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

II B.Tech I Semester Supplementary Examinations, November 2006
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) Derive the expressions for A_I, A_V, R_i and R_o of CC amplifier circuit.
   (b) Consider a 1-stage CE amplifier with R_S = 1KΩ and R_L = 1.2KΩ. Using typical values of h-parameters find A_I, A_V, R_i and R_o. [8+8]

2. (a) What are the specifications of amplifiers? Explain them. Give their typical values.
   (b) The LF parameters of a transistor at I_c = 20mA, V_{ce} = 10V and at room temperature h_{ie} = 400 Ω, h_{oe} = 10 $^{-5}$ A/V , h_{fe} = 150, h_{re} = 10^{-4} . At the same operating point f_T = 60 MHz, and C_{ob} = 3PF , compute the values of all the hybrid -π parameters. [6+10]

3. (a) Obtain the theoretical expressions for f_1n and f_2n when n-stages of identical amplifiers are cascaded.
   (b) For a given transistor (BJT), h_{fe} = 100. f_B = 5 KHzs. Determine the Bandwidth of the transistor. If the lower cut off frequency f_1 = 100 Hzs and upper cut off frequency f_2 = 100 KHzs, then determine the midband frequency f_0 of the amplifier circuit. [10+6]

4. (a) Derive the expression for maximum collector Power Dissipation $P_{c(Max)}$ in the case of class B power amplifiers.
   (b) What are the different types of coupling employed in Power Amplifiers? Compare them critically. [8+8]

5. (a) Derive the expression, with necessary diagrams, to calculate the total harmonic distortion 'D' in power amplifiers using the five-point method of analysis.
   (b) State the expression relating the total output power 'P'; total harmonic distortion 'D' and the fundamental power 'P_1' in power amplifiers. If total distortion in the amplifier is 9%; calculate its contribution to the total power .
   (c) Discuss the effect of the increase in the order of harmonic frequency in power amplifier stage used in an instrument for listening to music. [8+4+4]

6. The schematic circuit diagram of a basic class-C tuned amplifier is shown in the following figure1.
   (a) Explain the mechanism of dynamic d.c. bias to the transistor
   (b) Draw the various signal waveforms in the stage.

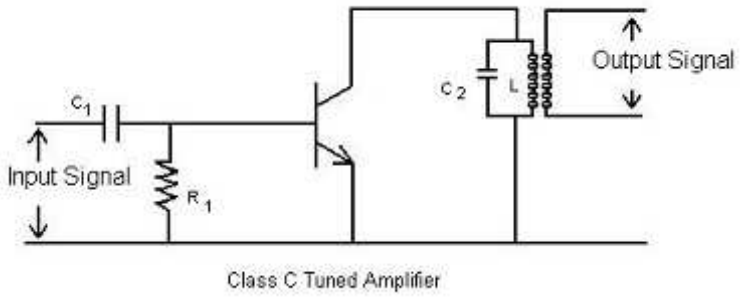

Figure 1:

(c) Explain how the conversion of d.c power to a.c signal power is much more efficient in class-C operation than that in either class-A or class-B operation of the amplifier [5+5+6]

7. (a) Design a series regulated power supply with following specifications.
Unregulated input voltage V_i = 30V and r_0 = 8 ohms
Regulated output voltage = 12 V
Maximum load current = 200 ma.
Control transistor h_{fe} = 100, h_{ie} = 200 ohms
Amplifier transistor h_{fe}= 200, h_{ie} = 1000 ohms
Reference voltage V_R = 6V
Zener resistance R_z = 10 ohms
Zener current = 20 mA

(b) Also calculate its stability factor and output resistance

(c) Also draw the complete circuit diagram with the designed component values.

[8+8]

8. (a) What are the draw backs of three terminal regulators

(b) Draw the circuit diagram of a dual power supply using three terminal regulators to obtain ±15 V output voltage and explain the operation of the circuit.

[6+10]

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

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

Answer any FIVE Questions
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1. (a) Figure1 given shows CS amplifier with self-bias and by pass resistor R_S. Derive the expressions for R_i, R_o and A_V . Using its equivalent circuit.

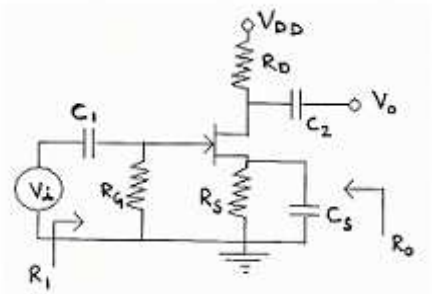

Figure 1:

(b) The transistor amplifier shown Figure2 uses a transistor whose h-parameters are h_{ie} = 1.1K, h_{fe} = 50, h_{re}= 2.5 x 10^{-4}, h_{oe} =25 μA/V. Calculate A_i, A_V, A_{VS}, $R_i^{'}$ and $R_o^{'}$. [8+8]

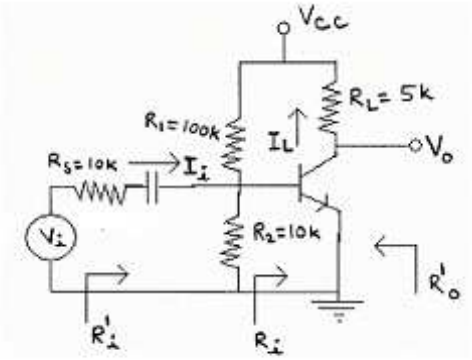

Figure 2:

2. (a) Prove that (i) h_{fe}=$g_m$rb/e for a Hybrid π model of CE amplifier.
   (b) How does a C_e and C_c vary with $|I_c|$ *and* $|V_{CE}|$.
   (c) How does g_m vary with $|I_c|$ *and* $|V_{CE}|, T$. [5+6+6]

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. [8+8]

4. (a) Determine the input power, output power and efficiency for a class B power amplifier circuit with V_{cc}=30 V , I_m=1 Amp and R_L=10 Ω.

   (b) Draw the circuit of transformerless pushpull amplifier circuit with loud speaker as the load resistance. Justify the circuit operation with "emitter follower" circuit working. [8+8]

5. (a) Explain why the complimentary symmetry power amplifier has become more popular in modern circuits.

   (b) Draw a practical circuit of a complimentary symmetry push pull amplifier circuit? Explain its function. [8+8]

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. [8+8]

7. (a) List out the advantages of a voltage regulator circuit over unregulated power supply.

   (b) Define the following terms.

      i. Line regulation

      ii. Load regulation

   (c) Draw the circuit of a simple Zener regulator circuit and state how to determine the component value. Explain the operation of the circuit with the help of load characteristics. [6+4+6]

8. (a) What are the draw backs of three terminal regulators

   (b) Draw the circuit diagram of a dual power supply using three terminal regulators to obtain ±15 V output voltage and explain the operation of the circuit.

[6+10]

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Code No: RR210401 **Set No. 3**

II B.Tech I Semester Supplementary Examinations, November 2006
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Time: 3 hours **Max Marks: 80**

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1. (a) Listout the characteristics of CB amplifier and mention their typical values. Draw the basic CB amplifier circuit and its eqivaleant h-parameter model. Derive an expression for its R_i and R_o.

   (b) The FET shown Figure1 has the following parameters : I_{DSS} = 5.6 ma, and V_P = -4V.

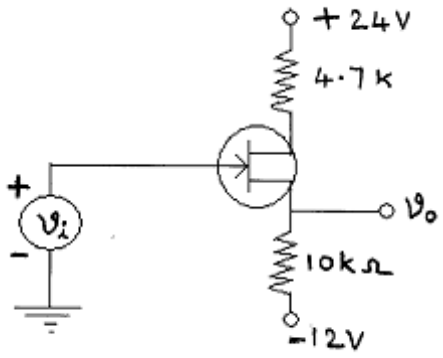

Figure 1:

   i. If $v_i = 0$, find v_o
   ii. If $v_I = 10$V , find v_o
   iii. If $v_o = 0$, find v_i [8+8]

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 Figure2}

   i. The upper 3 dB frequency of the current gain A_I
   ii. The magnitude of voltage gain at the frequency of part (i). [6+10]

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. [6+10]

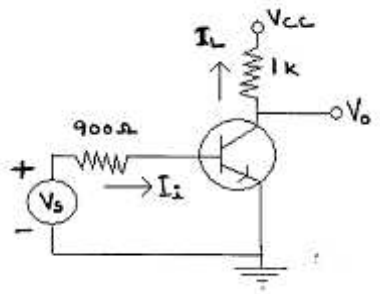

Figure 2:

4. (a) How are amplifiers classified based on the bias conditions.
   (b) Derive the equation for power output and conversion efficiency of a class A series fed Amplifier. [8+8]

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? [8+8]

6. (a) Explain the operation of a Double tuned amplifier.
   (b) Explain the advantages of double tuned circuit over single tuned circuit. [8+8]

7. (a) Design a series regulated power supply with following specifications.
   Unregulated input voltage V_i = 30V and r_0 = 8 ohms
   Regulated output voltage = 12 V
   Maximum load current = 200 ma.
   Control transistor h_{fe} = 100, h_{ie} = 200 ohms
   Amplifier transistor h_{fe}= 200, h_{ie} = 1000 ohms
   Reference voltage V_R = 6V
   Zener resistance R_z = 10 ohms
   Zener current = 20 mA
   (b) Also calculate its stability factor and output resistance
   (c) Also draw the complete circuit diagram with the designed component values. [8+8]

8. (a) Draw the circuit for 7805 voltage regulator along with unregulated power supply and explain its working.
   (b) Explain how 78XX can be used as a current source. Draw the circuit and explain. [8+8]

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

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ELECTRONIC CIRCUITS ANALYSIS
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1. (a) i. For the given circuit, draw it's a.c. equivalent circuit and derive the expression for R_i.{As shown in the Figure1}

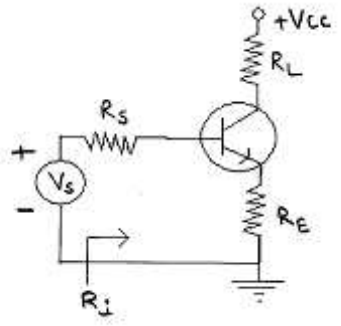

Figure 1:

ii. If $R_L = R_E = 1K\Omega$ and using typical values of h-parameters $h_{ie} = 1.1K$, $h_{fe} = 50$, $h_{re} = 2.5 \times 10^{-4}$, $h_{oe} = 25\ \mu A/V$. What is the value of R_i?

(b) For CD amplifier as shown in figure2 $g_m = 2.5mS$, $r_d = 25K\Omega$, calculate R_i, R_o and A_V. [8+8]

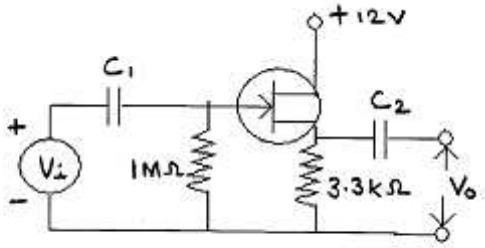

Figure 2:

2. (a) Derive the expressions for transconductance and input conductance of CE amplifier using HF model.

(b) The following LF parameters are known for a given transistor at Ic = 10 mA, V_{CE} =5V and at room temperature $h_{ie} = 500\Omega$, $h_{oe} = 10^{-5}A/V$, $h_{fe} = 100$,

$h_{re} = 10^{-4}$. At the same operating point f_T = 50 MHz, and C_{ob} = 3 PF, compute the values of all the hybrid-π parameter. [6+10]

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. [8+8]

4. (a) Distinguish between large signal and small signal amplifiers.
   (b) Calculate the transformer turns ratio required to match a 8 ohms speaker to an amplifier so that the effective load resistance is 7,2 k ohms.
   (c) What are the advantages and disadvantages of push pull amplifier. [5+5+10]

5. (a) Explain the method of determination of total harmonic distortion in push pull power amplifiers using 5 - point analysis.
   (b) Calculate the harmonic distortion components for an output signal, in push pull power amplifiers; having fundamental amplitude of 2.5 Volts, second harmonic amplitude of 0.25 Volts, third harmonic amplitude of 0.1 Volts, fourth harmonic amplitude of 0.05V. Also calculate the total harmonic distortion.

   [8+8]

6. (a) What is a stagger tuned amplifier and explain its working.
   (b) Derive the equation for the 3 dB band width of capacitance coupled single tuned amplifier.

7. (a) Design a series regulated power supply with following specifications.
   Unregulated input voltage V_i = 30V and r_0 = 8 ohms
   Regulated output voltage = 12 V
   Maximum load current = 200 ma.
   Control transistor h_{fe} = 100, h_{ie} = 200 ohms
   Amplifier transistor h_{fe}= 200, h_{ie} = 1000 ohms
   Reference voltage V_R = 6V
   Zener resistance R_z = 10 ohms
   Zener current = 20 mA
   (b) Also calculate its stability factor and output resistance
   (c) Also draw the complete circuit diagram with the designed component values.

   [8+8]

8. (a) Draw the circuit diagram of half wave voltage doubler circuit and explain its operation. Sketch the input and output waveforms. Mention what is the PIV of diode. What is its output voltage under no load conditions?
   (b) Why regulator is necessary for power supplies - Give reasons. [10+6]

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