KINGS

COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ACADEMIC YEAR 2007 – 2008 EVEN SEMSTER

YEAR : II-A SEC

SUBJECT NAME & CODE: EC1251-ELECTRONICS CIRCUITS-II

STAFF NAME : R.POORNIMA

UNIT-I

PART-A

1. An amplifier has a voltage gain of 1000, With negative gain reduces to 10. Calculate the fraction of the output i.e, feedback to the input. (2 marks)
2. Draw a block diagram of voltage shunt feedback amplifier and give its input and output resistance. (2 marks)
3. Compare positive and negative feedback. (2 marks)
4. List the four topologies of negative feedback. (2 marks)
5. Define desensitivity. (2 marks)
6. Mention the advantages of negative feedback. (2 marks)
7. Define current amplifier. (2 marks)
8. A feedback amplifier has an open loop gain of 600 and feedback factor $\beta = 0.01$. Find the closed loop gain with negative feedback. (2 marks)
9. A voltage series feedback amplifier has a voltage gain with feedback as 83.33 and feedback ratio as 0.01. Calculate the voltage gain of the amplifier without feedback. (2 marks)
10. If an amplifier has a gain of 60 db, a feedback of $\beta = 0.005$ is applied, what would be the change in overall gain of t he feedback amplifier if the internal amplifier is subjected to a gain reduction of 12%(2 marks)

UNIT-I PART-B

1. Explain in detail about effect of negative feedback, on gain, bandwidth, distortion and noise. (16)

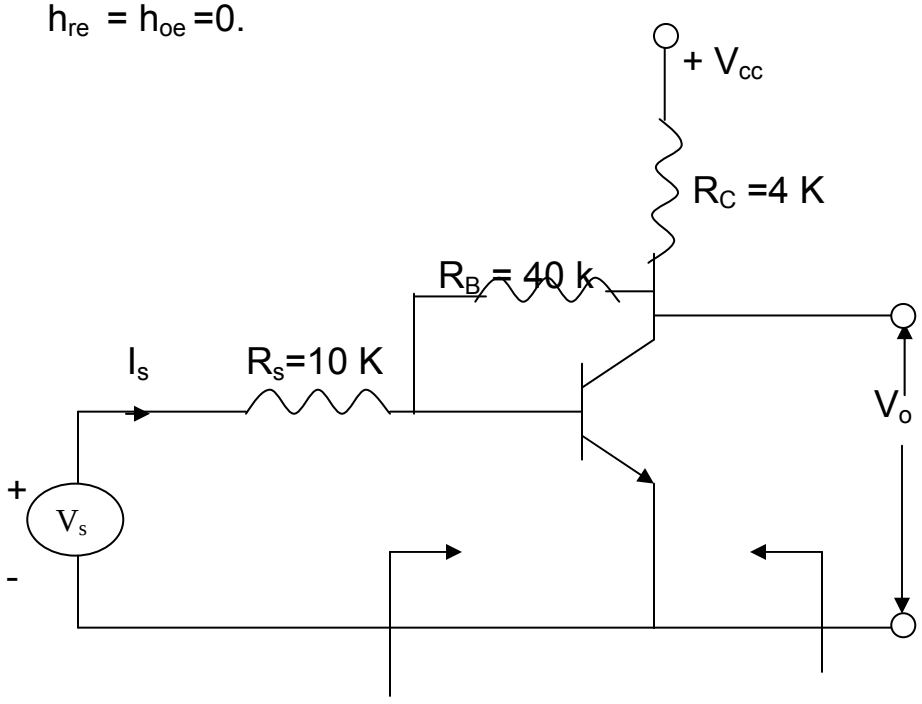
2. With neat sketch explain the current series feedback amplifier and also derive the expression for feedback ratio, voltage gain, D and β, R_{if} , R_{of} ,R_{of}' (16)

3. With neat sketch explain the voltage series feedback amplifier and also derive the expression for feedback ratio, voltage gain, D and β, R_{if} , R_{of} ,R_{of}' (16)

4. With neat sketch explain the voltage shunt feedback amplifier and also derive the expression for feedback ratio, voltage gain, D and β, R_{if} , R_{of} ,R_{of}' (16)

5. (i) An amplifier with negative feedback give an output of 12.5V with an input of 1.5V. When feedback is removed, it requires 0.25V input for the same output . Find (a) The value of voltage gain without feedback. (b) Value of feedback β, if the input and output are in phase. (8)
   (ii) Explain Nyquist Criterion in detail. (8)

6. For the amplifier circuit shown in figure with h_{fe} = 50, h_{ie}=1.1 kΩ h_{re} = h_{oe} =0.



R_{if}' R_{of}'

(i)Identityfy the type of negative feedback present.
(ii) Obtain the basic amplifier circuit.
(iii) Calculate the voltage gain, input resistance and output resistance of the given amplifier. (16)

7.(i) Derive the expression input and output resistance of voltage seires feedback amplifier. (8)
(ii) Derive the expression input and output resistance of current shunt feedback amplifier. (8)

8. .(i) Derive the expression input and output resistance of current seires feedback amplifier. (8)
(ii) Derive the expression input and output resistance of voltage shunt feedback amplifier. (8)

UNIT-II

PART –A

1. Compare oscillator and amplifier. (2 marks)
2. What are the advantages of RC and LC oscillators. (2 marks)
3. Define Barkhausan criterion(2 marks)
4. A colpitts oscillator is designed with C_2 =100 pF and C_1 =7500 pF. The inductance is variable. Determine the range of inductance values, if the frequency of oscillation is to vary between 950 kHz and 2050 kHz. (2 marks)
5. Calculate the frequency of oscillation for the clapp oscillator with C_1 =0.1μf, C_2 =1μf ,C_3 =100pf, and L =470μH. (2 marks)
6. Draw the electrical equivalent circuit of the quartz crystal oscillator and write the expression for series and parallel resonant frequencies. (2 marks)
7. Differentiate between phase shift and wien bridge oscillator. (2 marks)
8. The RC network of wien bridge oscillator consists of resistors and capacitors of values R_1 = R_2 =200 kΩ and C_1 = C_2 =250 pF. Determine the frequency of oscillation. (2 marks)
9. What is pizeo electric effect? (2 marks)
10. What are the conditions for sustained oscillations? (2 marks)

UNIT-II

PART –B

1. Draw the circuit of RC phase shift oscillator and explain its working. Also derive the expression of oscillation and condition for maintenance of oscillation. (16)
2. Explain Wein bridge oscillator circuit and derive its frequency of oscillation. (16)
3. Draw the circuit of Hartley oscillator and explain its working. Also derive the expression of oscillation and condition for maintenance of oscillation. (16)
4. Draw the circuit of colpitts oscillator and explain its working. Also derive the expression of oscillation and condition for maintenance of oscillation. (16)
5. Draw the circuit of clap oscillator and explain its working. Also derive the expression of oscillation and condition for maintenance of oscillation. (16)
6. (i) What is pizeo electric effect? Draw the equivalent circuit of quartz crystal. (6)
   (ii) Describe the crystal oscillator with neat circuit diagram. (6)
   (iii) The equivalent circuit of a crystal has the values of L = 1H, C = 0.01 pF, R = 1000 ohm, and C_m =20 pF. Calculate series resonant frequency and parallel resonant frequency of the crystal. (4)
7. In a colpitts oscillator, the values of the inductors and capacitors in the tank circuit are L =40mH, C_1 =100 pF and C_2 =500 pF.
   (1) Find the frequency of oscillation
   (2) If the input voltage is 10V, find the feedback voltage.
   (3) Find the minimum gain, if the frequency is changed by changing ‘L’ alone.
   (4) Find the value of C_1 for a gain of 10.
   (5) Also, find the new frequency of oscillation. (16)
8. (i) Draw the circuit of Miller and Pierce oscillator and explain its Working. (10)
   (ii) Write short notes on Twin –T oscillator. (6)

UNIT-III

PART –A

1. Differentiate between single and double tuned amplifier. (2 marks)
2. Mention the bandwidth of a double tuned amplifier. (2 marks)
3. What is quality factor? (2 marks)
4. Calculate the resonant frequency of a class C tuned amplifier whose capacitor value is 10 pF and inductor
5. value is 1mH. (2 marks)
6. Brief relation between bandwidth and Q-factor. (2 marks)
7. A parallel resonant circuit has an inductance if 150μH and a capacitance of 100 pF. Find resonant frequency. (2 marks)
8. Draw the frequency response curve of a double tuned voltage amplifier. (2 marks)
9. What is narrow band neutralization? (2 marks)
10. What are the advantages and disadvantages of tuned amplifier. (2 marks)
11. A class C tuned amplifier has inductance of 3 μH and capacitance of 470 pF in the tank circuit. Calculate the resonant frequency. (2 marks)

UNIT-III

PART –B

1. Draw the circuit diagram of capacitance coupled single tuned amplifier and derive the expression for the bandwidth. (16)
2. Write short notes on:
   (i) Stagger tuned amplifier (ii) Hazeltine Neutralization. (16)
3. Explain Class –C tuned amplifier and derive its efficiency. (16)
4. Draw the equivalent circuit synchronously tuned amplifier and derive the expression for the bandwidth. (16)
5. If class C tuned amplifier has R_L =6 kΩ and required tank circuit Q=80. Calculate the value of L and C of the tank circuit. Assume V_{cc} =20 V. resonant frequency = 5MHz and worst case power dissipation =20mW. (16)
6. Design a single tuned amplifier for following specifications:
   1. Center frequency =500 kHz.
   2. Bandwidth = 10kHZ

   Assume transistor parameters: g_m =0.04 S,h_{fe} =100, $C_{b'e}$ =1000 pF.

The bias network and the input resistance are adjusted so that r_i = 4 kΩ and R_L =510 Ω

UNIT-IV

PART –A

1. Define Duty cycle. (2 marks)
2. Give the applications of bistable multivibr4ator. (2 marks)
3. Draw the circuit of negative clipper with input and output waveforms. (2 marks)
4. What is clamper circuit? How it adds a d.c level to the output voltage. (2 marks)
5. An astable multivibrator has $C_1 = C_2$ =1000pf and $R_1 = R_2$ =20 kΩ. Find the frequency of oscillation. (2 marks)
6. What are application of monostable multivibrator? (2 marks)
7. Define Hysteresis loop. (2 marks)
8. How a Schmitt trigger is different from a multivibrator? (2 marks)
9. Draw a slicer circuit and explain its slicing operation. (2 marks)
10. Differentiate between clipper and clamper. (2 marks)

UNIT-IV

PART –B

1. Explain the operation of collector coupled astable multivibrator and also derive the expression of T for a collector coupled astable multivibrator. (16)
2. What is Schmitt trigger? Explain the working of a Schmitt trigger using neat sketch circuit diagram. Give the mathematical analysis of a Schmitt trigger. (16)
3. Draw the circuit diagram of emitter- coupled astable multivibrator and explain its operation with relevant waveforms. (16)
4. Draw the circuit diagram of bistable multivibrator and explain its operation with relevant waveforms. (16)
5. Design a Schmitt trigger circuit for V_{CC} =10V, UTP = 5 V, LTP = 3 V Assume $h_{fe\ (min)}$ = 100 and $I_{C\ (on)}$ =1mA.
6. Draw the circuit diagram of emitter- coupled monostable multivibrator and explain its operation with relevant waveforms. (16)
7. (i) Explain the classification of clipper circuit with neat sketch. (12)
   (ii) Explain the classification of clipper circuit with neat sketch. (04)
8. Consider a symmetrical collector coupled astable multivibrator using

npn silicon transistors. Specifications for the device and circuit are: V_{CC} =6 V, R_C = 560 Ω, R = 5.6 kΩ, C= 50 pF, h_{fe} =40, r_{bb}' =200 Ω Calculate the waveform at the base and collector of one transistor and plot to the scale. (16)

UNIT-V

PART –A

1. Give relation between rise time and bandwidth. (2 marks)
2. What is necessity for damping in a monostable –blocking oscillator? (2 marks)
3. Define time base generators. (2 marks)
4. Draw the input and output waveform of miller integrator circuit. (2 marks)
5. How to improve switching time of a transistor? (2 marks)
6. Draw the current time base generator circuit. (2 marks)
7. What are the applications of blocking oscillator? (2 marks)
8. Give few sweep circuits. (2 marks)
9. Draw the circuit of UJT sawtooth generator(2 marks)
10. Mention the features of Miller sawtooth generator. (2 marks)

UNIT-V

PART –B

1. With neat circuit diagram, explain the working of a monostable blocking oscillator using emitter timing. Draw the equivalent circuit. Also derive the expression for pulse width. (16)
2. Discuss briefly the operation of a current time base generator with necessary diagram. (16)
3. Describe the working of UJT relaxation oscillator. (16)
4. Design a astable blocking oscillator using diode control circuit with the following specifications and suitable assumptions.
   V_{CC} = 25 V; V_{BB} = 2 V ; f = 20kHZ ; Duty cycle =1/10.
   Peak of the pulse at collector is 20 V and emitter current is 3 mA peak. Calculate the value of V_γ , n, R and L. (16)
5. With necessary waveforms and circuit diagram explain the method of generating a linear sweep voltage using Bootstrap circuit. (16)
6. With neat circuit diagram, explain the working of a astable blocking oscillator using emitter timing. Draw the equivalent circuit. Also derive the expression for pulse width. (16)