Code No: RR210401 **Set No.1**

II B.Tech. I Semester Supplementary Examinations, May -2005
ELECTRONIC CIRCUITS ANALYSIS
(Electronics & Communication Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Give the typical values for h-parameters of CC configuration. Prove that
$$Y_o = h_o \left(\frac{R_s + R_{i\infty}}{R_s + R_{io}}\right)$$
Where $R_i\infty \equiv R_i$ for $R_L = \infty$, and $R_{io} \equiv R_i$ for $R_L = 0$.

   (b) For a CE amplifier, what is the maximum value of R_s for which R_o differs by not more than 10% of its value for $R_s = 0$? Given $h_{ie} = 1.1K\Omega$, $h_{fe} = 50$, $h_{re} = 2.5 \times 10^{-4}$, $h_{oe} = 25\mu A/V$.

   (c) Derive the condition to obtain A_V=1 in CC single stage amplifier.

2. (a) Derive the expression for f_T and f_β of CE amplifier using HF model.

   (b) If $\beta = 150$, what are the cut off frequencies of the input and output of the given circuit? {As shown in the Figure1}

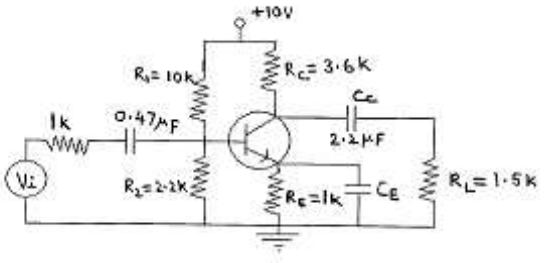

Figure 1:

3. (a) How is the High frequency gain of a single stage amplifier dependent on frequencies f_1 and f_2.

   (b) In an RC-coupled BJT amplifier, we have R_L=6.8k, effective ac load after C_c is R_{ac}=1k, C_c=1 μ f, CE=24μF, R_E=2.2k, h_{fe} =49, R_S=5k and h_{ie}=1k, find the low frequency cut off point.

4. (a) What is a tuned amplifier? What are the various types of tuned amplifiers.

   (b) Draw the equivalent circuit of a capacitance coupled single tuned amplifier and derive the equation for voltage gain.

5. (a) If two transistors are employed in a push-pull amplifier with cut-off bias, or in Class-B operation of the amplifier, explain the process of generation of 'crossover distortion' with necessary diagrams and the reasons behind such phenomenon.

(b) Suggest a suitable circuit for minimizing the above distortion.

6. (a) Explain about synchronous tuning of Tuned amplifiers with a block diagram for the system concept.

   (b) Draw the circuit of double-tuned transformer-coupled amplifier. Discuss the nature of responses of the amplifier for different values of KQ=1; KQ>1 and KQ<1.

7. (a) With reference to voltage regulators discuss about

      i. Output resistance

      ii. Load regulation

      iii. Line regulation

   (b) Explain the limitations of unregulated power supplies. To derive regulated DC output from AC mains, what are the important building blocks required. Explain about each block.

8. (a) Draw the circuit diagrams of voltage doubler and voltage tripler and explain their working.

   (b) What are the limitations of 3 terminal regulator?

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Code No: RR210401 **Set No.2**

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

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1. (a) State Miller's theorem .Explain its significance in transistor circuit analysis.
   (b) For the amplifier circuit calculate R_i, $R_i^{'}$, A_V , A_{VS} , A_I . Assume h_{ie}=1k and h_{fe}=100. {As shown in the Figure2}

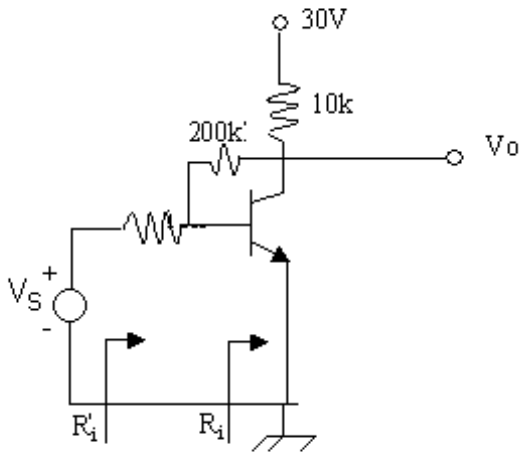

Figure 2:

2. (a) Explain how the parameters of hybrid-π model varies with I_C, V_{CE} and temperature.
   (b) The hybrid-π parameters of the transistor used in circuit are : g_m = 50mA/V, $r_{bb'}$=100Ω, $r_{b'e}$= 1K, $r_{b'c}$ = 4M, r_{ce} = 80K, C_c = 3PF, C_e = 100 PF. Using Miller's theorem and the appropriate analysis, compute {As shown in the Figure3}
      i. The upper 3 dB frequency of the current gain A_I
      ii. The magnitude of voltage gain at the frequency of part (i).

3. (a) The gain of an RC coupled 2 stage FET amplifier falls by 90% of the midband value at 400 kHz. If g_m of each FET is 10 m A/V, and total output capacitance for each stage is 20 pf. Calculate the R_L required and the stage midband gain.
   (b) Write a short note on Bandwidth of amplifiers.

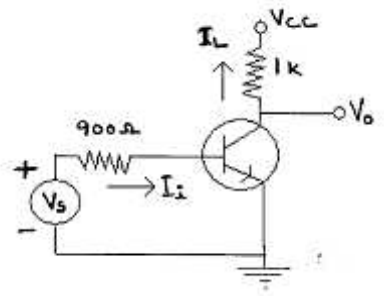

Figure 3:

4. (a) Show that in the case of transformer coupled class A power amplifier, maximum theoretical efficiency is 50%.
   (b) Compare series fed and transformer coupled class A power amplifiers.

5. (a) Show the necessary details of thermal-to-electrical analogy of power transistor. Explain the functioning of heat sinks used with power transistors?
   (b) A silicon power transistor is operated with a heat sink having thermal resistance θ_{SA}=1.5^{0}C / W. The transistor rated at 150 W (25^{0}C) has θ_{jC}=0.5^0 C / W and the mounting insulation has θ_{CS}=0.6^0 C / W. Calculate the maximum power that can be dissipated, if the ambient temperature is 40^0 C and T_{jmax} = 200^0 C?

6. (a) Draw the circuit of single tuned amplifier and explain its operation.
   (b) Draw the ideal and actual response characteristics of single tuned amplifiers
   (c) Discuss the significance of the pass band characteristic of tuned amplifiers when they are used in Radio receivers.

7. (a) Define the following terms.
      i. Input regulation factor
      ii. Output resistance
      iii. Temperature coefficient
   (b) Draw the circuit of a series regulator circuit to stabilize the DC output voltage and explain the design methodology.

8. (a) Draw the circuit diagrams of voltage doubler and voltage tripler circuits and explain their working.
   (b) What are the limitations and important features of three terminal regulators?
   (c) Draw the circuit of 7805 voltage regulator circuit and explain its operations.

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1. (a) What is square law distortion? What is its effect in FET amplifiers? Compare important characteristics of CD, CS, CG FET amplifier.
   (b) A self-biased CE amplifier circuit has R_1 = 100KΩ , R_2 = 10K, R_c = 5K, R_E = 1KΩ, R_S = 10K. Compute A_I, A_V, A_{VS} and R_i. The h-parameters of the transistor are h_{ie} = 1.1kΩ, h_{fe} = 50, h_{re} = 2.5 x 10^{-4} , h_{oe} = 25μA/V.
2. (a) Draw an approximate equivalent Hybrid π circuit for the calculation of the short-circuit CE current gain and derive the same.
   (b) Derive the frequencies f_β and f_T from the above derivation.
3. (a) Explain about different types of distortions that occur in amplifier circuits.
   (b) When 2-stages of identical amplifiers are cascaded, obtain the expressions for overall voltage gain, current gain and power gain.
4. (a) In a class B amplifier V_{CEmin}=1V and supply voltage V_{cc} is equal to 18V. Find the collector circuit efficiency.
   (b) Write a short note on power output and efficiency of power amplifiers.
5. (a) Mention the reasons for power dissipation in transistors used in power amplifiers and explain some typical methods of 'heat sinking'.
   (b) Explain the phenomenon of 'crossover distortion' that pops up in complementary-symmetry push-pull amplifier circuit for class-B operation. Explain with necessary diagrams, how 'trickle bias' overcomes the above problem.
   (c) Show some typical shapes of 'heat sinks'.
6. (a) Draw the circuit of FET tuned Voltage amplifier. Derive the necessary expression to draw the universal resonance curve with all necessary details.
   (b) Design the single stage FET tuned amplifier for the following specifications, f_o=12 M Hz. Bandwidth B=10 KHZ and midband voltage gain A_{vm} = -15. The FET parameters are g_m=4 ms r_d=25K ohms; C_{GS}= 30pf; C_{GD}=C_{DS}=5pf.
7. (a) What is the function of voltage regulator circuit? How it is different from unregulated power supply.
   (b) Define the following terms.
      i. Line input regulation
      ii. Load regulation

(c) Draw the circuit of a simple Zener regulator and explain its operation with the help of load characteristics.

8. (a) What are the limitations of three terminal regulators?

(b) Draw the circuit diagram of a three terminal regulator to deliver more than the rated current of regulator and explain its operation.

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Code No: RR210401 **Set No.4**

II B.Tech. I Semester Supplementary Examinations, May -2005
ELECTRONIC CIRCUITS ANALYSIS
(Electronics & Communication Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) The h-parameters of a transistor amplifier shown in figure4. below are h_{ie} = 1.1 KΩ, $h_{re} = 2.5 \times 10^{-4}$, $h_{fe} = 50$, $h_{oe} = 24\ \mu$A/V. Calculate A_I, A_V , A_{VS}, R_o, and R_i

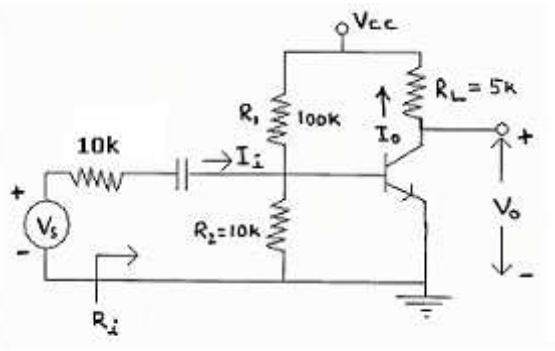

Figure 4:

   (b) Give the analysis of 1-stage transistor amplifier circuit.

2. (a) Define f_β and f_T and derive the relation between f_β and f_T.
   (b) The h-parameters of a transistor at I_c = 8mA, V_{CE} = 10v, and at room temperature are h_{ie} = 1KΩ , h_{oe} = 2 x 10^{-5} A/V, h_{fe} = 50, h_{re} = 2.5 x 10^{-4}. At the same operating point, f_T = 60 MHz, and C_{ob} = 2PF. Compute the values of hybrid - π parameters.

3. (a) Explain about different types of distortions that occur in amplifier circuits.
   (b) When 2-stages of identical amplifiers are cascaded, obtain the expressions for overall voltage gain, current gain and power gain.

4. In a class A amplifier V_{CEmax}=25 Ω, V_{CEmin}=5 v. Find the overall efficiency for
   (a) series fed load
   (b) Transformer coupled load.

5. (a) Draw the circuit diagram of a complementary symmetry push pull amplifier and explain its working.
   (b) Distinguish between cross over distortion and harmonic distortion. How they can be eliminated.

6. (a) What are the main advantages of class-C operating mode in RF applications?
   (b) Draw the circuit of class C radio frequency amplifier and explain its operation with necessary waveforms

7. (a) Define the following terms.
      i. Load regulation
      ii. Line regulation
      iii. Temperature Stability.
   (b) Give the circuit of a short circuit overload protection that is to be provided in a voltage regulator circuit and explain its working.

8. (a) Give the internal block schematic and pin configurations of 723 - voltage regulator.
   (b) Draw circuit diagram of 7812 voltage regulator along with current boosting circuit and explain its operation. Derive expression for load current.

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