



- N.B: (1) Question No.1 is compulsory.  
 (2) Solve any three questions from the remaining five.  
 (3) Figures to the right indicate full marks  
 (4) Assume suitable data if required and mention the same in the answer sheet.

1. Solve any five:-

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- Compare series and shunt voltage regulators
  - Differentiate between two transistor (BJT) and three transistor (BJT) current sources
  - What is cross-over distortion? How it is overcome.
  - Derive expression for the output voltage of differentiator.
  - BJT has parameters  $f_T=200\text{MHz}$  at  $I_C=1.5\text{mA}$ ,  $\beta=200$ ,  $C_\mu=0.2\text{pF}$ . Calculate bandwidth  $f_\beta$  and capacitance  $C_\pi$  of BJT.
  - Draw and explain in brief frequency response of Common Emitter Amplifier.
2. (a) In the common-base circuit shown in Fig 2a, the transistor parameters are:  $\beta=100$ ,  $V_{BE(on)}=0.7\text{V}$ ,  $V_A=\infty$ ,  $C_\pi=10\text{pF}$  and  $C_\mu=1\text{pF}$ . (i) Determine the higher cut off frequencies corresponding to the input and output portions of the equivalent circuit.  
 (ii) Calculate the small signal mid band voltage gain.

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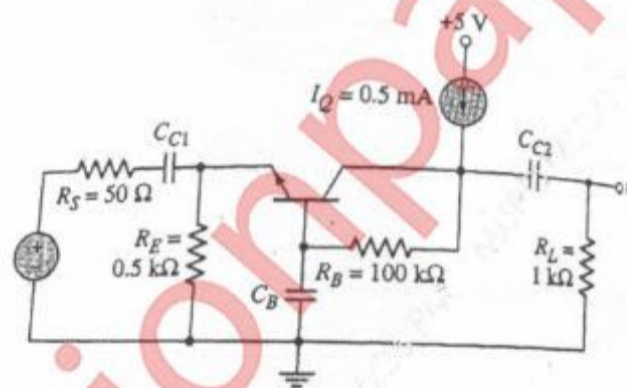


Fig 2a

2. (b) For the circuit in Fig 2b, the transistor parameters are:  $K_n=1\text{mA/V}^2$ ,  $V_{TN}=0.8\text{V}$ ,  $C_{gs}=2\text{pF}$  and  $C_{gd}=0.2\text{pF}$ . Determine: (i) the Miller Capacitance (ii) the higher cut-off frequency (iii) the mid band voltage gain

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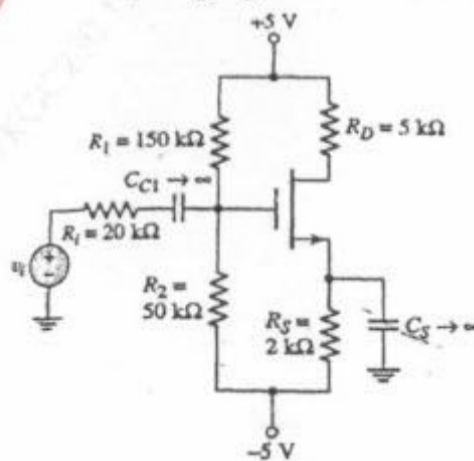


Fig. 2b

TURN OVER

3. (a) Draw circuit diagram of two stage Common Emitter Amplifier (CE-CE) and derive expression for overall voltage gain, current gain, input resistance and output resistance using hybrid- $\pi$  equivalent circuit. 10
3. (b) The transistor parameters for the circuit shown in Fig 3b are:  $\beta = 100$ ,  $V_{BE(on)} = 0.7V$ , and  $V_A = \infty$ . (i) Determine  $R_E$  such that  $I_E = 150\mu A$ . (ii) Find differential gain  $A_d$ , Common Mode gain  $A_c$  for one sided output at  $V_{O2}$ . 10

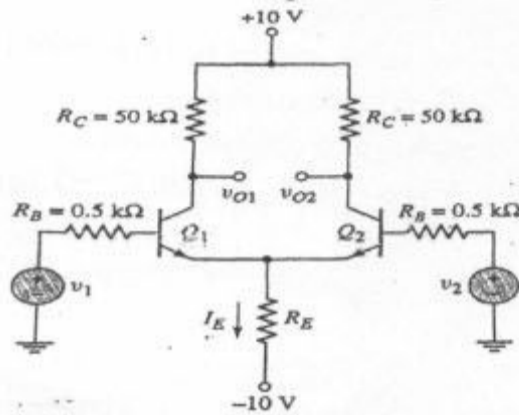


Fig 3b

4. (a) Explain working of first order low pass filter with help of circuit diagram and also derive expression for its voltage gain and cut-off frequency. 10
4. (b) Explain working of transformer coupled Class-A power Amplifier and derive expression for its efficiency. 10
5. (a) Draw circuit diagram of subtractor using OpAmp and derive expression for its output voltage. 10
5. (b) Draw the circuit diagram of MOSFET based differential amplifier and derive expression for differential voltage gain, common mode gain, and CMRR. 10
6. Write short notes on any four 20
- Darlington Configuration
  - Transistorized series regulator
  - Widlar Current sources
  - Cascode Amplifier
  - Class AB Power Amplifier
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