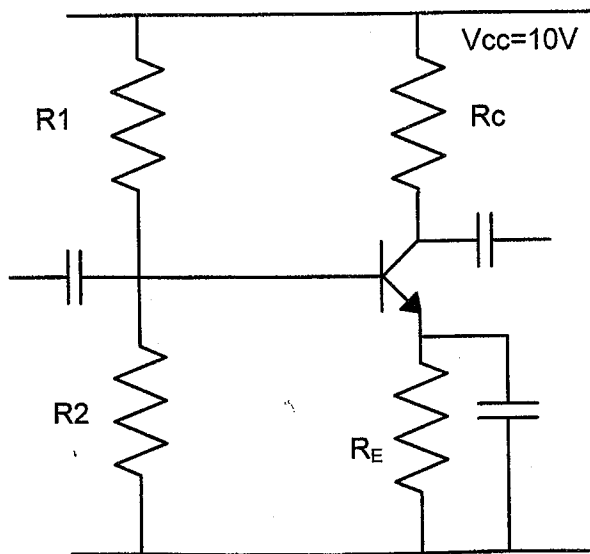


Uva Wellassa University, Sri Lanka
End Semester Examination – January 2010
CST 308-2 Microelectronics
Time: Two (02) hours

Total 04 Questions
 Answer All Questions

1)

- I. Draw the Basic circuit diagram of common emitter amplifier and indicate the current flow through the circuit.
- II. Find the Q point graphically, using the load line of a properly built bias transistor amplifier circuit.
- III. A transistor can be used for a circuit as a switch mode or as an amplifier mode. Explain these two modes and draw the output characteristic and load line.
- IV.



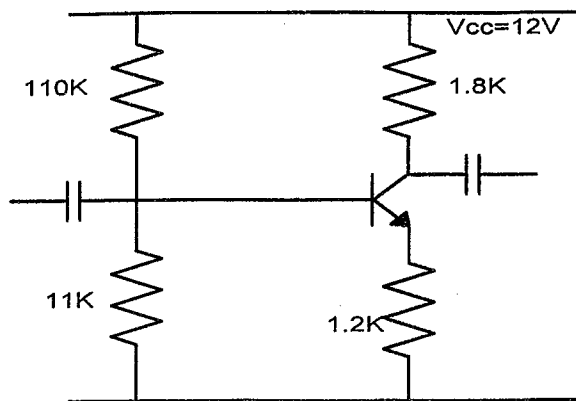
Find the value of R1 in the above potential divider circuit. You should consider the $I_B = 50\mu A$ and $I_E = 2mA$. $V_{BE} = 0.5V$, $R_2 = 10K$, $R_E = 1k$ and $V_{cc} = 10V$.

2)

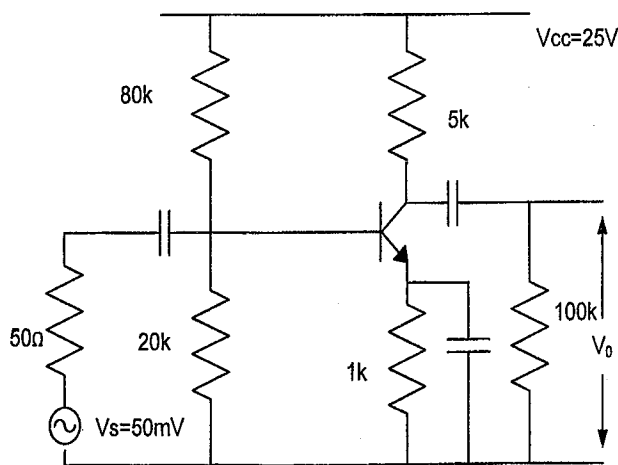
I. Explain how to thermally stabilize the following circuits. Describe advantages and Disadvantages of each circuit.

- a) Common emitter circuit.
- b) Fixed Bias circuit.
- c) Collector to Base Bias circuit.
- d) Potential divider circuit.

II. Determine I_C and V_{CE} for the following circuit. The transistor has $\beta=150$.



III. The amplifier circuit is shown in the following diagram. Draw the equivalent circuit for a small AC signal and determine the output voltage (V_o). When the parameters are as follows, $h_{fe}=100$, $h_{ie}=2k\Omega$, $h_{re}=h_{oe}=0$ and $V_{BE}=0.6 V$.



IV. Calculate the values of voltage gain A_v , current gain A_i and power gain A_p .

03)

- I. Describe the properties of an ideal operational amplifier.
- II. Draw the circuit diagrams for the applications listed below and in each case obtain the relationship between the input and output signals.
 - a) Inverting amplifier
 - b) Non-inverting amplifier
 - c) Summing amplifier
 - d) Integrator
 - e) Differentiator
- III. An inverting OP-Amp stage is designed with $R_1=500\Omega$ and $R_2=25M\Omega$. The OP-Amp has $A_v=5 \times 10^4$. Determine the current across R_2 for an rms input signal of 1.5V. What is the voltage gain if you convert it to a Noninverting OP- Amp.

04)

- I. What are the three terminals of Field effect transistors?
- II. Draw the circuit diagram of JFET and briefly explain working principle of it.
- III. Compare the advantages and disadvantages of BJT and JFET.
- IV. It is desired to set the operating point at $I_D = 2.5\text{mA}$ and $V_{DS} = 8\text{V}$. Find the value of R_S of the circuit when $V_{DD} = 30\text{V}$, $R_1 = 1\text{M}\Omega$ and $R_2 = 500\text{K}\Omega$ with the parameters of JFET are $I_{DSS} = 10\text{mA}$ and $V_P = -5\text{V}$.

