

(3 Hours)

[ Total Marks :80

- N.B. : (1) Question No.1 is compulsory  
 (2) Solve any three from remaining five questions.  
 (3) Figure to the right indicates full marks.  
 (4) Assume suitable data if necessary.

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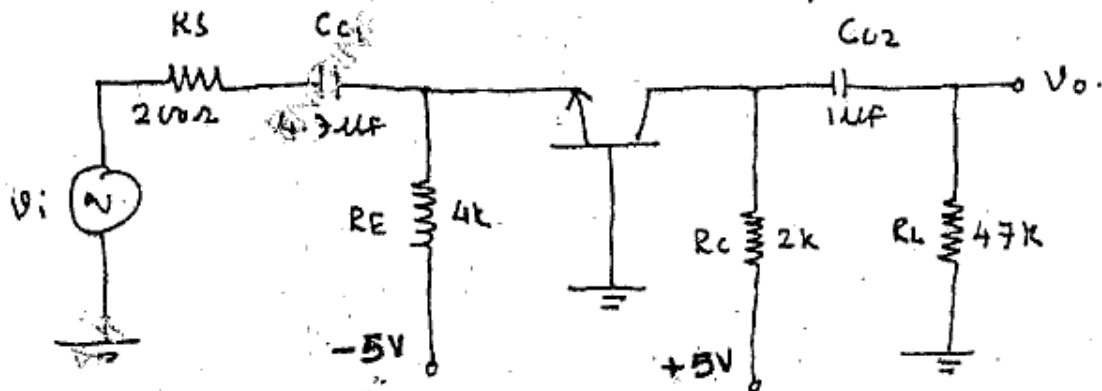
1. Solve Any four:-

20

- In case of CE amplifier, Why does the bandwidth of an amplifier decrease with increase in gain? Support the answer with relevant mathematical equation.
- Instead of single Power Supply, why we use Dual power supply biasing for differential amplifier?
- Why Efficiency of class A power Amplifier is less than class B.
- What is the drawback of current mirror circuit using MOSFET? How it is overcome?
- Why we prefer series voltage Regulator over shunt voltage Regulator? Explain in detail.

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2. (a) The Parameters of transistor are  $V_{BE} = 0.7V$  and  $\beta = 100$ ,  $V_A = 0V$ , Determine 10
- Q point of BJT
  - Time constant associated with  $C_{C1}$  and  $C_{C2}$
  - Lower cut-off freq. due to  $C_{C1}$  and  $C_{C2}$

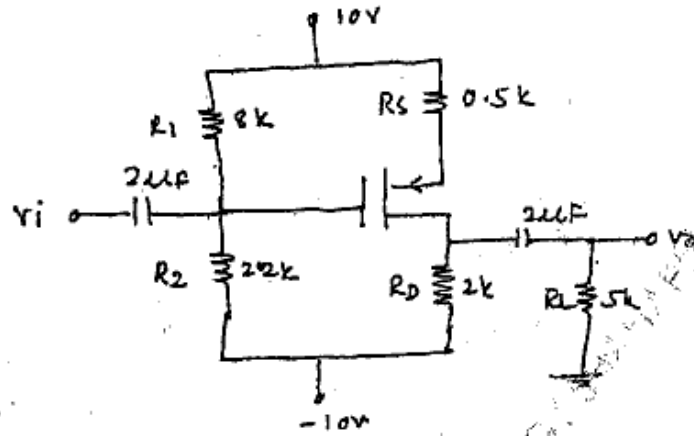


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- (b) For the PMOS CS amplifier, transistor parameters are  $V_{TP} = -2V$ ,  $K_p = 1$  mA/V<sup>2</sup>,  $\lambda = 0$ ,  $C_{gs} = 15$ pf,  $C_{gd} = 3$ pf  
 Determine (a) Equivalent Miller capacitance  
 (b) upper 3dB frequency

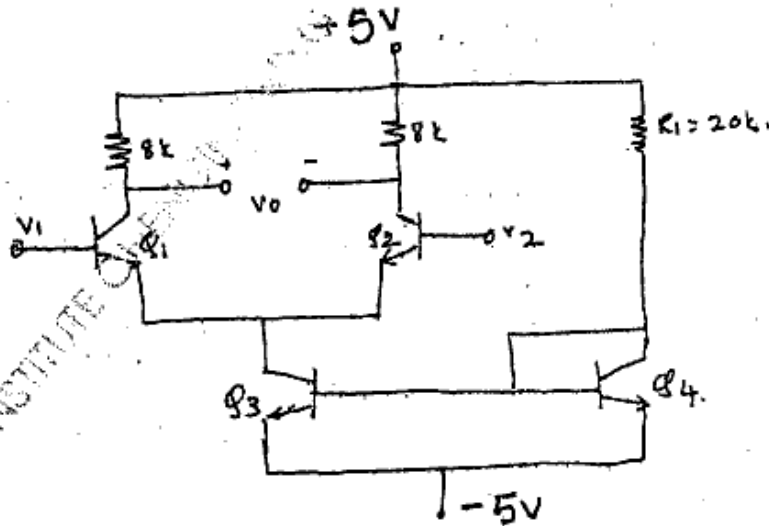
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3. (a) For the given circuit, Determine  
 (i) Differential mode gain  $A_d$   
 (ii) Common mode gain  $A_c$   
 (iii) CMRR

10

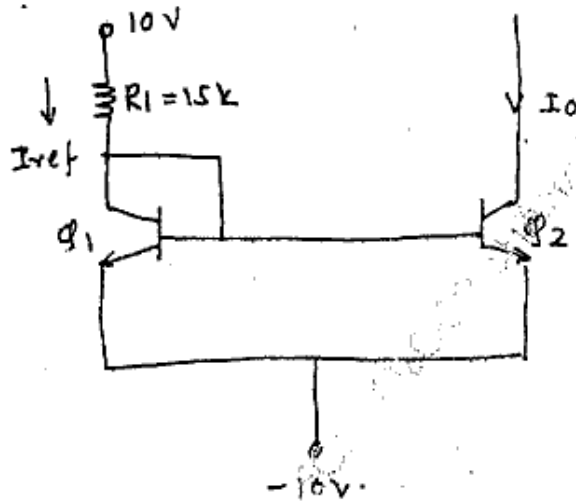
For BJT  $\beta = 100$ ,  $V_{BE} = 0.7V$ ,  $V_A = 100V$ .



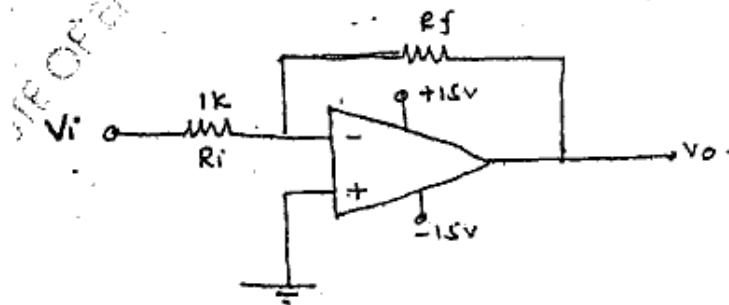
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- (b) Draw and explain the working of class A power amplifier (Transformer coupled). Derive the expression for efficiency. 10
4. (a) Draw and explain current mirror circuit using MOSFET, for the given circuit determine the value of  $I_{ref}$  and  $I_o$ . 10



- (b) Draw the circuit diagram of darlington pair using BJT, and derive the expression for  $A_v$ ,  $A_i$ ,  $Z_i$  and  $Z_o$ . 10
5. (a) For the given circuit, derive the equation for voltage gain  $A_v$  and find  $V_o$  for given cor 10



$V_i$	$V_o$	$R_i$	$R_f$
+1VDC	?	1K	10k
+1VDC	?	1K	100K
+1VDC	?	1k	1M

- (b) Draw the circuit diagram of MOS differential amplifier and derive the expression for  $A_d$ ,  $A_{cm}$  and CMRR. 10
6. Write short notes on (Attempt any Four.) 20
- (a) High pass and low pass filter using OPAMP
  - (b) Cascode amplifier using BJT.
  - (c) Widlar current source using MOSFET.
  - (d) Transistor shunt voltage regulator
  - (e) High frequency hybrid- $\pi$  model of BJT.

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