Code No: R05221401 **R05** **Set No. 2**

II B.Tech II Semester Examinations,December 2010
SEMICONDUCTOR DEVICES AND CIRCUITS
Mechatronics

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw the small signal equivalent circuit of common Source amplifier and derive the expression for voltage gain.
   (b) Derive the equation for the overall voltage gain of multistage amplifier in terms of the individual gains. [8+8]
2. (a) Explain the operation of NPN transistor with neat construction and biasing arrangement.
   (b) Draw the h-parameter model of a transistor in common emitter configuration and define h_{ie}, h_{re}, h_{fe}, h_{oe}. [8+8]
3. (a) Define the stability factors, S', S'', and what is the need of these factors in BJT circuits.
   (b) Draw the circuit diagram of a self bias BJT circuit and explain the operation. [8+8]
4. (a) List the steps needed to carry out the analysis of a feedback network.
   (b) An amplifier has a mid band gain of 125 and a bandwidth of 250KHz
      i. if 4% negative feedback is introduced, find the new bandwidth and gain
      ii. If the bandwidth is 1MHz, find the feedback ratio. [8+8]
5. (a) What are the merits and demerits of phase shift oscillator ?
   (b) Draw apparent equivalent circuit of a quartz crystal.
   (c) What makes the quartz produce stable oscillations? [8+4+4]
6. (a) What happens to an electron when it is exposed to parallel electric and magnetic fields, explain in detail?
   (b) Explain the measurement of frequency, with the help of Lissajous pattern? [8+8]
7. (a) Explain the following semiconductor parameters with the variation in temperature
      i. Intrinsic concentration
      ii. Mobility
      iii. Conductivity
      iv. Energy gap
   (b) State and explain mass action law. [10+6]

8. (a) A half wave rectifier circuit rectifies an alternating voltage v(t)=330 Sin(100πt). Sketch the input, output waveforms and find the RMS value of AC component of output of the filter.

   (b) Find the ripple factor of inductor filter, which is connected to a full wave rectifier circuit operating at 50 Hz to provide a DC output to a resistive load of 220Ω. Assume the inductance of a inductor filter is 2.2H. [8+8]

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Code No: R05221401 **R05** **Set No. 4**

II B.Tech II Semester Examinations,December 2010
SEMICONDUCTOR DEVICES AND CIRCUITS
Mechatronics

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the operation of NPN transistor with neat construction and biasing arrangement.
   (b) Draw the h-parameter model of a transistor in common emitter configuration and define h_{ie}, h_{re}, h_{fe}, h_{oe}. [8+8]
2. (a) A half wave rectifier circuit rectifies an alternating voltage v(t)=330 Sin(100πt). Sketch the input, output waveforms and find the RMS value of AC component of output of the filter.
   (b) Find the ripple factor of inductor filter, which is connected to a full wave rectifier circuit operating at 50 Hz to provide a DC output to a resistive load of 220Ω. Assume the inductance of a inductor filter is 2.2H. [8+8]
3. (a) Draw the small signal equivalent circuit of common Source amplifier and derive the expression for voltage gain.
   (b) Derive the equation for the overall voltage gain of multistage amplifier in terms of the individual gains. [8+8]
4. (a) List the steps needed to carry out the analysis of a feedback network.
   (b) An amplifier has a mid band gain of 125 and a bandwidth of 250KHz
      i. if 4% negative feedback is introduced, find the new bandwidth and gain
      ii. If the bandwidth is 1MHz, find the feedback ratio. [8+8]
5. (a) Define the stability factors, S', S'', and what is the need of these factors in BJT circuits.
   (b) Draw the circuit diagram of a self bias BJT circuit and explain the operation. [8+8]
6. (a) What are the merits and demerits of phase shift oscillator ?
   (b) Draw apparent equivalent circuit of a quartz crystal.
   (c) What makes the quartz produce stable oscillations? [8+4+4]
7. (a) Explain the following semiconductor parameters with the variation in temperature
      i. Intrinsic concentration
      ii. Mobility
      iii. Conductivity

iv. Energy gap

(b) State and explain mass action law. [10+6]

8. (a) What happens to an electron when it is exposed to parallel electric and magnetic fields, explain in detail?

(b) Explain the measurement of frequency, with the help of Lissajous pattern? [8+8]

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Code No: R05221401 **R05** **Set No. 1**

II B.Tech II Semester Examinations,December 2010
SEMICONDUCTOR DEVICES AND CIRCUITS
Mechatronics

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What happens to an electron when it is exposed to parallel electric and magnetic fields, explain in detail?
   (b) Explain the measurement of frequency, with the help of Lissajous pattern? [8+8]
2. (a) List the steps needed to carry out the analysis of a feedback network.
   (b) An amplifier has a mid band gain of 125 and a bandwidth of 250KHz
      i. if 4% negative feedback is introduced, find the new bandwidth and gain
      ii. If the bandwidth is 1MHz, find the feedback ratio. [8+8]
3. (a) A half wave rectifier circuit rectifies an alternating voltage v(t)=330 Sin(100πt). Sketch the input, output waveforms and find the RMS value of AC component of output of the filter.
   (b) Find the ripple factor of inductor filter, which is connected to a full wave rectifier circuit operating at 50 Hz to provide a DC output to a resistive load of 220Ω. Assume the inductance of a inductor filter is 2.2H. [8+8]
4. (a) Explain the operation of NPN transistor with neat construction and biasing arrangement.
   (b) Draw the h-parameter model of a transistor in common emitter configuration and define h_{ie}, h_{re}, h_{fe}, h_{oe}. [8+8]
5. (a) Draw the small signal equivalent circuit of common Source amplifier and derive the expression for voltage gain.
   (b) Derive the equation for the overall voltage gain of multistage amplifier in terms of the individual gains. [8+8]
6. (a) Explain the following semiconductor parameters with the variation in temperature
      i. Intrinsic concentration
      ii. Mobility
      iii. Conductivity
      iv. Energy gap
   (b) State and explain mass action law. [10+6]
7. (a) Define the stability factors, S', S'', and what is the need of these factors in BJT circuits.

(b) Draw the circuit diagram of a self bias BJT circuit and explain the operation. [8+8]

8. (a) What are the merits and demerits of phase shift oscillator ?
   (b) Draw apparent equivalent circuit of a quartz crystal.
   (c) What makes the quartz produce stable oscillations? [8+4+4]

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Code No: R05221401 **R05** **Set No. 3**

II B.Tech II Semester Examinations,December 2010
SEMICONDUCTOR DEVICES AND CIRCUITS
Mechatronics

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What happens to an electron when it is exposed to parallel electric and magnetic fields, explain in detail?
   (b) Explain the measurement of frequency, with the help of Lissajous pattern? [8+8]

2. (a) Explain the following semiconductor parameters with the variation in temperature
      i. Intrinsic concentration
      ii. Mobility
      iii. Conductivity
      iv. Energy gap
   (b) State and explain mass action law. [10+6]

3. (a) A half wave rectifier circuit rectifies an alternating voltage v(t)=330 Sin(100πt). Sketch the input, output waveforms and find the RMS value of AC component of output of the filter.
   (b) Find the ripple factor of inductor filter, which is connected to a full wave rectifier circuit operating at 50 Hz to provide a DC output to a resistive load of 220Ω. Assume the inductance of a inductor filter is 2.2H. [8+8]

4. (a) List the steps needed to carry out the analysis of a feedback network.
   (b) An amplifier has a mid band gain of 125 and a bandwidth of 250KHz
      i. if 4% negative feedback is introduced, find the new bandwidth and gain
      ii. If the bandwidth is 1MHz, find the feedback ratio. [8+8]

5. (a) Define the stability factors, S', S'', and what is the need of these factors in BJT circuits.
   (b) Draw the circuit diagram of a self bias BJT circuit and explain the operation. [8+8]

6. (a) Explain the operation of NPN transistor with neat construction and biasing arrangement.
   (b) Draw the h-parameter model of a transistor in common emitter configuration and define h_{ie}, h_{re}, h_{fe}, h_{oe}. [8+8]

7. (a) Draw the small signal equivalent circuit of common Source amplifier and derive the expression for voltage gain.

(b) Derive the equation for the overall voltage gain of multistage amplifier in terms of the individual gains. [8+8]

8. (a) What are the merits and demerits of phase shift oscillator ?

(b) Draw apparent equivalent circuit of a quartz crystal.

(c) What makes the quartz produce stable oscillations? [8+4+4]

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