

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0321

Roll No.

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B.Tech.

(SEM IV) EVEN SEMESTER THEORY EXAMINATION, 2009-2010

ELECTRONIC CIRCUITS

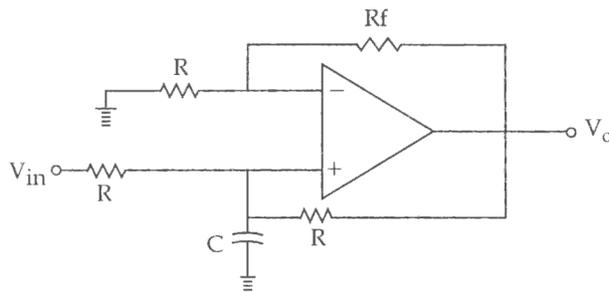
Time : 3 Hours

Total Marks : 100

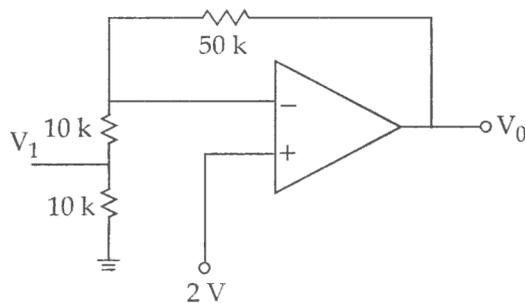
Note : Attempt *all* questions.

1. Attempt **any four** parts of the following :

(a) Derive a relationship between input and output voltages for the circuit shown in following figure

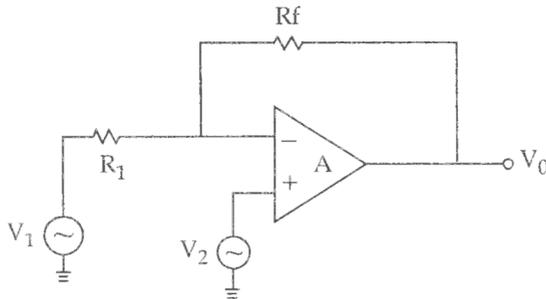


(b) Obtain the voltages V_1 and V_0 in following figure.



- (c) Describe how the performance of an Op-amp is affected by the open loop gain of amplifier ?
- (d) Show that the output voltage of following circuit is :

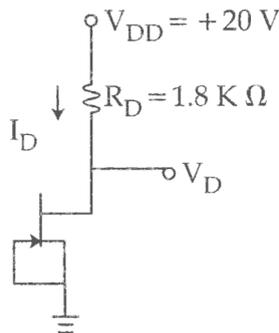
$$V_0 = \left(\frac{R_f}{R_1} \right) (V_2 - V_1) + V_2$$



- (e) Draw the circuit diagram of a difference amplifier and explain its working.
- (f) Describe the difference between inverting and non-inverting op-amp.

2. Attempt **any four** of the following :

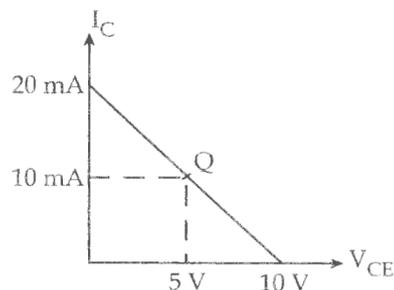
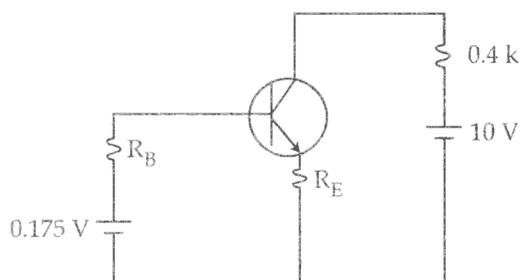
- (a) Analyze the circuit to determine I_D and V_D . The JFET is specified to have $V_p = -4V$ and $I_{DSS} = 10 \text{ mA}$.



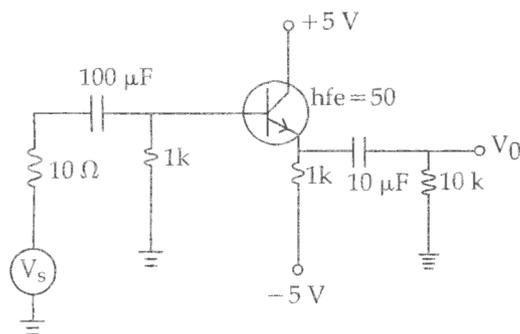
- (b) Explain the working of MOSFET inverter.
- (c) Obtain ON resistance of an NMOS transistor with $V_{GS} = 3V$, $V_{th} = 1V$, $\mu_n c_{ox} = 25 \text{ mA/V}^2$, $W = 3 \mu\text{m}$, $L = 1 \mu\text{m}$.
- (d) Draw the high frequency equivalent circuit of a MOSFET and explain the significance of the different elements of the circuit.
- (e) Explain operation of a MOSFET and explain its use as an amplifier.
- (f) Draw and explain the frequency response of CS-amplifier.

3. Attempt **any two** of the following :

- (a) Why transistor action can not be achieved by connecting two diodes back to back. Discuss briefly the charge transport mechanism in a BJT.
- (b) Calculate R_E , R_B and ΔI_{CQ} if $40 < B < 120$ of a silicon transistor with $I_{CQ} = 10\text{mA}$, $V_{CQ} = 5\text{V}$ of following fig :



- (c) Obtain the 3.db frequency and draw its voltage gain plot.



4. Attempt **any two** of the following :

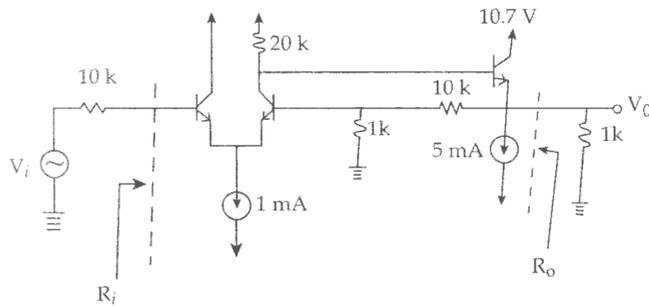
- (a) Draw the circuit diagram of a CS differential amplifier and derive the expression for its voltage gain.
- (b) Explain the small-signal operation of the BJT differential amplifier and hence show that the differential input resistance R_{id} is given as :

$$R_{id} = (\beta + 1) (2r_e + 2R_E)$$

- (c) Explain the working of differential amplifier with active load.

5. Attempt **any two** of the following :

- (a) Explain the effect of negative feedback on (i) gain and stability (ii) distortion of an amplifier.
- (b) Obtain A_v , β , A_{vf} , R_i , R_{if} , R_o and R_{of} of following circuit.



- (c) Explain the working of a Weinbridge oscillator. Derive an expression for the frequency of oscillations. What are the merits and demerits of such oscillator ?

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