BE (Regular) Degree End Semester Examinations, April/May 2014
IV Semester
EC8403 Electronic Circuits II
Reg-2012

Total Marks:100
Duration: 3Hrs

Answer All Questions

PART-A (10 X 2 =20 Marks)

1) Why single pole system is unconditionally stable?

2) Draw a circuit diagram of two stage voltage series feedback amplifier using BJTs and write its expression for feedback factor.

3) State Barkhausen criteria for oscillation.

4) A ring oscillator is constructed with three inverting amplifiers each with a bandwidth of 10KHz.Find the frequency of oscillation.

5) What is use of transformer in tuned amplifier circuit.

6) Differentiate between Synchronous and Staggered tuned amplifiers

7) List out the features of Chebyshev Filters.

8) A second-order filter has its poles as $s= -1/2 \pm j(\sqrt{3}/2)$. The transmission is zero at $\omega= 3$rad/s and is unity at dc ($\omega= 0$). Find the transfer function.

9) Determine the maximum power dissipation in a transistor.
θdev-case = 1.75°C/Watts, θcase-sink = 1°C/Watts, θsink-amb = 5°C/Watts, Tjmax=150°C and Tamb=30°C.

10) In Class-A power amplifier the output voltage across the direct coupled load of 10 ohms is $4\sin\omega t$. Let V_{CC}=12V. Determine its conversion efficiency.

PART-B (5 X 16 =80 Marks)

11) i) Design a low-pass filter by using butterworth approximation. Let fp=1KHz, fs=1.5KHz, Amax=1dB, Amin=50dB, dc gain=1. (8)

ii) Explain the principle of switched capacitor filter using inverting integrator (4)

iii) Design & Draw the first order high-pass filter with a corner frequency is 10^4 rad/s, and a high frequency gain is 10. Assume R=10KΩ to produce corner frequency. (4)

12)a)i) Draw the single stage current series feedback amplifier using BJT. Derive its overall trans-conductance gain, G_{MF}, Input Impedance, Rif, Output Impedance Rof.

(ii) Determine the trans-resistance gain R_{MF}, Input Impedance, Rif, Output Impedance, Rof of single stage voltage shunt feedback amplifier (BJT version).

From their characteristics find the suitable amplifier to amplify the signal-Reason-out why?

(5+5+2)

(iii)An amplifier is given negative feedback to reduce the gain from 10^5 to 50. Find the value of feedback factor. Also find the % change in gain with feedback (dAf in %) assuming change in gain without feedback is 10% (4)

(OR)

b)i) Consider a three-pole feedback amplifier with a loop gain given by

$$T(f)=\frac{5*10^5}{\left(1+j\frac{f}{10^6}\right)\left(1+j\frac{f}{10^7}\right)\left(1+j\frac{f}{10^8}\right)}$$

Determine the

(x) Frequency of the dominant pole to stabilize the feedback system. Assume the phase margin is atleast 45^o.

(y) The value of the feedback capacitor (to create dominant pole) when the gain of an amplifier is 10^3 and its resistance, R is 0.1MΩ. (8)

(ii) Identify the nature of feedback in Figure-1. Let R_{C1}=3KΩ, R_{C2}=500Ω, R_E=50Ω, R_S=R_F=1.2KΩ, hfe=50, hie=1.1KΩ, hre=hoe=0. Determine the overall voltage gain (Avf), overall current gain (Aif), (8)

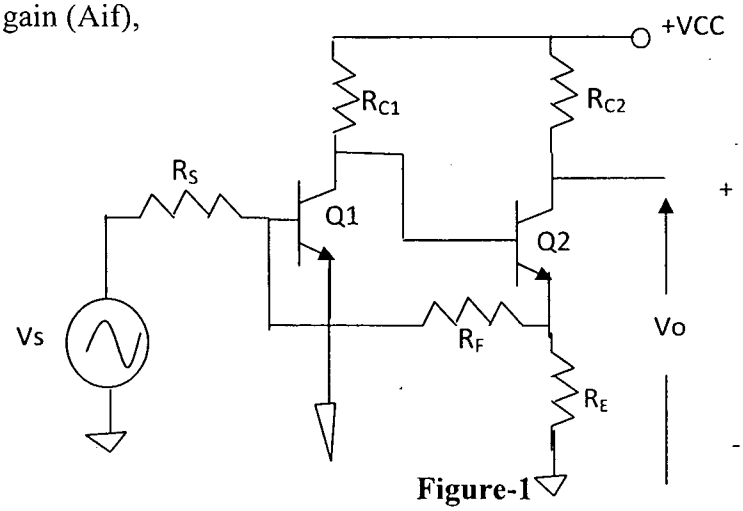

Figure-1

13)a)i) Explain RC-Phase shift oscillator using BJT transistor. Determine its frequency of oscillation. (10)

ii) Design an oscillator with feedback network shown in Figure-2. Let V_{CC}=20V and hfe=150. (6)

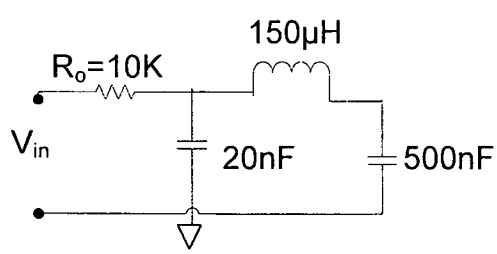

Figure-2

(OR)

b)i) Draw Clapp oscillator using FET, Explain and derive the condition for oscillation (10)

ii) In Colpitt's Oscillator C1=1μF and C2=0.2μF. If the frequency of oscillation is 10KHz, find the value of inductor. Also find the required gain for sustained oscillation. (4)

iii) Compare between Colpitt's and Clapp Oscillator. (2)

14)a) (i) Explain single tuned amplifier and derive for gain, resonant frequency and cutoff frequencies (10)

(ii) A JFET tuned amplifier is tuned at 200 KHz using coil with Q=100 and L=1.0 mH, gm=2mA/V and rd=20KΩ. Find the values of loaded Q, tuning capacitance, bandwidth, maximum gain and gain at 5KHz of resonance. (6)

(OR)

b) (i) List out the neutralization techniques that are used in the stability of tuned amplifiers. With the help of neat circuit diagram explain any one. (6)

(ii) Explain the frequency response of a stagger tuned amplifier (6)

(iii) Consider the design of an IF amplifier for FM radio receiver. Using two synchronously tuned stages with fo=10.7 MHz and 3-dB bandwidth of each stage so that the overall bandwidth is 200KHz. Using 3-μH inductors find C and R for each stage (4)

15))a)Explain the Buck-Boost Converter with the help of its relevant waveforms. Derive the equation for its output voltage, ripple current, critical values of inductance and capacitance. (16)

(OR)

b)i) Explain Class-AB power amplifier utilizing the MOSFETs as output stage (10)

(ii)In boost converter, Vo=15V,Vin=5V, L=150μH, C=220μF and switching frequency=25 KHz. Calculate the values of Duty cycle, ripple current and ripple voltage. (4)

(iii) Define Cross-over distortion. How to overcome it (2)