Code No: R05321404 **Set No. 1**

III B.Tech II Semester Supplimentary Examinations, Aug/Sep 2008
LINEAR AND DIGITAL IC APPLICATIONS
(Mechatronics)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Define common mode rejection ratio (CMRR)? Explain why for an $CMRR \rightarrow \infty$ emitter coupled differential amplifier where $R_E \rightarrow \infty$.
   (b) Why is cascade configuration used in an Op-amp?
   (c) Explain with the figures how two supply voltages $V^+$and V^- are obtained from a single supply. [8+4+4]

2. (a) What is a voltage follower? What are its features and applications?
   (b) What do you mean by sampling?
   (c) Explain basic circuit for sample and hold circuit. [8+3+5]

3. Derive the transfer function, gain and phase angle for first order and second order low pass active filter. [16]

4. Explain the functional block diagram of PLL emphasizing the importance of capture range and Lock range. [16]

5. (a) Explain the operation of an Op-amp based weighted resistor Digital to Analog converter through a neat circuit diagram.
   (b) Design a 4-bit weighted resistor DAC whose full-scale output voltage is -10Volts. Assume R_f= 10 KΩ and logic '1' level as + 5volts and logic '0' level as 0 volts. What is the output voltage when the input is 1011. [8+8]

6. (a) Explain the following terms with reference to TTL gate?
      i. Logic levels.
      ii. DC Noise margin.
      iii. Low-state unit load.
      iv. High-state fan out.
   (b) List out TTL families and compare them with reference to propagation delay, power consumption, speed-power product and low level input current? [8+8]

7. (a) Write short notes on parity generator and checker?
   (b) Design a 8:1 multiplexer using two 4:1 multiplexers? Write the truth table and draw the logic diagram? [8+8]

8. (a) Explain 4 bit serial in parallel out register.
   (b) Draw the circuit of edge trigged SR flip flop made up of by basic gates & explain the operation. Sketch the wave form. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: R05321404 **Set No. 2**

III B.Tech II Semester Supplimentary Examinations, Aug/Sep 2008
LINEAR AND DIGITAL IC APPLICATIONS
(Mechatronics)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Derive closed loop voltage gain, input resistance, output resistance and bandwidth for inverting amplifier with feedback arrangement. [10+6]
   (b) Explain any one of the frequency compensation technique in connection with Op-amp.

2. Explain how Op-amp can be used in the following applications.
   (a) Rectifiers.
   (b) Logarithmic Amplifiers.
   (c) Peak detector. [6+6+4]

3. (a) Define by means of a diagram the pass band, stop band, transition band and pass band ripple.
   (b) Sketch the ideal frequency-response characteristics of Low pass, high pass and band reject filters.
   (c) Design a second order low pass filter at a higher cut off frequency of 2KHz. [5+5+6]

4. (a) List the application of IC 565PLL and briefly describe the role of the PLL in any of that application.
   (b) Referring to the circuit shown in figure 4b determine the free running output, lock range and the capture range . [8+8]

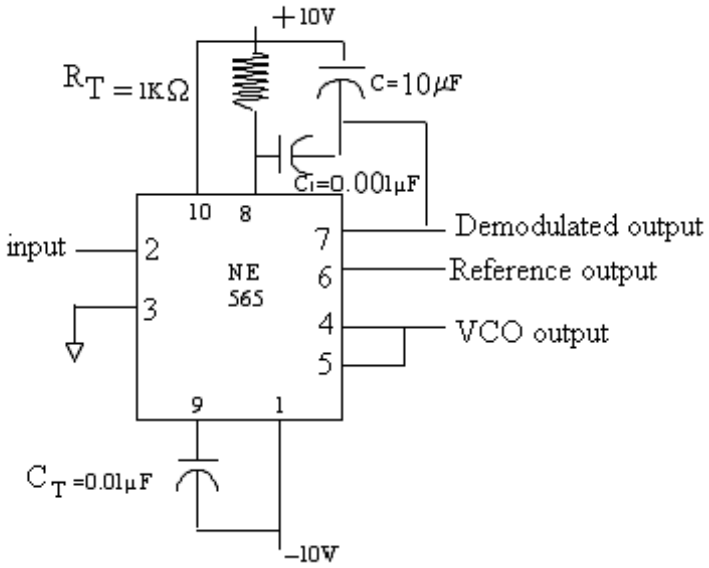


Figure 4b

5. (a) Explain the operation of a multiplying DAC and mention its applications.
   (b) A 12-bit D to A converter has a full-scale range of 15 volts. Its maximum differential linearity error is ± 1/2 LSB.
      i. What is the percentage resolution?
      ii. What are the minimum and maximum possible values of the increment in its output voltage? [8+8]

6. (a) Explain sinking current and sourcing current of TTL output? Which of the above parameters decide the fan out and how?
   (b) Distinguish between static and dynamic power dissipation of a CMOS circuit? Derive the expression for dynamic power dissipation? [8+8]

7. (a) What is the necessity of tri state buffer?
   (b) Design a 16-bit comparator using 74×85 ICs? [8+8]

8. (a) Write short notes on Master slave JK flip flop.
   (b) Design MOD 10 counter. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: R05321404 **Set No. 3**

III B.Tech II Semester Supplimentary Examinations, Aug/Sep 2008
LINEAR AND DIGITAL IC APPLICATIONS
(Mechatronics)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Explain the open loop and closed loop operations of an Op-amp.
   (b) Explain different methods to increase the input resistance of an Op-amp.[8+8]
2. (a) With the help of neat block diagram, explain the operation of a fixed voltage regulator.
   (b) Describe the operation of an IC based negative voltage regulator. Give few applications.
   (c) Describe the principle of operation of a peak detector with wave forms.[6+6+4]
3. (a) Classify the filters and explain the characteristics of each one of them.
   (b) Draw the first order low-pass Butterworth filter and analyze the same by deriving the gain and phase angle equation. [8+8]
4. (a) Design a 555 Astable multivibrator to operate at 10 KHz with 40% duty cycle.
   (b) Draw the circuit of PLL as frequency multiplier and explain its working. [8+8]
5. (a) Illustrate one application each of Analog to Digital and Digital to Analog converters.
   (b) Describe in detail the operation of a dual slope Analog to digital converter.
   (c) List out and compare different types of A/D converters. [4+7+5]
6. (a) With neat sketch explain the operation of TTL NAND gate.
   (b) A two input NAND gate has V_{cc} = + 5V & 1 KΩ load connected to its output. Calculate the output voltage
      i. When both inputs are low.
      ii. When both inputs are high. [8+8]
7. (a) Draw the logic diagram of 74×283 IC and explain the operation?
   (b) Write short notes on BCD to binary converter? [8+8]
8. (a) Design a conversion circuit to convert a SR flip-flop to J-K flip-flop?
   (b) Write short notes on parallel in serial out shift register. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆

Code No: R05321404 **Set No. 4**

III B.Tech II Semester Supplimentary Examinations, Aug/Sep 2008
LINEAR AND DIGITAL IC APPLICATIONS
(Mechatronics)

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Why is it necessary to use an external offset voltage compensating network with practical Op-amp circuits?
   (b) Compare and contrast an ideal Op-amp and practical Op-amp.
   (c) Explain the precautions that can be taken to minimize the effect of noise on an Op-amp circuit.
   (d) Calculate the effect of variation in power supply voltages on the output offset voltage for an inverting amplifier circuit. [3+5+5+3]

2. (a) Find Vo for the following circuit given (figure2).
   (b) Design a subtractor circuit whose output is equal to the difference between the two inputs. Use a differential Op-amp configuration. [8+8]

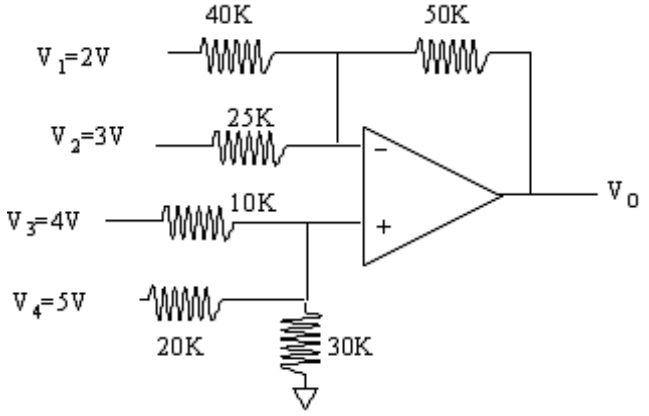


Figure 2

3. (a) Define the conditions on the feedback circuit of an amplifier to convert it in to an oscillator.
   (b) Design an RC phase shift oscillator for 300HZ frequency using IC μA 741 and $\pm$15V power supplies. Assume necessary component values.
   (c) Suggest a method to reduce the output voltage swing to I $\pm$ 6.5 Volts.[6+6+4]

4. (a) With necessary external components to a VCO IC NE556, Explain the generation of a triangular wave.
   (b) A PLL has a free running frequency of 500 KHz, the bandwidth of the LPF=10 KHz. Will the PLL lock in if f_i =60 KHz? What is the frequency of the VCO outputs? [10+6]

5. (a) Explain the operation of the successive approximation A/D converter, with a block diagram and timing diagram. Give it's advantages.
   (b) With help of a block diagram and timing diagram explain the operation of ramp type A/D converter. [8+8]

6. (a) Design a three input NAND gate using diode logic and a transistor inverter? Analyze the circuit with the help of transfer characteristics?
   (b) Explain the following terms with reference to TTL gate?
      i. Logic levels.
      ii. DC Noise margin.
      iii. Low-state unit load.
      iv. High-state fan out. [8+8]

7. (a) Design a serial binary adder?
   (b) Design a full subtractor with logic gates? [8+8]

8. (a) Distinguish between Combinational circuits and sequential circuits.
   (b) Write short notes on Clocked SR flip flop. [8+8]

⋆ ⋆ ⋆ ⋆ ⋆