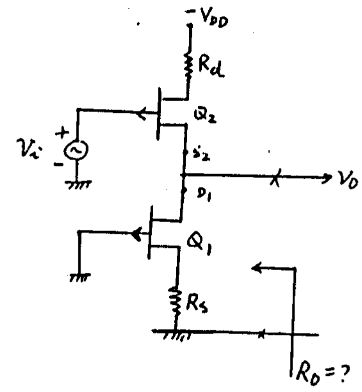
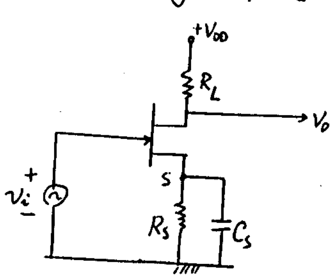
國立成功大學75學年度工程科學研究所考試(電子學試題) 共一頁 第一頁

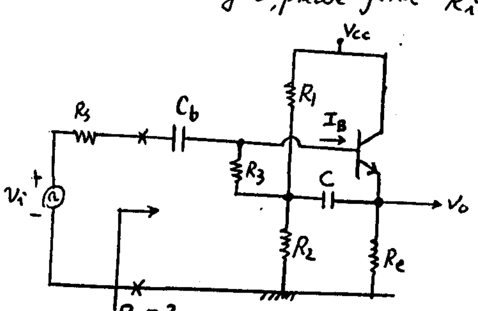
(一) In the following circuit, two FETs are identical with parameters μ, r_d and g_m. Please find $A_v \triangleq \frac{V_o}{V_i} = ?$ and output impedance $R_o = ?$



(二) For the circuit shown, please analyze the effect of a source bypass capacitor C_s on low frequency response.
Please find $A_v(s) \triangleq \frac{V_o(s)}{V_i(s)}$ and plot the idealized Bode magnitude plot.



(三) The following circuit is a bootstrapped emitter-follower.
Please use the approximate model of the transistor and neglect the reactances of capacitors.
(a) For dc-analysis, please find $I_B = ?$
(b) For ac-analysis, please find $R_i = ?$



(四) ‹i› For Fig.(a), please use the approximate model for the transistor to obtain the lower 3-dB frequency $f_L = ?$
‹ii› In Fig.(b), please find $A_v(s) \triangleq \frac{V_o(s)}{V_i(s)} = ?$
‹iii› please draw a complete circuit of astable multivibrator to generate an unsymmetrical square-wave.
‹iv› what is the circuit in Fig.(c)?
‹v› what is the circuit in Fig.(d)?

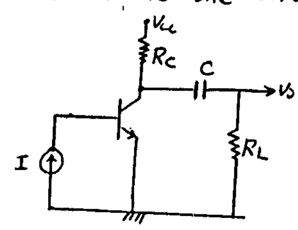


Fig.(a)

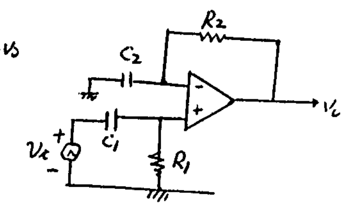


Fig.(b)

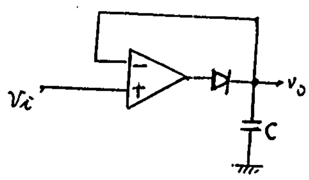


Fig.(c)

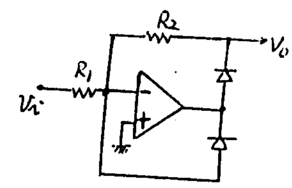


Fig.(d)

(五) ‹i› For Fig.(a), please find $R_i = ?$
‹ii› For Fig.(b), please verify that J-K flip-flop truth table is satisfied by the difference equation $Q_{n+1} = J_n \bar{Q}_n + \bar{K}_n Q_n$
where $Q_n \triangleq$ the present state
$Q_{n+1} \triangleq$ the next state

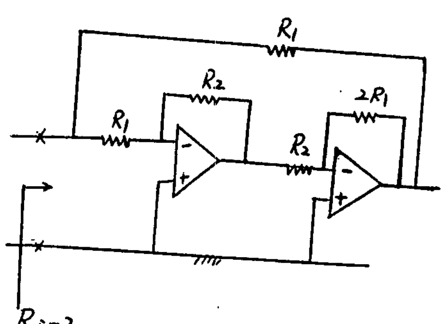


Fig.(a)

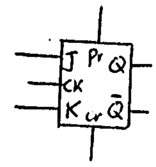


Fig.(b)