circuit of BJT based Darlington pair and discuss its advantages.	1	CO1
2a	Draw the circuit diagram of a BJT-based differential amplifier and derive the expression for the large signal collector currents (I_{C1} & I_{C2}) of both BJTs. Additionally, plot the graph of differential voltage versus collector currents for the same.	3	CO1
2b	Define CMRR and how it can be improved in case of single ended output?	1	CO1
3a	The MOS amplifier shown in Fig. 2 has $g_m = 4\text{mS}$ and $V_A = \infty$. If $ A_{DM} = 100$ and $\text{CMRR} = 80\text{dB}$, find R_{SS} and R_D .	3	CO1

			
	Fig. 2		
3b	State and prove Miller's theorem.	1	CO1
4a	Derive the expressions for approximate high cut-off frequency for the CE amplifier shown in Fig. 3.	3	CO2
			
	Fig. 3		
4b	Draw the 4-terminal high frequency model of MOSFET showing all parasitic capacitances.	1	CO2
5a	Draw the Bode plots for magnitude and phase response for the transfer function given below: $H(s) = \frac{50(s+40)}{(s+20)(s+60)}$	3	CO2
5b	Draw the BJT based differential amplifier circuit of differential to single ended converter using active load and give the expression of A_{DM} .	1	CO1

GOOD LUCK