S.E. (EXTC) Sem IV (R) 21-05-09

Electronic Devices & Circuits - II 3 p.m. to 6 p.m

Con. 2580-09. **VR-3825**

(REVISED COURSE)

(3 Hours) **[Total Marks : 100**

N.B.: (1) Question Nos. **1** and **2** are **compulsory.**
(2) Attempt **three** questions from the remaining **five** questions.
(3) Assume suitable data if **necessary.**

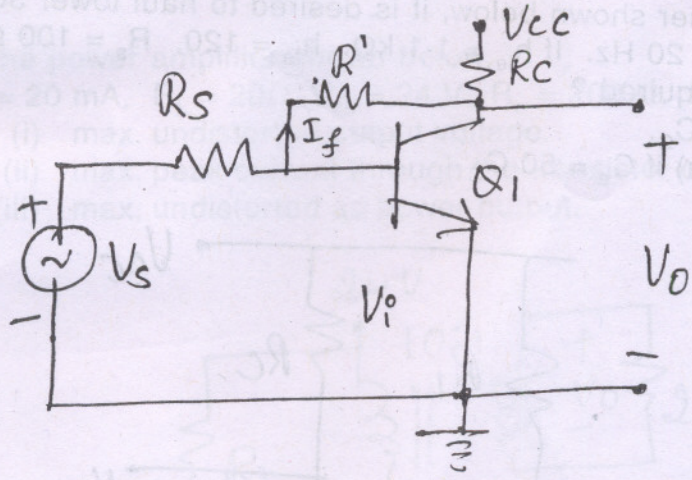
1. (a) Draw the low frequency model of a JFET and obtain expressions for the voltage gain, input impedance, output impedance in CS Amplifier. **10**
   (b) Show the effect of low frequency and high frequency on coupling and bypass capacitors. **10**

2. (a) For a cascaded amplifier, show that the overall lower 3 dβ frequency, **10**

$$f_{LT} = \frac{f_L}{\sqrt{2^{1/n} - 1}} \text{ and } f_{HT} = f_H \sqrt{2^{1/n} - 1} \text{ with n stages.}$$

   (b) A differential amplifier has a differential gain 50 dβs, CMRR = 75 dβs. **10**
   V_{s1} = 15 mv. V_{s2} = 10 mv. Find error voltage and % error in the output voltage.

3. (a) The following circuit has the parameters. R_c = 4 kΩ. R' = 40 kΩ, R_s = 10 kΩ, **12**
   h_{ie} = 1·1 kΩ. h_{fe} = 50, $h_{re} = h_{oe}$ = 0.
   Find A_{vf}, R_{if} , R_{of} , R_{if}', R'_{of}



   (b) Explain the various feedback topologies. **8**

4. (a) Derive an expression for the frequency of oscillation of a transistorized RC phase-shift oscillator. **12**
   (b) A class A transformer coupled circuit is to deliver a maximum power of 6W to 4 Ω load. V_{CC} = 25 V. V_{min} = 0. Find, **8**

   (i) Transformer turn ratio (n) = $\frac{N_1}{N_2}$
   (ii) Peak collector current I_m.
   (iii) Q (I_C, V_{CE})
   (iv) Conversion efficiency.

5. (a) Explain the operation of a Schmitt Trigger with a neat sketch. **10**

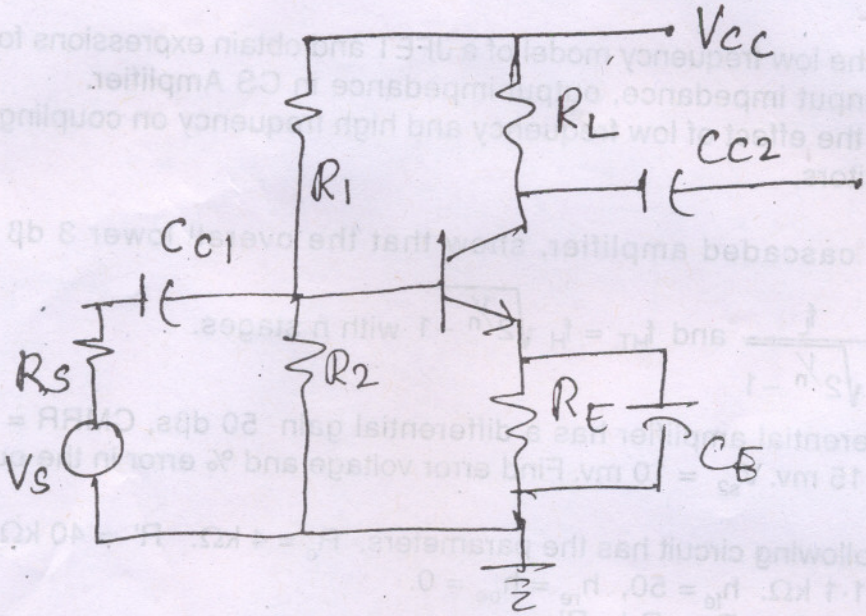
   (b) Design a phase shift oscillator using FET having a $g_m = 5000\ k\mho$. $r_d = 40k\Omega$, and a FB circuit of R = 10 kΩ. Frequency of oscillation is 1 KHz. **10**

6. (a) For the following circuit, V_{cc} = 12 V. R_L = 4·7 kΩ, R_E = 1 kΩ, R_1 = 15 kΩ, R_2 = 2·2 kΩ, R_s = 600 Ω. h_{fe} = 100, h_{ie} = 1K. Find,

(i) Calculate mid frequency voltage gain $\frac{V_0}{V_s}$ and $\frac{V_0}{V_i}$

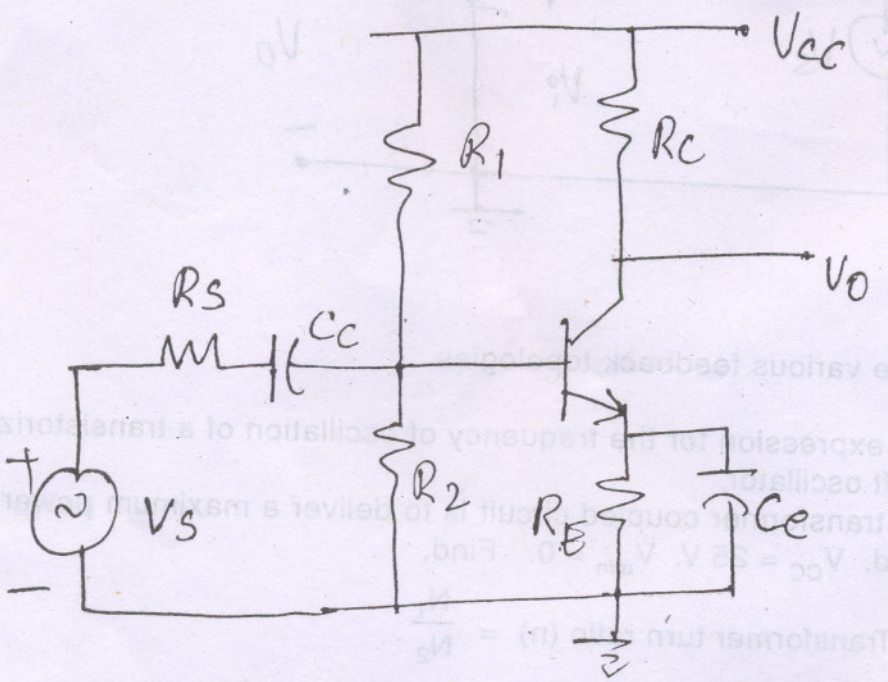
(ii) Calculate the size of bypass capacitor if f_L = 50 Hz.

(iii) Calculate the size of coupling capacitor if f_L = 50 Hz.



(b) For the amplifier shown below, it is desired to haul tower 3dβ frequency of not more than 20 Hz. If h_{ie} = 1·1 kΩ. h_{fe} = 120, R_s = 100 Ω. What is the value of C_C required ?
Assume $C_e = C_C$.

(b) Repeat part (a) if C_e = 50 C_C

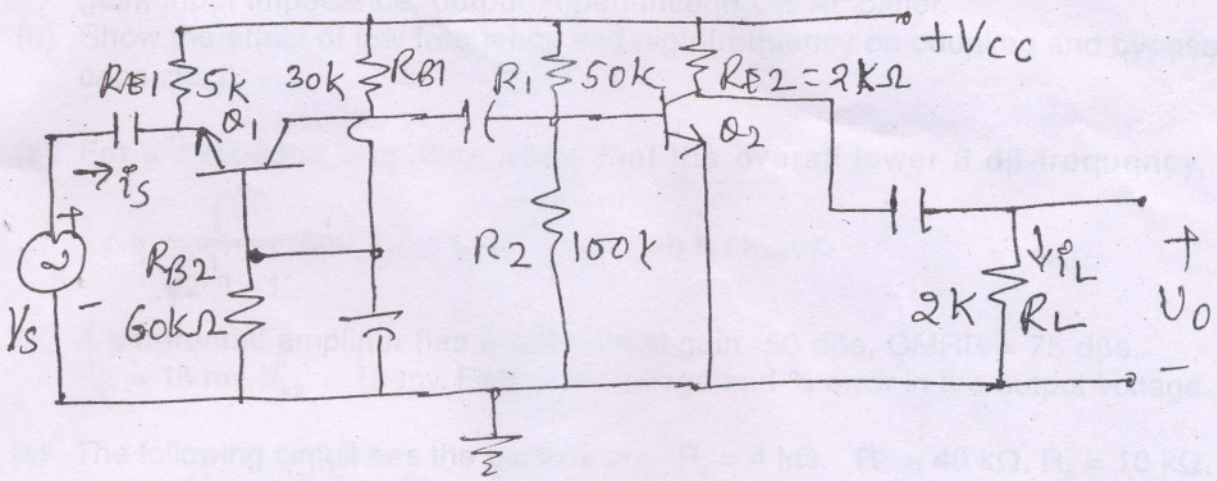


7. (a) The following circuit has the parameters— 12

$h_{ib} = 50\ \Omega$, $h_{fb} = -0{\cdot}99$, $h_{rb} = h_{ob} = 0$
$h_{ie} = 500\ \Omega$, $h_{fe} = -100$, $h_{re} = 1$ and $h_{oc} = 0$.

(i) Find the overall voltage gain = $\frac{V_0}{V_s}$

(ii) Find the overall current gain = $\frac{i_L}{i_S}$



(b) For the power amplifier shown below, 8

$I_{CQ} = 20$ mA, $R_L = 20\Omega$ $V_{cc} = 24$ V., $R_e = 200\ \Omega$. Find

(i) max. undistorted output voltage.
(ii) max. peak current through the transistor collector.
(iii) max. undistorted ac power output.