Code No: Z0421 / R07 **Set No. 1**

I B.Tech - Regular Examinations, June 2009
ELECTRONIC DEVICES AND CIRCUITS
(Common to Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering and Instrumentation & Control Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. What are the main parts of the CRT? Explain briefly with neat sketch. [16]
2. (a) Short notes on LED voltage drop and current.
   (b) Write short notes on Multi colour LED. [10+6]
3. (a) Draw the circuit diagram of HWR. Explain its working. What is the frequency of ripple in its output
   (b) A HWR circuit supplies 100mA d.c to a 250 Ω load. Find the d.c output voltage, PIV rating of a diode and the r.m.s. voltage for the transformer supplying the rectifier. [8+8]
4. Derive an Eber's Moll equation for a transistor. [16]
5. (a) Explain the criteria for fixing operating point.
   (b) List out the different types of biasing methods. [12+4]
6. A transistor used in a CC Circuit as shown in Figure 6. has the following set of h parameters.
   h_{ic} = 2 KΩ, h_{fc} = -51, h_{rc} = 1, h_{oc} = 25 × 10^{-6}
   Find the values of input and output resistances, current and voltage gains of the amplifier stage. Use the approximate analysis. [16]

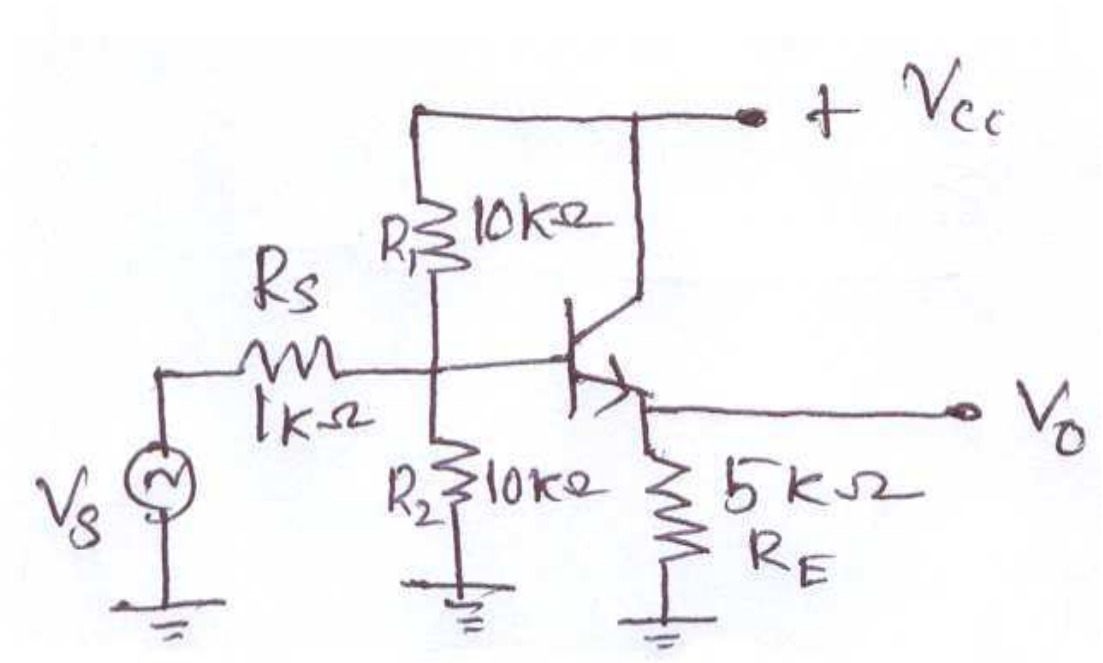

Figure 6

7. Enumerate the effects of negative feedback on the various characteristics of the amplifier. [16]

8. (a) Define:
   i. Damped Oscillation
   ii. Un Damped oscillation.
   (b) Why an LC tank circuit, once excited, does not produce sustained oscillation? Explain it briefly?
   (c) Give the two Bark Hansen condition required for sinusoidal oscillations to be sustained.
   (d) What are the factors which affect the frequency stability of an oscillator? [4+6+2+4]

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

Answer any FIVE Questions
All Questions carry equal marks

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1. In a parallel place diode, the cathode and anode are spaced 5mm apart and the anode is kept at 200V d.c. with respect to cathode. Calculate the velocity and the distance travelled by an electron after a time of 0.5ns, when [16]
   (a) The initial velocity of an electron is zero and
   (b) The initial velocity is 2×10^6 m/s in the direction towards the anode.
2. Explain in detail PN junction energy band diagram of a PN diode. [16]
3. A voltage of 200 cos wt is applied to HWR with load resistance of 5 KΩ. find the maximum d.c current component, r.m.s. current, ripple ractor, TUF and rectifier efficiency. [16]
4. Explain the input and output characteristics of common base transistor configuration. [16]
5. Briefly explain fixed bias with Emitter Feed back. Also find the stability of this bias. [16]
6. (a) Draw the low frequency hybrid equivalent. Circuit for CE & CB amplifier.
   (b) Give the approximate h-parameter conversion formulae for CB and CC configuration in terms of CE.
   (c) Give the advantages of h-parameter analysis.
   (d) Give the procedure to form the approximate h - model from exact h - model of amplifier. [4+6+3+3]
7. A negative feedback of 0.0005 is applied to an amplifier whose open loop gain is 60dB. If the open loop gain gets reduced by 132%, how much the overall gain gets altered? [16]
8. (a) A colpitts oscillator is designed with C_1 = 100 PF and C_2 = 7500 PF. The inductance is variable. Find the range of inductance value, if the frequency of oscillation is to vary between 950 KHz and 2050 KHz.

(b) A Hartely oscillator is designed with $L_2 = 20\mu$H and a variable capacitance. Find the range of capacitance values. If the frequency of oscillation is varied between 950 KHz to 2050 KHz. [10+6]

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Code No: Z0421 / R07 **Set No. 3**

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Two plane parallel plates A and B are placed 3 mm apart and potential of b is made 200 V positive with respect to plate A. An electron starts from rest from plate A. Calculate
   (a) The velocity of the electron on reaching plate B.
   (b) Time taken by the electron to travel from plate A to plate B, and
   (c) Kinetic energy of the electron on reaching the plate B. [16]
2. (a) Explain about semiconductor, Insulator & Conductor with neat sketch.
   (b) State the Einstein relationship for semiconductor.
   (c) State paulis exclusion principle. [6+5+5]
3. Derive the ripple factor of capacitor filter. [16]
4. Derive the analytical expression for transistgor characteristics. [16]
5. In a germanium transistor CE amplifier biased by feedback resistor method , V_{CC} = 20 V, V_{BE} = 0.2 V, β = 100 and the operating point is chosen such that V_{CE} = 10.4 V and I_C = 9.9mA, determine the value of R_B and R_C. [16]
6. A transistor used in a CC Circuit as shown in Figure 6. has the following set of h parameters.
   h_{ic} = 2 KΩ, h_{fc} = -51, h_{rc} = 1, h_{oc} = 25 × 10^{-6}
   Find the values of input and output resistances, current and voltage gains of the amplifier stage. Use the approximate analysis. [16]

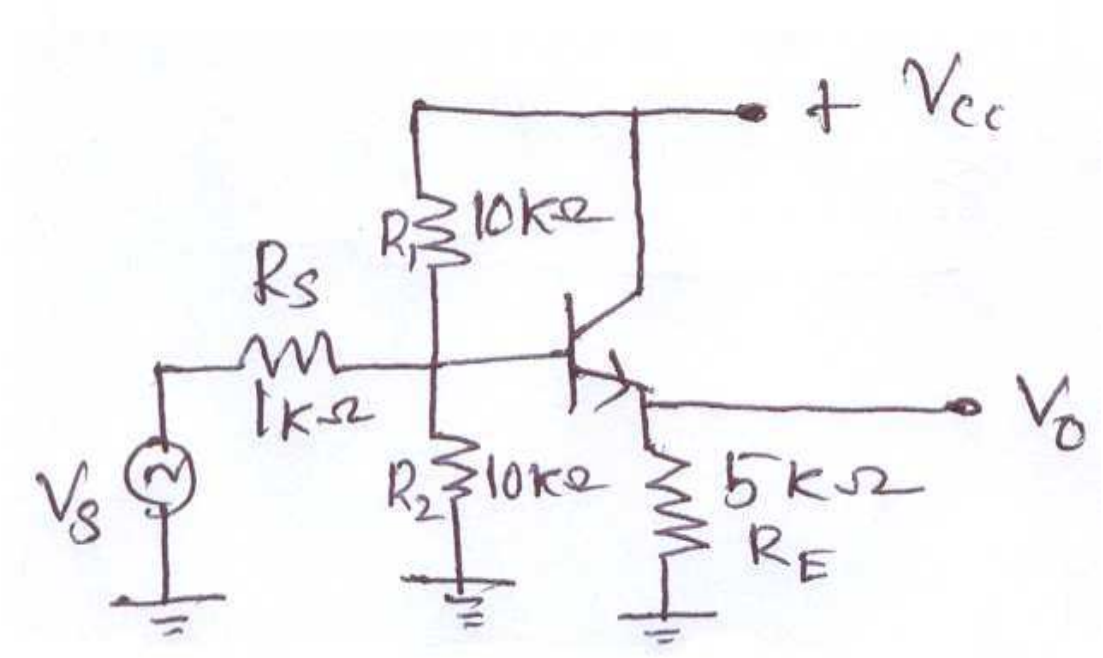

Figure 6

7. (a) How the distortion is decreased in negative feedback?
   (b) An amplifier has an open loop gain of 1000 and a feedback ration of 0.04. if the open loop gain changes by 10% due to temperature, find the percentage change in gain of he amplifier with feed back. [10+6]

8. The frequency of oscillation of a colpitts oscillator is given by,
   $f_0 = \frac{1}{2\Pi\sqrt{L\left(\frac{C_1 C_2}{C_1 + C_2}\right)}}$
   This circuit operates at 450 KHz with $C_1 = C_2$ what will be the oscillation frequency if the value of C_2 is doubled? [16]

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Code No: Z0421 / R07 **Set No. 4**

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

Answer any FIVE Questions
All Questions carry equal marks

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1. An infinitely large parallel plane plates are spaced 0.8 cm apart. The voltage on one of the plates is raised from 0 to 5 V in 1 ns at a uniform rate with respect to the other. After this duration, the potential difference between the plates is suddenly dropped to 0 V and remains the same thereafter. Find
   (a) The position of the electron, which started with zero initial velocity from the negative plate, when the potential difference drops to zero volt,
   (b) The total time of transit of the electron from the cathode to the anode. [16]
2. Explain in detail PN junction energy band diagram of a PN diode. [16]
3. (a) Describe transistor shunt regulator.
   (b) Calculate the output voltage and zener current in the regulator circuit shown in Figure 3b. [6+10]

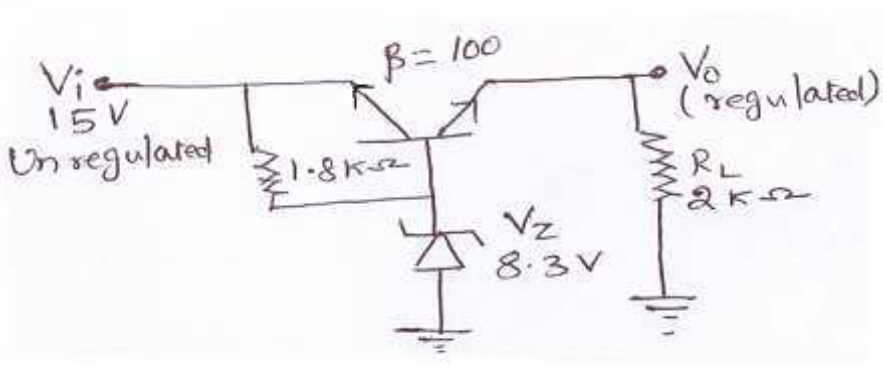

Figure 3b

4. (a) Write the reason why the Ico value is negative for NPN transistor & Ico value is positive for NPN transistor.
   (b) Define base spreading reisitance. [10+6]
5. A transistor with $\beta = 50$; V_{BE}=0.7V, V_{CC}=22.5V, and $R_C = 5.6\text{K}\Omega$ is used in biasing circuit shown in figure 5. It is designed to establish the quiescent point at

$V_{CE} = 12$V, $I_C = 1.5$mA and stability factor S < 3. Find the value of resistor R_{E1}, R_1 and R_2. [16]

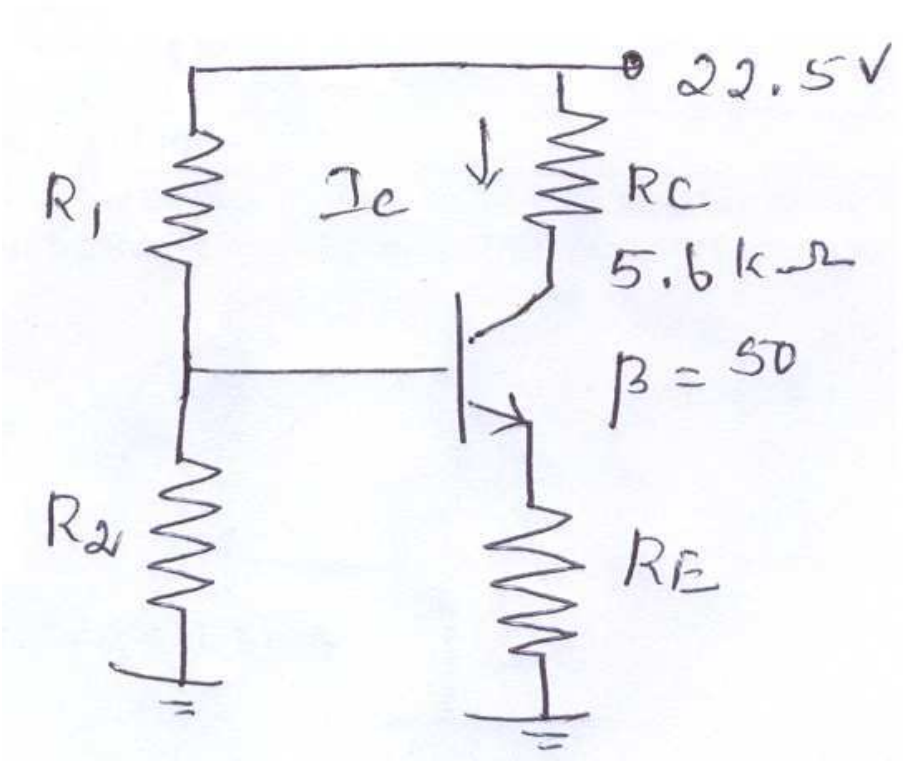

Figure 5

6. (a) Draw the low frequency hybrid equivalent. Circuit for CE & CB amplifier.
   (b) Give the approximate h-parameter conversion formulae for CB and CC configuration in terms of CE.
   (c) Give the advantages of h-parameter analysis.
   (d) Give the procedure to form the approximate h - model from exact h - model of amplifier. [4+6+3+3]

7. Draw the practical circuit for voltage series feedback and find the voltage gain, input impedance & output impedance. [16]

8. Explain briefly about frequency and amplitude stability of oscillators. [16]

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