VEERMATA JIJABAI TECHNOLOGICAL INSTITUTE

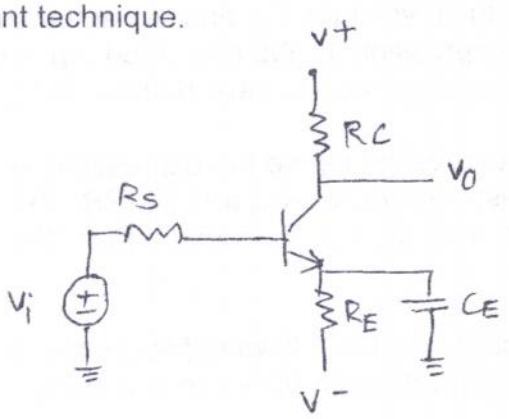
[Central Technological Institute, Maharashtra State]

Matunga, Mumbai-400 019

SEMESTER EXAMINATION	*2011*	DATE OF EXAM	16-7-11
SEMESTER & PROGRAM	*IV/S.Y.B.Tech Electronics*	TIME	2.30pm to 5.30pm
TIME ALLOWED	*3 HRS.*	MARKS	*100*
COURSE (CourseCode) :	*ECAD-II*		

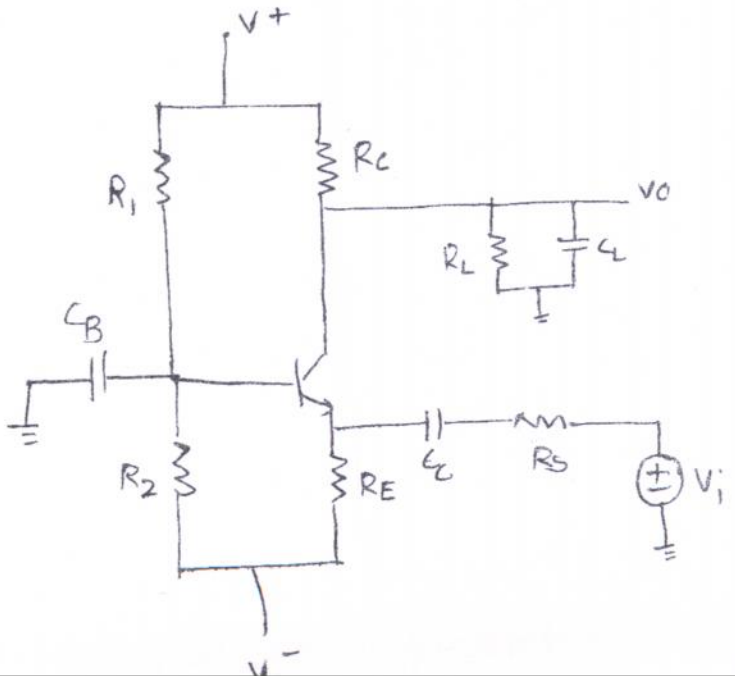
Instructions: 1. Attempt All questions.
2. **Figures** to the **right** indicate **Full Marks.**
3. Assume suitable **additional data,** if required.
4. Illustrate your answer with neat sketches whenever necessary.

Q1. a) Explain the advantages/disadvantages of using a bypass capacitor as shown in the circuit below. Derive the transfer function for this configuration and draw the magnitude bode plot. Do not use the time constant technique. **10**



b) For the above circuit, $R_E = 4k\Omega$, $R_C = 2k\Omega$, $R_s = 0.5k\Omega$, $C_E = 1\mu F$, V+/- = +/-5V, $\beta=100$, $r_o = \infty$. Find out V_{CEQ}, I_{CQ}, g_m, r_Π, and the time constants, corner frequencies and the voltage gain(s). **10**

Q2. a) For the common base circuit as shown below find out V_{CEQ}, I_{CQ}, g_m, r_Π, f_{HII} , $f_{H\mu}$ and the midband voltage gain. $R_1 = 40k\Omega$, $R_2 = 5.72k\Omega$, $R_E = 0.5k\Omega$, $R_C = 5k\Omega$, $R_s = 0.1k\Omega$, $R_L = 10k\Omega$, V+/- = +/-5V, $\beta = 150$, $V_A = \infty$, $C_\Pi = 35pF$, $C\mu = 4pF$. **10**



(P.T.O.)

b) For an op-amp connected in series-shunt configuration derive the expression for closed loop voltage gain and the equivalent input resistance. **10**

Q3. a) Calculate the practical efficiency for the common source circuit. V_{DD} = 10V, R_D= 5kΩ, K_n = 1mA/V^2, V_{TN} = 1V, λ=0. Assume o/p voltage swing limited to range between transition point and V_{DS} = 9V. **10**

b) Discuss class AB power amplifier with V_{BE} multiplier **05**

c) Determine P_{Dmax}, T_{case}, T_{sink}, given $\theta_{dev\text{-}case}$ = 1.75°C/W, $\theta_{case\text{-}sink}$ = 1°C/W, $\theta_{sink\text{-}amb}$ = 5°C/W, $\theta_{case\text{-}amb}$ = 50°C/W, T_{amb} = 30°C, T_{jmax} = T_{dev} = 150°C. Consider both cases: with a heat sink and without a heat sink. **05**

Q4. a) For a differential amplifier with i/p voltages V_{b1} and V_{b2} at the base of the two transistors, derive the expression for the one sided o/p in terms of A_d and A_{CM}. The current source is assumed to have resistance R_o. **10**

b) Using results from the above question derive the expression for CMRR. For the following values, find out A_d, A_{CM} and CMRR. V+/- = +/- 5V, I_Q = 0.8mA, R_C = 12kΩ, β = 100, V_A = ∞, R_o = 25kΩ, R_B = 0kΩ. The output is one sided. **10**

Q5. a) Discuss/explain mathematically how the following factors are affected by feedback: (i)Gain sensitivity (ii)Bandwidth (iii)Noise sensitivity (iv)Non linear distortion **08**

b) For a 2 stage CE amplifier, derive expression for loop gain and hence discuss stability of the circuit with the help of Bode plots. **08**

c) For the given loop gain, determine stability for β = 0.2 and β = 0.02 **04**

$$T(f) = \frac{\beta(100)}{\left(1 + j\frac{f}{10^5}\right)^3}$$