Code No: RR220203 $\boxed{\textbf{RR}}$ $\boxed{\textbf{Set No. 2}}$

II B.Tech II Semester Examinations,December 2010
LINEAR AND DIGITAL IC APPLICATIONS
Common to Instrumentation And Control Engineering, Electronics And Computer Engineering, Electrical And Electronics Engineering

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
$\star\star\star\star\star$

1. (a) Explain the terms Lock range, Capture range and Pull-in time of a PLL. How are Lock Range and Capture range determined? [8]

   (b) Design a PLL circuit using IC 565 to get:

      i. Free-running frequency $= 4.5\ KHz$
      ii. Lock range of $2\ KHz$ and
      iii. Capture range $= 100\ Hz$.

      Assume a supply voltage of + or - 10V. Show the circuit diagram with all component values. [3+3+2]

2. (a) Define the terms: SVRR,CMRR, input bias current, input offset voltage, Gain Bandwidth product.

   (b) What are the differences between the inverting and non inverting terminals? What do you mean by the term "virtual ground"? [10+6]

3. (a) The 741C Op-Amp is configured as a non-inverting amplifier having the following parameters: A=400000, R_1=470Ω, R_F=4.7KΩ, R_i=33MΩ, R_o=60Ω, f_o=5Hz, Unity gain bandwidth=0.6MHz, supply voltages= ±15V, maximum output voltage swing = ±13V. Computer the values of:

      i. A_F closed loop voltage gain,
      ii. R_{iF} input resistance with feedback,
      iii. R_{oF} output resistance with feedback, and
      iv. f_F bandwidth with feedback. [4×3]

   (b) Explain the operation of zero crossing detector using Op-Amps. [4]

4. (a) List out different types of A/D converters and compare their merits and demerits.

   (b) Give the schematic circuit of an A/D converter widely used in digital voltmeters and explain its operation. Derive expression for output voltage. [8+8]

5. (a) An integrator with R=400Ω and C=1 μF is used to generate a triangular waveform from a 500 Hz square wave that alternates between $\pm$ 12V. What should be the minimum slew rate of the Op-amp? What is the maximum output voltage? [2×4]

   (b) Draw and explain the operation of an analog multiplexer. [2+6]

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6. (a) Compare different logic families and mention their advantages and disadvantages?

   (b) Which is the fastest non-saturated logic gate? Draw the circuit and explain its functions. [8+8]

7. (a) What are the advantages of active filters over passive ones?

   (b) Design a second order low pass Butterworth filter for a cut off frequency of $2kHz$. Assume necessary data.

   (c) What is an all pass filter? Draw the circuit of all pass filters. [5+6+5]

8. Explain the operation of Monostable multivibrator using 555 timer. Derive the expression of time delay of a Monostable multivibrator using 555 timer. [8+8]

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Code No: RR220203 $\boxed{\textbf{RR}}$ $\boxed{\textbf{Set No. 4}}$

II B.Tech II Semester Examinations,December 2010
LINEAR AND DIGITAL IC APPLICATIONS
Common to Instrumentation And Control Engineering, Electronics And Computer Engineering, 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) List out different types of A/D converters and compare their merits and demerits.

   (b) Give the schematic circuit of an A/D converter widely used in digital voltmeters and explain its operation. Derive expression for output voltage. [8+8]

2. (a) What are the advantages of active filters over passive ones?

   (b) Design a second order low pass Butterworth filter for a cut off frequency of $2kHz$. Assume necessary data.

   (c) What is an all pass filter? Draw the circuit of all pass filters.   [5+6+5]

3. (a) Compare different logic families and mention their advantages and disadvantages?

   (b) Which is the fastest non-saturated logic gate? Draw the circuit and explain its functions.   [8+8]

4. (a) Define the terms: SVRR,CMRR, input bias current, input offset voltage, Gain Bandwidth product.

   (b) What are the differences between the inverting and non inverting terminals? What do you mean by the term "virtual ground"?   [10+6]

5. (a) Explain the terms Lock range, Capture range and Pull-in time of a PLL. How are Lock Range and Capture range determined?   [8]

   (b) Design a PLL circuit using IC 565 to get:

       i. Free-running frequency = 4.5 KHz
       ii. Lock range of 2 KHz and
       iii. Capture range = 100 Hz.

       Assume a supply voltage of + or - 10V. Show the circuit diagram with all component values.   [3+3+2]

6. (a) An integrator with R=400Ω and C=1 μF is used to generate a triangular waveform from a 500 Hz square wave that alternates between $\pm$ 12V. What should be the minimum slew rate of the Op-amp? What is the maximum output voltage?   [2×4]

   (b) Draw and explain the operation of an analog multiplexer.   [2+6]

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7. Explain the operation of Monostable multivibrator using 555 timer. Derive the expression of time delay of a Monostable multivibrator using 555 timer. [8+8]

8. (a) The 741C Op-Amp is configured as a non-inverting amplifier having the following parameters: A=400000, R_1=470Ω, R_F=4.7KΩ, R_i=33MΩ, R_o=60Ω, f_o=5Hz, Unity gain bandwidth=0.6MHz, supply voltages= $\pm$15V, maximum output voltage swing $=\pm$13V. Computer the values of:

   i. A_F closed loop voltage gain,
   ii. R_{iF} input resistance with feedback,
   iii. R_{oF} output resistance with feedback, and
   iv. f_F bandwidth with feedback. [4$\times$3]

   (b) Explain the operation of zero crossing detector using Op-Amps. [4]

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Code No: RR220203 |RR| |Set No. 1|

II B.Tech II Semester Examinations,December 2010
LINEAR AND DIGITAL IC APPLICATIONS
Common to Instrumentation And Control Engineering, Electronics And
Computer Engineering, Electrical And Electronics Engineering
Time: 3 hours Max Marks: 80
Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) An integrator with R=400Ω and C=1 μF is used to generate a triangular waveform from a 500 Hz square wave that alternates between ± 12V. What should be the minimum slew rate of the Op-amp? What is the maximum output voltage? [2×4]

   (b) Draw and explain the operation of an analog multiplexer. [2+6]

2. (a) What are the advantages of active filters over passive ones?

   (b) Design a second order low pass Butterworth filter for a cut off frequency of $2kHz$. Assume necessary data.

   (c) What is an all pass filter? Draw the circuit of all pass filters. [5+6+5]

3. (a) The 741C Op-Amp is configured as a non-inverting amplifier having the following parameters: A=400000, R_1=470Ω, R_F=4.7KΩ, R_i=33MΩ, R_o=60Ω, f_o=5Hz, Unity gain bandwidth=0.6MHz, supply voltages= ±15V, maximum output voltage swing = ±13V. Computer the values of:

      i. A_F closed loop voltage gain,
      ii. R_{iF} input resistance with feedback,
      iii. R_{oF} output resistance with feedback, and
      iv. f_F bandwidth with feedback. [4×3]

   (b) Explain the operation of zero crossing detector using Op-Amps. [4]

4. (a) Define the terms: SVRR,CMRR, input bias current, input offset voltage, Gain Bandwidth product.

   (b) What are the differences between the inverting and non inverting terminals? What do you mean by the term "virtual ground"? [10+6]

5. (a) Compare different logic families and mention their advantages and disadvantages?

   (b) Which is the fastest non-saturated logic gate? Draw the circuit and explain its functions. [8+8]

6. (a) List out different types of A/D converters and compare their merits and demerits.

   (b) Give the schematic circuit of an A/D converter widely used in digital voltmeters and explain its operation. Derive expression for output voltage. [8+8]

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7. Explain the operation of Monostable multivibrator using 555 timer. Derive the expression of time delay of a Monostable multivibrator using 555 timer. [8+8]

8. (a) Explain the terms Lock range, Capture range and Pull-in time of a PLL. How are Lock Range and Capture range determined? [8]

   (b) Design a PLL circuit using IC 565 to get:

      i. Free-running frequency $= 4.5\ KHz$

      ii. Lock range of $2\ KHz$ and

      iii. Capture range $= 100\ Hz$.

      Assume a supply voltage of + or - 10V. Show the circuit diagram with all component values. [3+3+2]

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Code No: RR220203 $\boxed{\textbf{RR}}$ $\boxed{\textbf{Set No. 3}}$

II B.Tech II Semester Examinations,December 2010
LINEAR AND DIGITAL IC APPLICATIONS
Common to Instrumentation And Control Engineering, Electronics And
Computer Engineering, Electrical And Electronics Engineering
Time: 3 hours   Max Marks: 80
Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Explain the terms Lock range, Capture range and Pull-in time of a PLL. How are Lock Range and Capture range determined? [8]

   (b) Design a PLL circuit using IC 565 to get:

      i. Free-running frequency $= 4.5\ KHz$

      ii. Lock range of $2\ KHz$ and

      iii. Capture range $= 100\ Hz$.

      Assume a supply voltage of $+$ or $-$ 10V. Show the circuit diagram with all component values. [3+3+2]

2. Explain the operation of Monostable multivibrator using 555 timer. Derive the expression of time delay of a Monostable multivibrator using 555 timer. [8+8]

3. (a) List out different types of A/D converters and compare their merits and demerits.

   (b) Give the schematic circuit of an A/D converter widely used in digital voltmeters and explain its operation. Derive expression for output voltage. [8+8]

4. (a) The 741C Op-Amp is configured as a non-inverting amplifier having the following parameters: A=400000, R_1=470Ω, R_F=4.7KΩ, R_i=33MΩ, R_o=60Ω, f_o=5Hz, Unity gain bandwidth=0.6MHz, supply voltages= $\pm$15V, maximum output voltage swing $= \pm$13V. Computer the values of:

      i. A_F closed loop voltage gain,

      ii. R_{iF} input resistance with feedback,

      iii. R_{oF} output resistance with feedback, and

      iv. f_F bandwidth with feedback. [4×3]

   (b) Explain the operation of zero crossing detector using Op-Amps. [4]

5. (a) Define the terms: SVRR,CMRR, input bias current, input offset voltage, Gain Bandwidth product.

   (b) What are the differences between the inverting and non inverting terminals? What do you mean by the term "virtual ground"? [10+6]

6. (a) Compare different logic families and mention their advantages and disadvantages?

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(b) Which is the fastest non-saturated logic gate? Draw the circuit and explain its functions. [8+8]

7. (a) What are the advantages of active filters over passive ones?

(b) Design a second order low pass Butterworth filter for a cut off frequency of $2kHz$. Assume necessary data.

(c) What is an all pass filter? Draw the circuit of all pass filters. [5+6+5]

8. (a) An integrator with R=400Ω and C=1 μF is used to generate a triangular waveform from a 500 Hz square wave that alternates between $\pm$ 12V. What should be the minimum slew rate of the Op-amp? What is the maximum output voltage? [2×4]

(b) Draw and explain the operation of an analog multiplexer. [2+6]

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