Code No: Y0221 / R07 **Set No. 1**

I B.Tech - Regular Examinations, June 2009
BASIC ELECTRONIC DEVICES AND CIRCUITS
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) With the help of a neat sketch, explain the principle of working of a CRT.
   (b) In a CRT, the length of deflecting plates is 2cm. The spacing between the plates is 0.6cm. The distance of the screen from the center of the plates is 16cm. Calculate the deflection sensitivity in m/volt if the final anode voltage is:
      i. 600V and
      ii. 900V. [8+8]

2. (a) How does the reverse sturation current of diode varies with temperature. Explain.
   (b) Draw the energy band diagram of p-n diode for no bias, forward bias and reverse bias and explain. [6+10]

3. (a) A 15-0-15 Volts (rms) ideal transformer is used with a full wave rectifier circuit with diodes having forward drop of 1 volt. The load is a resistance of 100ohm and a capacitor of 10,000μf is used as a filter across the load resistance. Calculate the dc load current and voltage.
   (b) Draw the circuit diagram of a bridge rectifier circuit with L-section filter and explain its operation. [8+8]

4. (a) Draw the circuit for BJT in C.C. configuration and draw the input and output characteristics.
   (b) Explain the terms α, β, I_{CEO},I_{CBO},β^* and γ pertaining to BJT. [8+8]

5. (a) Determine the stability factor for the circuit shown in figure 5a.

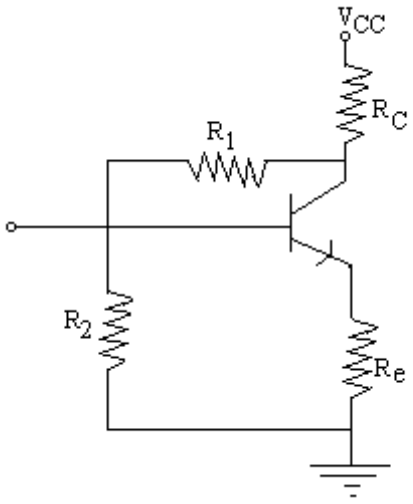

Figure 5a

(b) Calculate the thermal resistance for the 2N338 transistor for which the manufacturer specifies $P_{c,max}$=125mW at 25^0C free-air temperature and maximum junction temperature T_j=150^0C. What is the junction temperature if the collector dissipation is 75mW? [8+8]

6. (a) Explain the method of evaluating h parameters for a transistor in CB configuration.

(b) A CC amplifier is driven by a voltage source of internal resistance R_s=1kΩ. The load impedance if R_L=1KΩ. The transistor parameters are h_{ic}= 1.1KΩ, h_{fc} = -51, h_{rc}=1, h_{oc}= 25μA/V. Compute input and output impedance of the amplifier. [8+8]

7. (a) Define Desensitivity D. What is the significance of this?

(b) An amplifier without feedback gives a fundamental output of 36V with 7 percent second-harmonic distortion when the input is 0.028V. If 1.2 percent of the output is fed back into the input in a negative voltage series feedback circuit, what is the output voltage? If the fundamental output is maintained at 36V but the second-harmonic distortion is reduced to 1 percent, what is the input voltage? [6+10]

8. (a) Consider the two section RC network shown in figure 8a. Find the V_i/V_f' function, and verify that it is not possible to obtain 180^0phase shift with a finite attenuation.

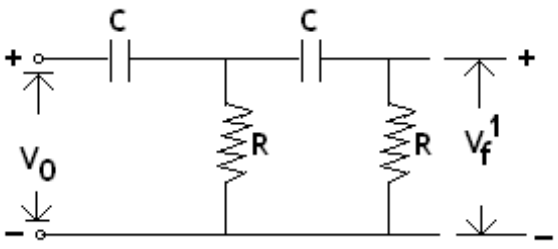

Figure 8a

(b) State the similarities and differences between series and parallel resonance crystal oscillator circuits. [10+6]

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Code No: Y0221 / R07 **Set No. 2**

I B.Tech - Regular Examinations, June 2009
BASIC ELECTRONIC DEVICES AND CIRCUITS
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw the schematic diagram of a CRT and explain about the various sections and the materials used.
   (b) In a CRT, the electrons emitted are accelerated by a potential of 500V. The length of the deflecting plates is 1.3 cm. Distance between the deflecting plates is 0.5 cm. The distance between the centre of the deflecting plates and the screen is 20 cm. Determine the value of electrostatic deflection sensitivity. [8+8]

2. (a) Draw and explain the V-I characteristics of a p-n junction diode. Use equations wherever necessary.
   (b) The transition capacitance of an abrupt junction diode is 30pf at 8V. Determine the value of capacitance for an increase in the bias voltage of 2V. [8+8]

3. (a) Explain the circuit diagram of a single phase full-wave bridge rectifier and sketch the input and output wave forms.
   (b) Define percentage regulation and prove that the regulation of both half wave and full wave rectifier is given by percentage regulation equal to $\frac{Rf}{Rl} \times 100\%$. [8+8]

4. (a) Draw the circuit and explain the characteristics of BJT (input and output characteristics) in C.E. configuration.
   (b) Give the specifications, parameters and typical values of a silicon NPN transistor. [8+8]

5. (a) What is the necessity to stabilize the operating point of transistor amplifier?
   (b) What is thermal runaway?
   (c) For a fixed bias configuration determine I_c, R_c, R_b and V_{ce} using the following specifications: V_{cc}=12V, V_c=6V, β =80, I_b = 40 μA. [4+4+8]

6. Show that the exact expression for h_{fe} in terms of the CB hybrid parameters is $h_{fe} = -\frac{h_{fb}(1-h_{rb})+h_{ib}h_{ob}}{(1+h_{fb})(1-h_{rb})+h_{ob}h_{ib}}$
   from this formula obtain the approximate expression for h_{fe}. [16]

7. (a) An amplifier has a gain of -100 and a distortion of 8%. What is the effect of introducing negative feedback with feedback factor of 0.05?
   (b) Find A_f for a CE stage with an un bypassed emitter resistor. [8+8]

8. (a) What is condition of unity loop gain to sustain oscillations? Prove it.
   (b) Prove that the ratio of the parallel to series resonant frequencies of a crystal is 1+1/2(C/C'). [8+8]

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Code No: Y0221 / R07 **Set No. 3**

I B.Tech - Regular Examinations, June 2009
BASIC ELECTRONIC DEVICES AND CIRCUITS
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw the schematic diagram of a CRT and explain about the various sections and the materials used.
   (b) In a CRT, the electrons emitted are accelerated by a potential of 500V. The length of the deflecting plates is 1.3 cm. Distance between the deflecting plates is 0.5 cm. The distance between the centre of the deflecting plates and the screen is 20 cm. Determine the value of electrostatic deflection sensitivity. [8+8]

2. (a) Derive the expression for contact difference of potential V_0 in the case of an open circuited p-n junction.
   (b) What is the ratio of current for a forward bias of 0.08 V to the current for the same magnitude of reverse bias for the Germanium diode. [8+8]

3. (a) Discuss the operation of HW recitifier with and without capacitor filter.
   (b) Draw the Half wave rectifier circuit using a step down Transformer with $V_s = 46 \sin(100\pi\ t)$ and a semiconductor diode. Calculate the turns ratio of the Transformer windings when the primary voltage of the Transformer is 230 volts. [8+8]

4. (a) Derive the relation between α and β of the BJT.
   (b) Derive the relation between I_{CEO} and I_{CBO} of a transistor.
   (c) Explain how transistor can be used as an amplifier. [5+5+6]

5. (a) What do you understand by dc and ac load line? Explain how to choose the operating point?
   (b) For a fixed bias configuration, determine I_{bQ}, I_{CQ} and V_{ceQ} using the following specifications: V_{cc}= 16V, β =90, R_c = 2.7KΩ, R_b=470KΩ and also find the saturation current Isat. [8+8]

6. Find the overall h parameters of the composite transistor shown in figure 6. [16]

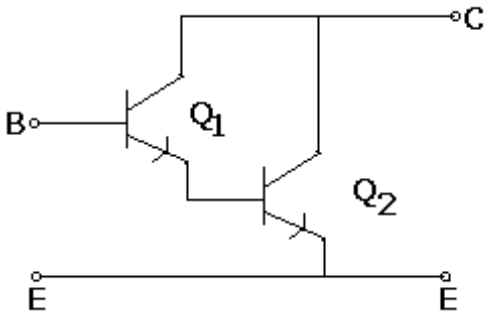

Figure 6

7. (a) List the steps required to carry out the analysis of a feedback amplifier.
   (b) Calculate voltage gain, input impedance and output impedance of a CE amplifier with voltage-shunt negative feedback. [6+10]

8. (a) Find V_i/V_f' for the network shown in figure 8a.

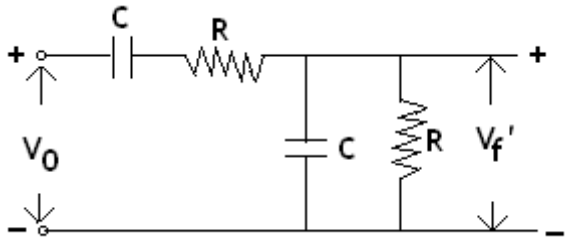

Figure 8a

   (b) Sketch the circuit of a phase shift oscillator using feedback network shown in figure 8b.

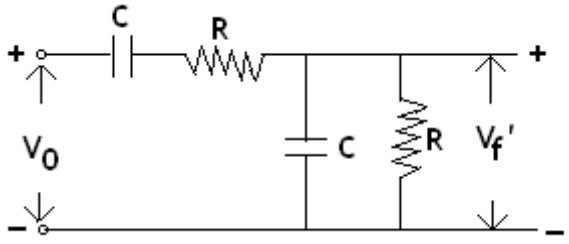

Figure 8b

   (c) Find the expression for the frequency of oscillation, assuming that the network does not load down the amplifier of question (b).
   (d) Find the minimum gain required for oscillations of the circuit of question (b). [16]

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Code No: Y0221 / R07 **Set No. 4**

I B.Tech - Regular Examinations, June 2009
BASIC ELECTRONIC DEVICES AND CIRCUITS
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Derive an expression for magnetic deflection sensitivity of C.R.O.
   (b) An electron is injected with an initial velocity V_{ox} of 4×10^6 m/sec halfway between two large parallel plates 0.5 cm apart. The XZ plane is parallel to the plates. There is a voltage of 200V impressed between the plates, and a magnetic field of 10 mwb/m^2 perpendicular to the plates, directed from the positive to the negative plate. Where does the electron strike the positive plate and with what velocity? [8+8]

2. (a) Determine the resistivity of Germanium:
      i. in intrinsic condition at 300 ^{0}K
      ii. with donor impurity of 1 in 10^7
      iii. with acceptor impurity of 1 in 10^8
      Given for germanium at room temperature. $n_i = 2.5 \times 10^{13}/cm^3$; $\mu_p = 1800$ cm^2/V-sec, $\mu_n = 3800$ cm^2/V-sec and number of Germanium atoms/$cm^3 = 4.4 \times 10^{22}$.
   (b) Compare Avalanche and Zener breakdown. [10+6]

3. (a) Explain why a bridge rectifier is preferred over a centre-tap rectifier. Give circuit diagrams.
   (b) A diode has an internal resistance of 20Ω and 1000Ω load from a 110V rms source of supply. Calculate:
      i. the efficiency of rectification
      ii. the percentage regulation from no load to full load. [8+8]

4. (a) Compare JFET and MOSFET with respect to various features.
   (b) Draw the biasing circuit suitable for JFET and if the JFET is replaced by a MOSFET for what mode of operation it is valid and explain about the function of each component used in the circuit. [6+10]

5. (a) Compare the advantages and disadvantages of biasing schemes.
   (b) Calculate the quiescent current and voltage of collector to base bias arrangement using the following data:
   V_{cc} =10V, R_b=100KΩ, R_c=2KΩ, β=50 and also specify a value of R_b so that V_{ce}=7V. [8+8]

6. Obtain CB h parameters in terms of CE h parameters. [16]

7. (a) Explain how the nonlinear distortion can be reduced by using negative feedback in an amplifier.

   (b) Calculate voltage gain, input impedance and output impedance of a CE amplifier with Voltage-Series negative feedback. [8+8]

8. (a) Consider the two section RC network shown in figure 8a. Find the V_i/V_f' function, and verify that it is not possible to obtain 180^0phase shift with a finite attenuation.

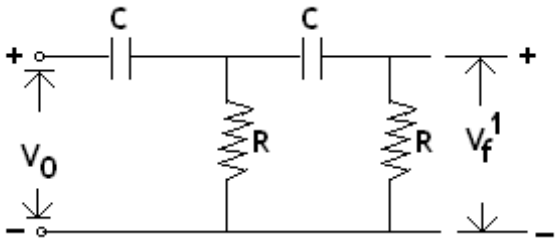

Figure 8a

   (b) State the similarities and differences between series and parallel resonance crystal oscillator circuits. [10+6]

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