

ET 4 SEM ANALOG ELECTRONICS-2 JUN 2016

Q.P. Code : 545702

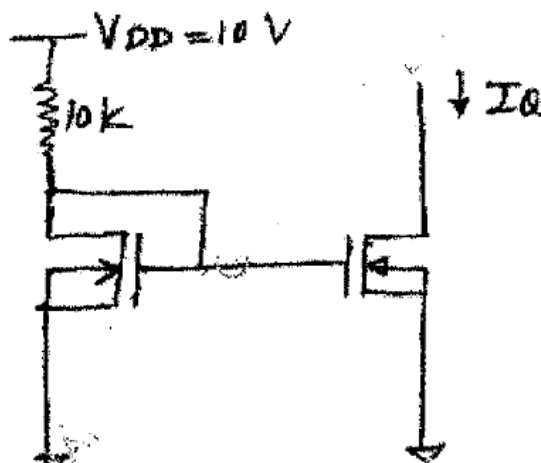
(3 Hours)

[Total Marks : 80

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

1. Solve any Five :

- (a) Define CMRR. Derive the expression for CMRR of a BJT differential amplifier.
 (b) Draw the circuit diagram of an inverting amplifier using Op-Amp and derive expression for its voltage gain.
 (c) Differentiate between small signal BJT and power BJT.
 (d) For the circuit shown below find I_Q .



For both MOSFETs $V_{TN} = 1V$, $K_n = 100 \mu A/V^2$.

- (e) Explain working of Integrator using Op-Amp.
 (f) For differential amplifier with $A_d = 100$ and $A_c = 0.1$. If two sets of inputs are applied as given below.
 (i) $V_1 = 100\mu V$, $V_2 = 80\mu V$
 (ii) $V_1 = 200\mu V$, $V_2 = 160\mu V$
 Determine output voltage in each case.

TURN OVER

2. (a) Determine the corner frequency and maximum gain of the MOSFET amplifier shown in figure. 10

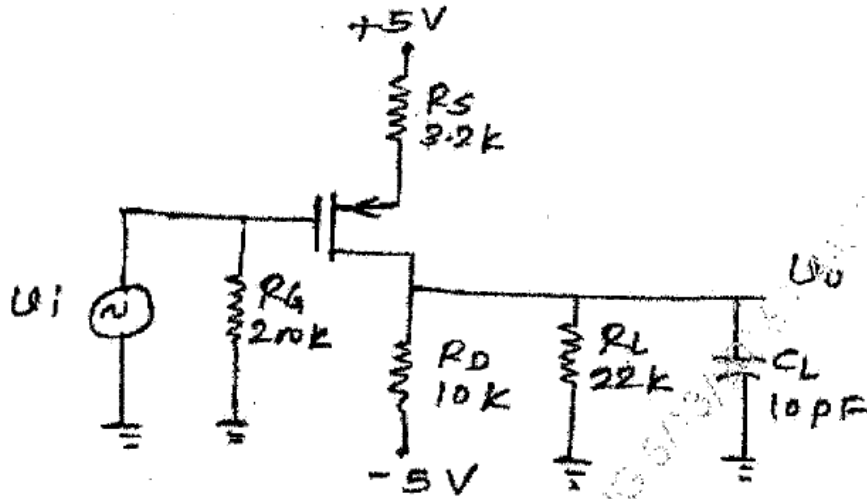


Fig. 2a

The transistor parameters are $V_{TP} = -2V$, $K_p = 0.25 \text{ mA/V}^2$ and $\lambda = 0$.

- (b) For the circuit in Fig. 2b, Find midband gain and corner frequencies. 10

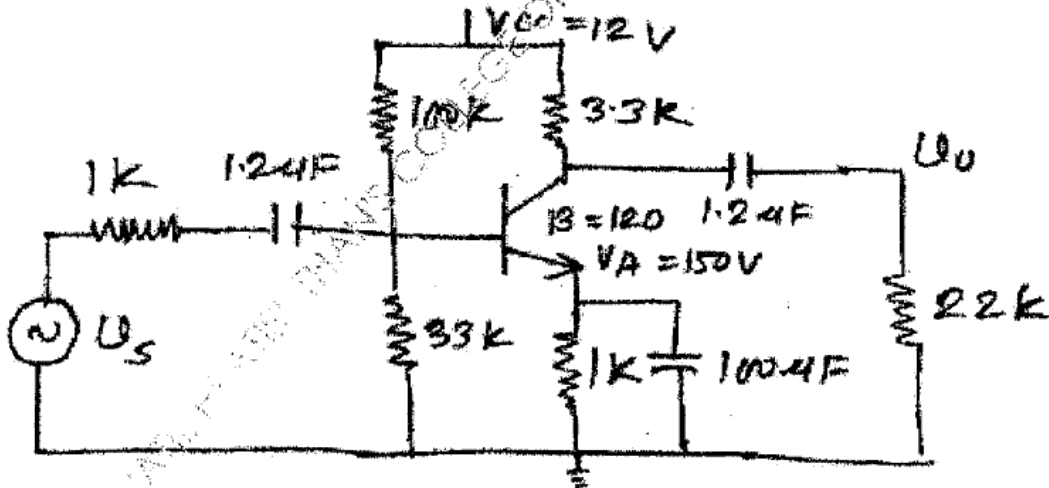


Fig. 2b

TURN OVER

3. (a) The cascode circuit shown in Fig. 3a has parameters $V^+ = 12V$, $V^- = 0V$, $R_1 = 58.8k\Omega$, $R_2 = 33.3k\Omega$, $R_3 = 7.92k\Omega$, $R_C = 7.5k\Omega$, $R_S = 1k\Omega$, $R_E = 0.5k\Omega$ and $R_L = 2k\Omega$. The transistor parameters are $\beta = 100$, $V_{BE} = 0.7V$, $V_A = \infty$, $C_\pi = 24pf$ and $C_u = 3pf$.

- (i) Determine upper 3dB frequencies corresponding to the input and output portions of the equivalent circuit.
- (ii) Calculate small signal midband voltage gain.

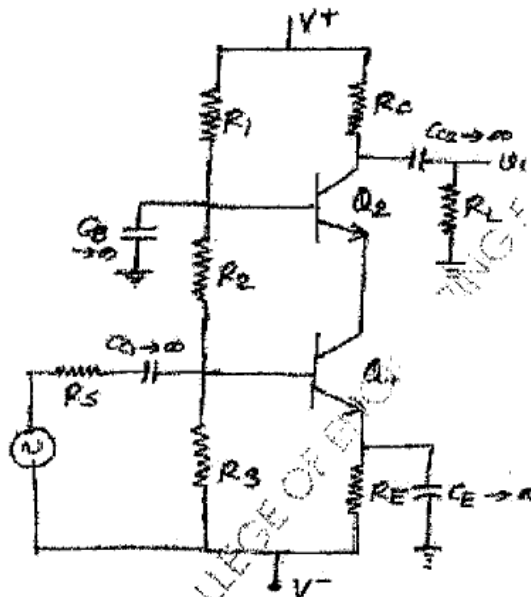
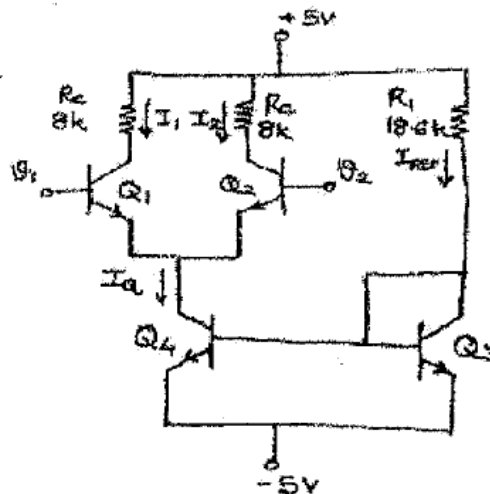


Fig. 3a

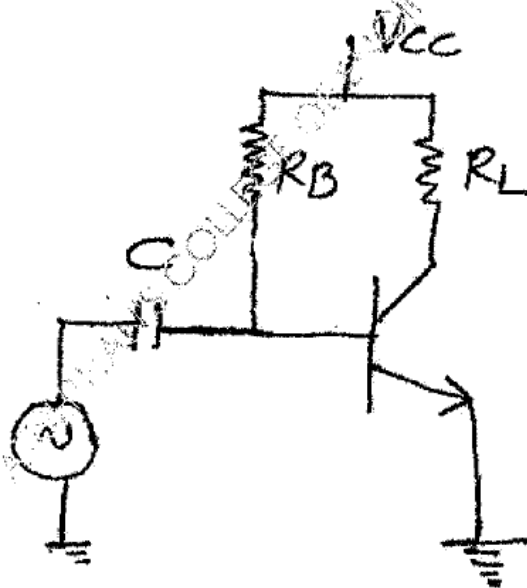
(b) Determine the differential and common-mode input resistances of a differential amplifier shown in figure below :



The transistor parameters are $V_{BE(ON)} = 0.7V$, $\beta = 100$ and $V_A = 100V$.

TURN OVER

4. (a) Draw a neat circuit diagram and explain working of the improved 3 transistor (MOSFET) current source. Derive the relationship between the output current and reference current. 10
- (b) Draw the circuit diagram for an inverting summing amplifier using operational amplifier. Derive the relationship for its output voltage V_0 for four inputs V_1, V_2, V_3 and V_4 . 10
5. (a) Explain Class - B operation of power amplifiers. What is crossover distortion? How is it eliminated. 10
- (b) For the circuit shown in fig. 5b, the transistor parameters are $\beta = 100$, $P_{DMAX} = 2.5 \text{ W}$, $V_{CEMAX} = 25\text{V}$, $I_{CMAX} = 500\text{mA}$. If $R_L = 100\Omega$ then find V_{CC} and R_B to deliver maximum power to the load. With the obtained values of V_{CC} and R_B calculate the maximum undistorted ac power that can be delivered to R_L . 10



6. Write short notes on any Four :

- Zener Shunt Regulator
- Power MOSFET
- Active Filters
- Multistage Amplifiers
- Millers Theorem.

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