SECOND SEMESTER APRIL 2005

BASIC ELECTRONICS

Question 1

i) Do the following conversion
   a. $A3E89_{16}$ to octal
   b. $82B_8$ to hexadecimal

ii) Subtract the following binary numbers:
   a. 1100 – 1001
   b. 11010 – 10111

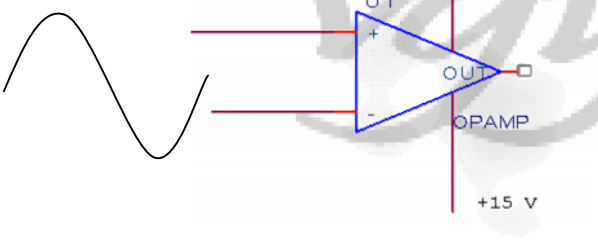
iii) Express -85 in 8 bit sign magnitude 1's and 2's complement form.

iv) Add 56 and -27 using 2's complement form.

v) The resistance of the semiconductor material decreases with an increase in temperature –Justify the following starement.

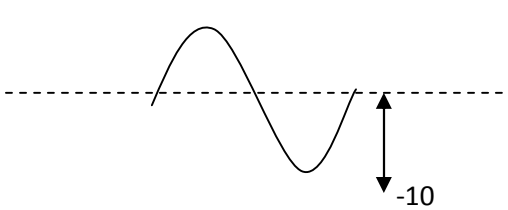
vi) Distinguish between zener breakdown voltage and Avalanche breakdown . Which of the following can be used in the high voltage application?

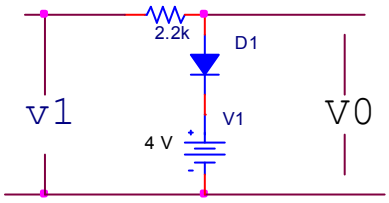
vii) Draw the output of the following circuit:



viii) Bring out the difference between BJT and FET.

ix) Draw the output of the following circuit.





x) If $\sqrt{41}_b=5_b$ find the value of b.

Question 2

Radiation falls on the semiconductor specimen that is uniformly illuminated , and a steady state is reached . At t=0 , the light source is switched off. Sketch the minority carrier concentration as the function of time for t>=0. Define all the symbols in your equation describing the sketch.

Question 3

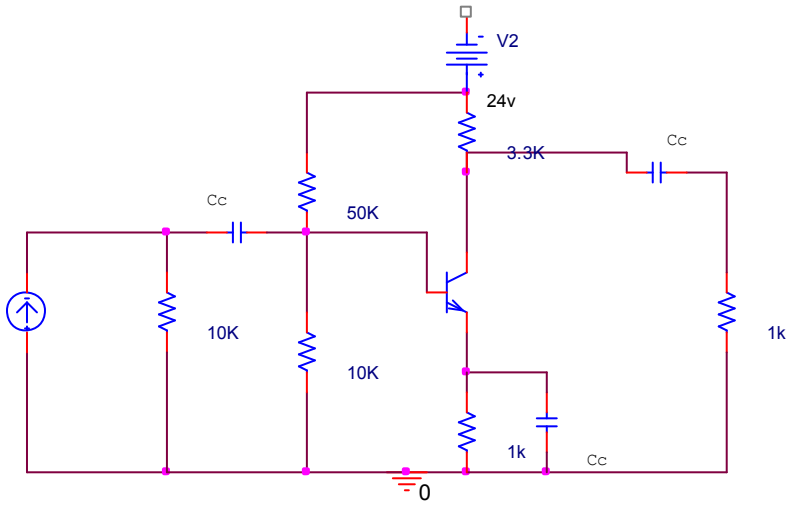
A crystal diode having an internal resistance r_f=20 is used for half wave rectification. If the applied voltage is v=50 sin10t and the load resistance R_L=800, determine the following:

(i) I_m I_{dc} and $I_{\pi ns}$.
(ii) AC power input and DC power output.
(iii) DC output voltage
(iv) Ripple factor.

Question 4

The BJT shown in the figure below has the following

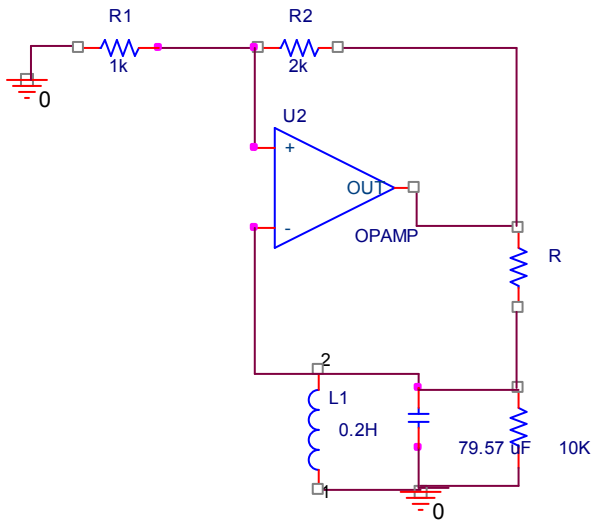
All bypass and coupling capacitor assumed to have zero reactance at the signal frequency. Find the quiescent condition(V_{CEQ},I_{CQ}) the small signal equivalent circuit the current, gain and input impedance seen by the current source I_C.



Cc=∞

Question 5

Consider the opamp to be ideal . What would be the value of R for which the oscillation will be sustained? What is the frequency of oscillation?



Question 6

(i) Convert the following expression to canonical SOP form(5)

$(\bar{A}+C).(A.B+B.C+A.C)$

(ii) Convert the following expression to canonical POS form.(5)

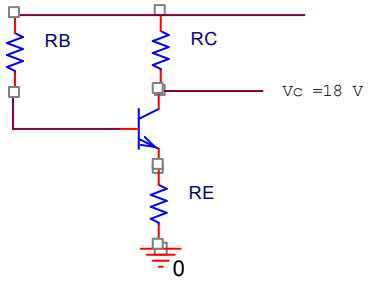
$A+A.B+\bar{A}.C$

Question 7

For the emitter bias configuration of the following figure below with the following specification:

$I_{CQ}=(1/2)C_{SAT}$,$I_{C\ sat}$ =8mA, V_e=18V

And β = 110 , determine the value of R_c R_E and R_B.



Question 8

(i) Explain the need for the communication system . Hence describe the role of modulation and demodulation in it.(5)

(ii) What is the input impedance of the ideal voltmeter and why? Explain CRO as a voltmeter?