

III B.Tech. I Semester Supplementary Examinations, December - 2013

**LINEAR IC APPLICATIONS**

(Electronics and Communications Engineering)

**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

\*\*\*\*\*

1. (a) Draw the circuit diagram of dual input unbalanced output differential amplifier and derive the expression for dc analysis.  
(b) Design a constant current bias circuit using zener diode for the following specifications:  $I_{E3}=5\text{mA}$ , zener diode with  $V_z=4.7\text{V}$ ,  $I_{z1}=5.3\text{mA}$ , transistor with  $\beta_{ac}=\beta_{dc}=100$  and  $V_{BE} = 0.175\text{V}$ ,  $V_{CC}=V_{EE}= 9\text{ Volts}$ .
2. (a) Draw the pin diagram and schematic symbol of a typical OP-AMP IC741 and explain the function of each pin.  
(b) For an OP-AMP, PSRR is 70dB, CMRR is  $10^5$ , and differential mode gain is  $10^5$ . The output voltage changes by 20V in 4  $\mu\text{sec}$ . Calculate: (i) numerical value of PSRR (ii) Common mode gain and (iii) Slew rate.
3. (a) Draw and explain the ideal differentiator circuit using an Op-Amp. Mention its drawbacks and how these can be eliminated by using a practical differentiator.  
(b) For the non-inverting a.c amplifier  $R_{in}=50\Omega$ ,  $C_f=0.1\mu\text{f}$ ,  $R_I=100\Omega$ ,  $R_F=1\text{k}\Omega$  and  $R_O=10\text{k}\Omega$ . Determine the gain & band width of the amplifier.
4. (a) Explain the principle of operation of a log amplifier with neat circuit diagram.  
(b) Design a Schmitt trigger with an Op-Amp  $\mu\text{A}741$  with the following specifications and also determine the threshold voltages  $V_{UT}$  and  $V_{LT}$ .  
 $R_1 = 100\text{k}\Omega$ ,  $R_2 = 56\text{k}\Omega$ ,  $V_{IN(pp)} = 1\text{V}$  and  $V_{CC} = V_{EE} = 15\text{V}$
5. (a) Draw the circuit diagram of fourth order butter worth low pass filter using an Op-Amp. And also draw the frequency response of it.  
(b) For the all pass filter, determine the phase shift between the input and output at  $f=2\text{kHz}$ . To obtain a positive phase shift, what modifications are necessary in the circuit?
6. (a) Design an astable multivibrator using 555 Timer to operate at 10 KHz with 40% duty cycle.  
(b) With a suitable circuit diagram using NE 565 PLL IC, explain the implementation of a frequency translation.
7. (a) List and compare different types of analog to digital converters.  
(b) Explain the operation of successive approximation type ADC with neat circuit diagram.
8. (a) Briefly explain the applications of analog multiplexers.  
(b) Draw the circuit diagram of sample and hold circuit and explain its working.

\*\*\*\*\*

III B.Tech. I Semester Supplementary Examinations, December - 2013

**LINEAR IC APPLICATIONS**

(Electronics and Communications Engineering)

**Time: 3 Hours**

**Max Marks: 80**

Answer any FIVE Questions  
All Questions carry equal marks

\*\*\*\*\*

1. (a) What is a differential amplifier? Mention the classification of differential amplifier with neat diagrams.  
(b) Draw the ac and dc equivalent circuits of single input balanced output differential amplifier and also derive an expression for voltage gain of this differential amplifier.
2. (a) What are the differences between the inverting and non inverting terminals? What do you mean by the term "virtual ground"?  
(b) For the circuit shown below; calculate  $I_I$ ,  $I_L$  and  $V_o$  with  $R_I=10k\Omega$ ,  $R_f=100k\Omega$ ,  $V_i=1V$ ,  $R_L=25K\Omega$ .
3. (a) With suitable circuit diagram explain about voltage to current converter with grounded load and also derive the expression for the output current.  
(b) Design a differentiator circuit to differentiate an input signal that varies in frequency from 10Hz to about 1kHz. Draw its output waveform, if  $\sin[2\pi(1000)t]$  signal is applied.
4. (a) With neat circuit diagram, explain the operation of monostable multivibrator using an Op-Amp. And also derive an expression for the time period.  
(b) Design a triangular wave generator with the following specifications:  $f_o=2kHz$ ,  $V_o(pp)=7V$  and supply voltage is  $\pm 15V$
5. (a) With neat circuit diagram explain the operation of 2<sup>nd</sup> order butter worth HPF and derive an expression for voltage gain.  
(b) A certain narrow band pass filter has been designed to meet the following specification:  $f_c=2kHz$ ,  $Q=20$ , and  $A_F=10$ . What modifications are necessary in the filter design to change  $f_c$  to 1kHz keeping gain and bandwidth constant?
6. (a) In the astable mode of 555 Timer,  $R_A=2.2k\Omega$ ,  $R_B=3.9k\Omega$  and  $C=0.1\mu f$ . Determine the positive pulse width  $t_C$ , negative pulse width and free running frequency  $f_0$ . And also find the duty cycle.  
(b) With a neat functional diagram, explain the operation of VCO and also derive an expression for free running frequency,  $f_0$ .

7. (a) Which type of DAC is more preferable? Draw the circuit diagram and obtain expression for output voltage for 4 bits.  
(b) What is an integrating type ADC? Explain the operation of dual slope ADC.
8. (a) Draw the circuit diagram of four quadrant multiplier and explain briefly.  
(b) Draw the circuit diagram of balanced modulator using IC1496 and explain in detail.

\*\*\*\*\*

ALL JNTU WORLD



