VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE

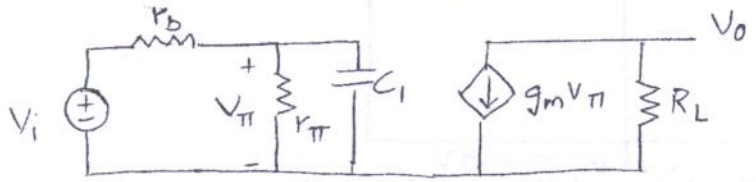
[Central Technological Institute, Maharashtra State]

Matunga, Mumbai-400 019

SEMESTER EXAMINATION	*May 2012*	DATE OF EXAM	21/05/2012
SEMESTER & PROGRAM	*IV SYBTech EC/EXTC*	TIME	1.30 - 4.30 pm
TIME ALLOWED	*3 HRS.*	MARKS	*100*
COURSE (CourseCode) :	ECAD II		

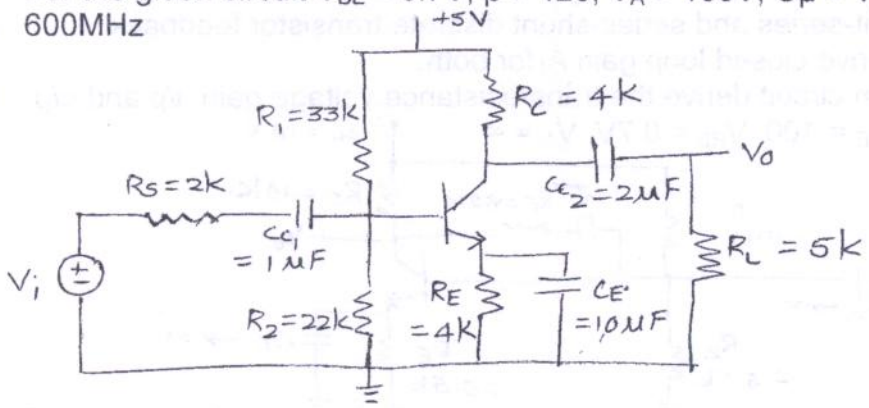
Instructions: 1. Attempt All questions.
2. **Figures** to the **right** indicate **Full Marks.**
3. Assume suitable **additional data,** if required.
4. Illustrate your answer with neat sketches whenever necessary.

Q1. a) For the hybrid – π equivalent circuit given below: **10**



i)Derive the expression for the voltage gain transfer function
ii)If the transistor is biased at I_{CQ} = 1 mA and if R_L = 4kΩ and β_o = 100 determine the midband voltage gain for a) r_b = 100Ω and b) r_b = 500Ω
iii)For C_1 = 2.2pF, determine the -3dB frequency for the two above values of r_b

b) For the given circuit V_{BE} = 0.7V, β = 120, V_A = 100V, Cμ = 1pF, and f_T = 600MHz **10**

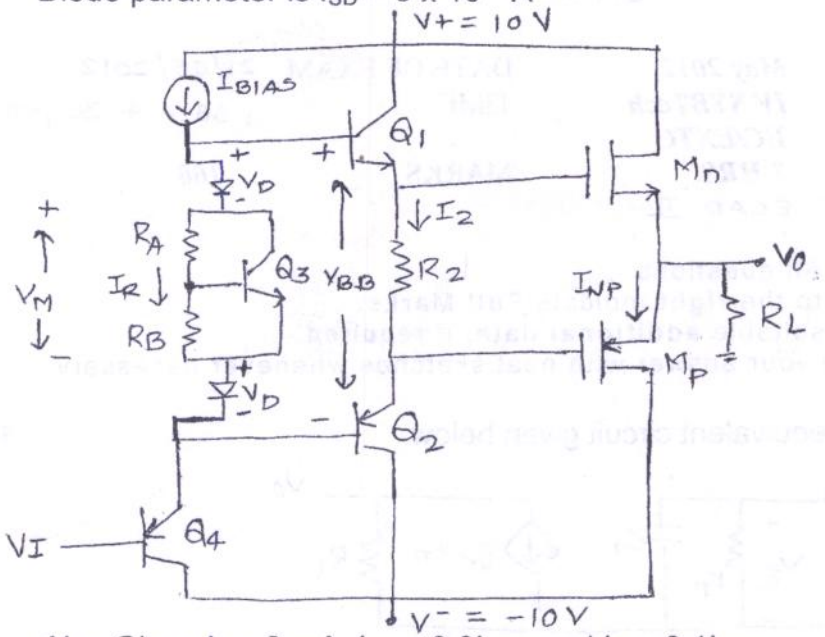


i)Determine C_π and the equivalent Miller Capacitance C_M. State any approximations or assumptions that you make.
ii)Find the upper 3 dB frequency and the midband voltage gain

Q2. Design the output stage configuration below. The current I_{BIAS} is 5mA and the zero output quiescent current in M_n and M_p is to be 0.5 mA. MOSFET parameters are V_{TN} = 0.8V, V_{TP} = -0.8V, $K_n = K_p$ = 5mA/V^2 and λ = 0. BJT parameters are $I_{S1} = I_{S2} = 10^{-12}$A, $I_{S3} = I_{S4} = 2 \times 10^{-13}$A, β = 150 **20**

P.T.O

Diode parameter is $I_{SD} = 5 \times 10^{-13}$A



Also Given $I_2 = 2$ mA, $I_{C3} = 0.9I_{BIAS}$ and $I_R = 0.1I_{BIAS}$
Find V_{GSN} ,V_{GSP} ,R_2 ,V_{BE1} ,V_{BE2} ,V_{BB} ,V_D ,V_M ,V_{BE3} ,R_B ,R_A ,V_{EB4} ,V_I

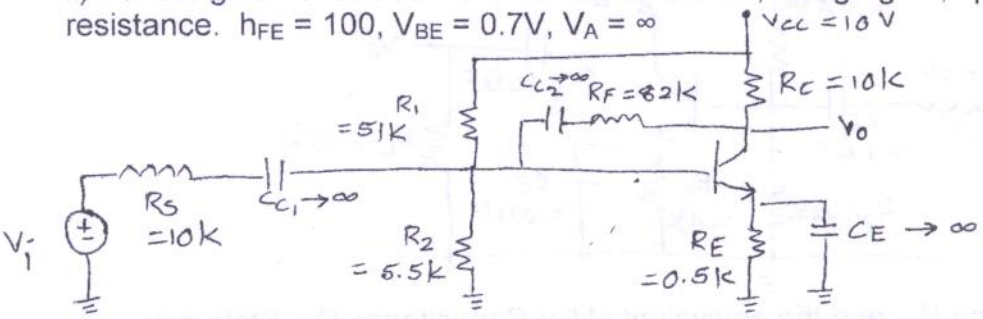
Q3. a) Derive the normalized DC transfer characteristics for BJT diffamp. **05**

b) Determine the maximum differential mode input signal that can be applied and still maintain linearity in the differential amplifier. **05**

c) Discuss Diff-Amp Frequency Response due to Differential-Mode Input Signal and Common-Mode Input Signal in detail **10**

Q4. a) i) Explain shunt-series and series-shunt discrete transistor feedback topologies. Derive closed loop gain A_f for both. **06**

ii) For the given circuit derive the transresistance,voltage gain, i/p and o/p resistance. $h_{FE} = 100$, $V_{BE} = 0.7$V, $V_A = \infty$ **10**



b) Explain with the help of an example the approach to derive the loop gain of discrete transistor circuits **04**

Q5. a) Explain the Barkhausen Criterion and working of the Phase-Shift Oscillator in detail **08**

b) For one sided output derive CMRR for MOSFET diffamp **08**

c) Explain inductively coupled power amplifier with circuit diagram and load line. **04**

— x — x —