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

III B.Tech. I Semester Supplementary Examinations, June/July - 2014

LINEAR & DIGITAL IC APPLICATIONS

(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) In which type of analog to digital converter, a digital to analog converter is used? Explain its operation in detail.
   (b) Calculate the conversion time for a full scale input in case of a 12-bit countertype A/D converter driven by 2 MHz clock

2. (a) Carryout AC & DC analysis of differential amplifier with swamping resistors.
   (b) For dual input balanced output differential amplifier R_c =47K, R_{s1} = R_{s2} =20KΩ, R_1 = 43K h_{fe} = 75 h_{ie} = 20 kΩ V_{CC} = 9V V_{EE} = -9V and V_{BE} =0.7V. Calculate:
   (i) Operating point values (ii) A_d (iii) A_C (iv) CMRR in dB

3. a) Write about the parameters that should be considered for ac and dc applications of operational amplifier
   b) What are the ideal characteristics of the operational amplifier and how do they differ practically?
   c) Explain why open loop op-amp configurations are not used in linear applications

4. a) Design a fourth order Butterworth Low-pass filter having upper cut-off frequency 1kHz.
   b) Determine the order of a low-pass Butterworth filter that is to provide 60 dB attenuation at ω/ω_h=2.

5. In a triangular wave generator R2 = 1:2k; R3 = 6:8k; R1 = 120kandC1 =0:01μF Determine
   (i) The peak-to peak output amplitude of the triangular wave.
   (ii) Frequency of the triangular wave.

6. a) Design 2-input NAND & NOR gates using CMOS transistors. With the help of truth tables explain their operation.
   b) Draw the circuit of 2- input NAND gate using Diode Transistor Logic. With the help of truth table explain its operation.

7. Write a short notes on CMOS 40XX series of IC counters?

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 R_1 = R_2 = 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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Code No: R31026 **R10** **Set No: 2**

III B.Tech. I Semester Supplementary Examinations, June/July - 2014

LINEAR & DIGITAL IC APPLICATIONS

(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 PSRR of OP-AMP? Explain how it can be measured.
   b) Sketch the output waveforms, if a square wave input is applied to op-amp differentiator circuit. Given R=0.1KΩ, C=0.01μF. frequency of the square wave input is 100Hz. Explain.

2. a) Explain about IGMF configuration in active filter design
   b) Distinguish between active and passive filters

3. a) Derive the expression for the lock-in range.
   b) Derive the expression for the capture range.

4. Explain the operation of ECL NOR gate.

5. a) Discuss about successive approximation converter with necessary diagrams
   b) Explain about ladder type DAC.

6. a) Draw the functional diagram and connection diagram of sample and hold IC LF 398 and explain.
   b) What are the applications of sample & hold circuit?

7. a) What is a Notch filter? Draw the circuit and explain its operation.
   b) Design a second order Butter worth 50 Hz notch filter for removing line noise from an ECG signal.

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: 3**

III B.Tech. I Semester Supplementary Examinations, June/July - 2014

LINEAR & DIGITAL IC APPLICATIONS

(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) Design Op-amp based first order low pass butter worth filter with cut off frequency 1KHz and convert this filter with cut off frequency of 1.6KHz by using Frequency scaling concept?
   b) Define Oscillator? Give the requirements for perfect sustained oscillations

2. a) With neat sketches, explain the operation of Astable multivibrator using 555 timer and derive expression for its frequency of oscillations.
   b) Draw the functional block diagram of IC565 PLL. Derive expressions for lock-in range and capture range

3. 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.

4. Draw the circuit of edge trigged SR flip flop made up of by basic gates & explain the operation. Sketch the wave form?

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

6. a) Explain about ECL gate
   b) Discuss about the Fan out calculation of ECL gate.

7. a) mention the applications of Analog multiplexers.
   b) Discuss about successive approximation converter with necessary diagrams.

8. 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?

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

III B.Tech. I Semester Supplementary Examinations, June/July - 2014

LINEAR & DIGITAL IC APPLICATIONS

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

3. (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?

4. (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

5. (a) Design a fourth order Butterworth Low-pass filter having upper cut-off frequency 1kHz.
   (b) Determine the order of a low-pass Butterworth filter that is to provide 60 dB attenuation at $\omega/\omega_h=2$.

6. a) Explain the op-amp as Schmitt trigger.
   b) Design an op-amp free running multi-vibrator with T_{ON}= 1m sec and T_{OFF}= 2m.sec.

7. a) Draw the circuit diagram and explain the operation of series voltage regulator using op-amp. Derive an expression for its output voltage.
   b) Mention the applications of Analog multiplexers

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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