Code No: R31026 **R10** **Set No: 1**

III B.Tech. I Semester Supplementary Examinations, May 2013

LINEAR &DIGITAL IC APPLICATION

(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) List the characteristics of an ideal operational amplifier.
   (b) What is frequency compensation and why is it required in operational amplifier?
   (c) Draw the circuit of an inverting adder using operational amplifier and explain its operation. Derive the input / output relationship.

2. (a) What are the limitations of weighted resistor type D/A converter?
   (b) With neat block diagram, explain successive approximation type A/D converter in detail.

3. (a) Explain how dual supply operation is obtained from single supply connection.
   (b) Explain various stages through the internal block diagram of an op-amp.

4. (a) With the help of a neat circuit diagram, explain the operation of a three op-amp instrumentation amplifier and obtain the expression for its output voltage?
   (b) Find R_1 and R_f in the practical integrator (lossy integrator), so that the peak gain is 20 dB and the gain is 3 dB down from its peak when ω = 10,000 rad/sec. Use a capacitance of 0.01μF.

5. (a) Draw and explain the functional block diagram of IC 555.
   (b) Explain the functioning of IC555 in Monostable configuration.

6. Write short notes on the following:
   (a) Level triggering.
   (b) Edge triggering.
   (c) Pulse triggering
   (d) Explain the RS flip-flop using NAND gates?

7. (a) Design a 3 input 5-bit multiplexer? Write the truth table and draw the logic diagram?
   (b) Design a full subtractor with logic gates?

8. (a) Explain the operation of Synchronous SRAM with the help of its internal Architecture?
   (b) Design a conversion circuit to convert a D flip-flop to J-K flip-flop?

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Code No: R31026 **R10** **Set No: 2**

III B.Tech. I Semester Supplementary Examinations, May 2013

LINEAR &DIGITAL IC APPLICATION

(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) What is an ideal active integrator? Explain its working with neat circuit diagram.
   (b) Design a practical integrator circuit with a D.C. gain of 10, to integrate a square wave of 10 KHz.

2. (a) Draw the circuit of a triangular-wave generator, explain its operation and derive expressions for frequency of oscillations?
   (b) Describe the limitations of op-amp as a comparator.

3. (a) Draw the internal structure of a MOS transistor based Read only memory. Describe the procedure to fuse a combinational circuit in to this type of ROM with the help of a simple example.
   (b) Discuss whether it is possible to build a ROM using bipolar Junction transistors?
   (c) List out the merits and demerits of the above three types of ROM.

4. (a) Explain the operation of Monostable multivibrator using IC555 timer and derive expression for its output pulse-width?
   (b) Draw the circuit of Schmitt trigger using IC555 timer and explain its operation?

5. (a) With a net sketch explain the operation of an n-bit Weighted Resistor DAC and obtain expression for its output?
   (b) Which is the fastest ADC, explain the operation and discuss its merits & de-merits?

6. (a) What is meant by a transparent latch?
   (b) Convert a D-FF to a JK-FF, using extra NAND gates, if required.
   (c) Explain the function of preset and clear inputs in flip-flop.
   (d) Why S=R=1 not permitted in SR-Flip-Flop.

7. (a) With neat circuit diagram explain the working of a 4-bit odd parity generator .
   (b) Design a 2-digit binary multiplication circuit?

8. (a) List out the merits and limitations of integrated circuit technology?
   (b) Explain the input offset current and input bias current with Op-Amps.

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Code No: R31026 **R10** **Set No: 3**

III B.Tech. I Semester Supplementary Examinations, May 2013

LINEAR &DIGITAL IC APPLICATION

(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Explain how dual supply operation is obtained from single supply connection.
   (b) Compare the four configurations of differential amplifier with reference to the parameters A_d, A_C, R_{in} and R_o, CMRR.

2. (a) Suggest different methods to increase the input resistance of an op-amp.
   (b) Explain various stages through the internal block diagram of an op-amp.

3. (a) Explain the operation of +ve and -ve clampers with suitable sketches.
   (b) What are the application of comparator? Explain.

4. (a) Explain the function of each pin of IC555 timer.
   (b) Draw the circuit of Astable Multivibrator using IC555 timer and explain its operation?

5. (a) Design a first -order low pass filter so that it has a cut off frequency of 2kHz and pass Band gain of '1'.
   (b) Convert the 2 kHz low pass filter to a cut off frequency of 3kHz in part (a)

6. (a) With the help of logic diagram of a 4-bit adder/subtractor for adding or subtracting two numbers of arbitrary signs, using 1's complement and explain its working?
   (b) Design a 4-bit parallel full adder with look ahead carry scheme?

7. Explain with suitable example how binary multiplication can be performed using shift and add method?

8. With the help of internal structure of a small SRAM and its timing diagram, describe Read and write operations performed in the SRAM.

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Code No: R31026 **R10** **Set No: 4**

III B.Tech. I Semester Supplementary Examinations, May 2013
LINEAR &DIGITAL IC APPLICATION
(Electrical and Electronics Engineering)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Construct a full adder circuit using two half adders and basic logic gates.
   (b) Draw the circuit diagram of a 4-bit ripple carry adder using 4 full adder circuit blocks.

2. (a) Draw the timing diagram to specify typical timing parameters of an SRAM to perform write operation.
   (b)Describe the sequence of operations taking place in a DRAM cell to refresh the cell after write operation is performed.

3. (a) Compare the conversion times and efficiencies of 8-bit tracking type and successive approximation type A/D converters.
   (b) Determine the resolution of an 8-bit A/D converter for a 10V input range.
   (c) If the maximum output voltage of a 7-bit D/A converter is 25.4 V. What is the smallest change in the output as the binary count increases?

4. (a) An inverting amplifier using op-amp has R1 = 10 k and Rf = 47 K. It is applied with 2V peak to peak sine wave. An AC voltmeter is used between the output terminal and ground to measure the output voltage. Calculate the reading on the voltmeter. Assume supply voltage to be ±12V.
   (b) Compare and contrast the properties of ideal and practical op-amp.

5. (a)Write short notes on Ring Counter and Johnson counter.
   (b) Design a conversion circuit to convert a D flip-flop to J-K flip-flop?

6. (a) Derive the expression for the frequency of the output of an Astable multivibrator.
   (b) A IC555 timer is configured to run in Astable mode with R1 = 20K and R2 = 8K and C = 0.1µf. Determine the output frequency and duty cycle.

7. (a) Explain how the following op-amp parameters are measured.
      (i) Open loop voltage gain.
      (ii) Input bias current.
      (iii) Input offset current.
      (iv)Input offset voltage.
   (b) An op-amp has a slew rate of 2V /µs. What is the maximum frequency of an output sinusoid of peak value 5V at which the distortion sets is due to the slew rate limitation.

8. (a) Explain the operation and derive the expression for the overall gain of the three op-amp instrumentation amplifier. What are its advantages.
   (b) If R1 = R2 = 5 K in a three op-amp instrumentation amplifier, determine the value of external resistance RG required to get the gain of 300.

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