Code No: R07A10401 **R07** **Set No. 2**

I B.Tech Examinations,December 2010
BASIC ELECTRONIC DEVICES AND CIRCUITS
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw and explain a fixed bias circuit. Explain why the circuit is unsatisfactory if the transistor is replaced by another of the same type.
   (b) Find the value of thermal resistance required for the Ge transistor for self bias circuit with the collector current of 1.5mA at 25 ^{0}C and it increases by 0.131mA over a temperature range of 25 to 75 ^{0}C in order for the circuit to be thermally stable. Assume V_{cc}=30V and R_c=2.0K and R_e=4.7K. [8+8]

2. (a) Explain the input and output characteristics of BJT in CB configuration.
   (b) Compare important characteristics of BJT and FET. [10+6]

3. (a) Draw and explain the approximate model of a CC amplifier.
   (b) Find the voltage gain and current gain of a CE amplifier whose h_{ie} = 1 KΩ, h_{fe} = 50, h_{re} = 2.5 x 10^{-4}, h_{oe} = 25 μA/V. Consider the source and load resistance of 1 KΩ both. [8+8]

4. (a) Explain the construction, operation and applications of the varactor diode.
   (b) In a p-type semiconductor, the Fermi level lies 0.4 eV above the valance band. Determine the new position of the Fermi level if the concentration of acceptor atoms is multiplied by a factor of:
      i. 0.5 and

ii. 4.0.

KT = 0.025eV. [10+6]

5. (a) Draw the schematic diagram of a CRT and explain about the various sections and the materials used.

   (b) In a CRT, the electrons emitted are accelerated by a potential of 500V. The length of the deflecting plates is 1.3 cm. Distance between the deflecting plates is 0.5 cm. The distance between the centre of the deflecting plates and the screen is 20 cm. Determine the value of electrostatic deflection sensitivity. [8+8]

6. (a) Prove that the amplitude of the oscillations is limited by the onset of nonlinearity.

   (b) Design a phase-shift oscillator to operate at a frequency of 5kHz. Use a MOSFET with μ=55 and r_d=5.5K. The phase shift network is not to load down the amplifier. Find the minimum value of the drain circuit resistance Rd for which the circuit will oscillate. [8+8]

7. (a) Derive the expression for ripple factor in a full wave rectifier using an inductor filter.

   (b) In a full wave rectifier using an LC-filter L=10 H, C=100μ F and R_L=500Ω. Calculate I_{dc}, V_{dc} for an input V=30sin (100πt). [8+8]

8. (a) State the three fundamental assumptions which are made in order that the expression A_f=A/(1+A β) be satisfied exactly.

   (b) The output impedance may be calculated as the ratio of the open circuit voltage to the short circuit current. Using this method evaluate output resistance with feedback R_{of} for a voltage-series feedback amplifier. [6+10]

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Code No: R07A10401 **R07** **Set No. 4**

I B.Tech Examinations,December 2010
BASIC ELECTRONIC DEVICES AND CIRCUITS
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Derive the expression for ripple factor in a full wave rectifier using an inductor filter.
   (b) In a full wave rectifier using an LC-filter L=10 H, C=100μ F and R_L=500Ω. Calculate I_{dc}, V_{dc} for an input V=30sin (100πt). [8+8]
2. (a) Explain the input and output characteristics of BJT in CB configuration.
   (b) Compare important characteristics of BJT and FET. [10+6]
3. (a) Explain the construction, operation and applications of the varactor diode.
   (b) In a p-type semiconductor, the Fermi level lies 0.4 eV above the valance band. Determine the new position of the Fermi level if the concentration of acceptor atoms is multiplied by a factor of:
      i. 0.5 and
      ii. 4.0.

   KT = 0.025eV. [10+6]
4. (a) Draw and explain the approximate model of a CC amplifier.
   (b) Find the voltage gain and current gain of a CE amplifier whose h_{ie} = 1 KΩ, h_{fe} = 50, h_{re} = 2.5 x 10^{-4}, h_{oe} = 25 μA/V. Consider the source and load resistance of 1 KΩ both. [8+8]

5. (a) Prove that the amplitude of the oscillations is limited by the onset of nonlinearity.

   (b) Design a phase-shift oscillator to operate at a frequency of 5kHz. Use a MOSFET with μ=55 and r_d=5.5K. The phase shift network is not to load down the amplifier. Find the minimum value of the drain circuit resistance Rd for which the circuit will oscillate. [8+8]

6. (a) Draw and explain a fixed bias circuit. Explain why the circuit is unsatisfactory if the transistor is replaced by another of the same type.

   (b) Find the value of thermal resistance required for the Ge transistor for self bias circuit with the collector current of 1.5mA at 25 ^{0}C and it increases by 0.131mA over a temperature range of 25 to 75 ^{0}C in order for the circuit to be thermally stable. Assume V_{cc}=30V and R_c=2.0K and R_e=4.7K. [8+8]

7. (a) State the three fundamental assumptions which are made in order that the expression A_f=A/(1+A β) be satisfied exactly.

   (b) The output impedance may be calculated as the ratio of the open circuit voltage to the short circuit current. Using this method evaluate output resistance with feedback R_{of} for a voltage-series feedback amplifier. [6+10]

8. (a) Draw the schematic diagram of a CRT and explain about the various sections and the materials used.

   (b) In a CRT, the electrons emitted are accelerated by a potential of 500V. The length of the deflecting plates is 1.3 cm. Distance between the deflecting plates is 0.5 cm. The distance between the centre of the deflecting plates and the screen is 20 cm. Determine the value of electrostatic deflection sensitivity. [8+8]

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Code No: R07A10401 **R07** **Set No. 1**

I B.Tech Examinations,December 2010
BASIC ELECTRONIC DEVICES AND CIRCUITS
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) State the three fundamental assumptions which are made in order that the expression A_f=A/(1+A β) be satisfied exactly.
   (b) The output impedance may be calculated as the ratio of the open circuit voltage to the short circuit current. Using this method evaluate output resistance with feedback R_{of} for a voltage-series feedback amplifier. [6+10]

2. (a) Derive the expression for ripple factor in a full wave rectifier using an inductor filter.
   (b) In a full wave rectifier using an LC-filter L=10 H, C=100μ F and R_L=500Ω. Calculate I_{dc}, V_{dc} for an input V=30sin (100πt). [8+8]

3. (a) Draw and explain the approximate model of a CC amplifier.
   (b) Find the voltage gain and current gain of a CE amplifier whose h_{ie} = 1 KΩ, h_{fe} = 50, h_{re} = 2.5 x 10^{-4}, h_{oe} = 25 μA/V. Consider the source and load resistance of 1 KΩ both. [8+8]

4. (a) Explain the construction, operation and applications of the varactor diode.
   (b) In a p-type semiconductor, the Fermi level lies 0.4 eV above the valance band. Determine the new position of the Fermi level if the concentration of acceptor atoms is multiplied by a factor of:

i. 0.5 and
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KT = 0.025eV. [10+6]

5. (a) Explain the input and output characteristics of BJT in CB configuration.
   (b) Compare important characteristics of BJT and FET. [10+6]

6. (a) Prove that the amplitude of the oscillations is limited by the onset of nonlinearity.
   (b) Design a phase-shift oscillator to operate at a frequency of 5kHz. Use a MOSFET with μ=55 and r_d=5.5K. The phase shift network is not to load down the amplifier. Find the minimum value of the drain circuit resistance Rd for which the circuit will oscillate. [8+8]

7. (a) Draw the schematic diagram of a CRT and explain about the various sections and the materials used.
   (b) In a CRT, the electrons emitted are accelerated by a potential of 500V. The length of the deflecting plates is 1.3 cm. Distance between the deflecting plates is 0.5 cm. The distance between the centre of the deflecting plates and the screen is 20 cm. Determine the value of electrostatic deflection sensitivity. [8+8]

8. (a) Draw and explain a fixed bias circuit. Explain why the circuit is unsatisfactory if the transistor is replaced by another of the same type.
   (b) Find the value of thermal resistance required for the Ge transistor for self bias circuit with the collector current of 1.5mA at 25 ^{0}C and it increases by 0.131mA over a temperature range of 25 to 75 ^{0}C in order for the circuit to be thermally stable. Assume V_{cc}=30V and R_c=2.0K and R_e=4.7K. [8+8]

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Code No: R07A10401 **R07** **Set No. 3**

I B.Tech Examinations,December 2010
BASIC ELECTRONIC DEVICES AND CIRCUITS
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) State the three fundamental assumptions which are made in order that the expression A_f=A/(1+A β) be satisfied exactly.
   (b) The output impedance may be calculated as the ratio of the open circuit voltage to the short circuit current. Using this method evaluate output resistance with feedback R_{of} for a voltage-series feedback amplifier. [6+10]

2. (a) Draw and explain the approximate model of a CC amplifier.
   (b) Find the voltage gain and current gain of a CE amplifier whose h_{ie} = 1 KΩ, h_{fe} = 50, h_{re} = 2.5 x 10^{-4}, h_{oe} = 25 μA/V. Consider the source and load resistance of 1 KΩ both. [8+8]

3. (a) Derive the expression for ripple factor in a full wave rectifier using an inductor filter.
   (b) In a full wave rectifier using an LC-filter L=10 H, C=100μ F and R_L=500Ω. Calculate I_{dc}, V_{dc} for an input V=30sin (100πt). [8+8]

4. (a) Prove that the amplitude of the oscillations is limited by the onset of nonlinearity.
   (b) Design a phase-shift oscillator to operate at a frequency of 5kHz. Use a MOSFET with μ=55 and r_d=5.5K. The phase shift network is not to load down

the amplifier. Find the minimum value of the drain circuit resistance Rd for which the circuit will oscillate. [8+8]

5. (a) Draw and explain a fixed bias circuit. Explain why the circuit is unsatisfactory if the transistor is replaced by another of the same type.

   (b) Find the value of thermal resistance required for the Ge transistor for self bias circuit with the collector current of 1.5mA at 25 ^{0}C and it increases by 0.131mA over a temperature range of 25 to 75 ^{0}C in order for the circuit to be thermally stable. Assume V_{cc}=30V and R_c=2.0K and R_e=4.7K. [8+8]

6. (a) Explain the input and output characteristics of BJT in CB configuration.

   (b) Compare important characteristics of BJT and FET. [10+6]

7. (a) Draw the schematic diagram of a CRT and explain about the various sections and the materials used.

   (b) In a CRT, the electrons emitted are accelerated by a potential of 500V. The length of the deflecting plates is 1.3 cm. Distance between the deflecting plates is 0.5 cm. The distance between the centre of the deflecting plates and the screen is 20 cm. Determine the value of electrostatic deflection sensitivity. [8+8]

8. (a) Explain the construction, operation and applications of the varactor diode.

   (b) In a p-type semiconductor, the Fermi level lies 0.4 eV above the valance band. Determine the new position of the Fermi level if the concentration of acceptor atoms is multiplied by a factor of:

   i. 0.5 and

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   KT = 0.025eV. [10+6]

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