53 (EC 403) LINC

2012C
2013
(May)

LINEAR INTEGRATED CIRCUIT

Paper : EC 403

Full Marks : 100

Pass Marks : 30

Time : Three hours

The figures in the margin indicate full marks for the questions.

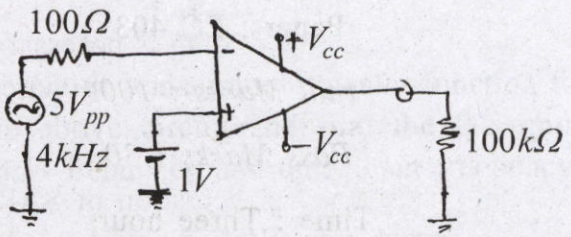
*Answer **any five** questions.*

1. *(a)* Find out the expression for differential gain of a dual-input balanced output configuration. 10

   (b) Derive the expression for closed loop voltage gain of an inverting amplifier using non ideal op-Amp. The non ideal op-Amp has a non ideal input Resistance 'Rid' and a non ideal open loop gain of 'Av'. 10

2. *(a)* Design an inverting amplifier having an input Resistance of $0.2\ M\Omega$ and gain $20\ v/v$ and maximum value of feedback Resistor available is 300Ω and the input signal applied from the source has 50Ω source resistance. 10

(b) A circuit diagram is shown below : 5



Plot the output waveform and input waveform.

(c) Why level-shifters are used in multistage amplification ? Draw the circuit diagram of a basic level shifter and write its output expression. 5

3. *(a)* Describe the full-operation of PLL with block level diagrams and mention its applications. 10

(b) Describe the operation of a square wave generator with proper circuit diagram and plot input, output waveforms. 10

4. *(a)* Design a low-pass fitter having a cut-off frequency of 1*KHz* with a pass band gain of 6*dB* and plot the frequency response. 10

(b) What is Four-Quadrant Multiplication ? Describe the basic operation of a balanced modulator with the help of circuit diagram. 10

5. *(a)* Why compensation is necessary in op-Amp circuits ? Describe how miller compensation causes pole splitting. 5

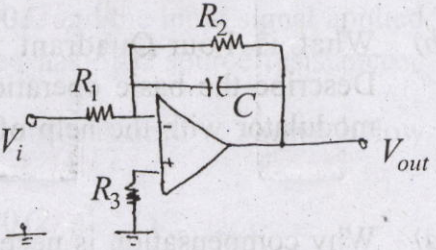
(b) Describe the operation of SAR ADC. 10

(c) Describe briefly the functional block diagram of IC NE 566 and mention its applications. 5

6. *(a)* Describe the operation of Precision-Half wave Rectifier using op-Amp and plot the input and output waveforms. How precision Rectifiers are different from normal rectifiers ? 10+2

(b) Describe the mono-stable operation of 555 timer. 8

7. *(a)* The circuit diagram is shown below. Mention which mathematical operation it can perform on input signal. 15



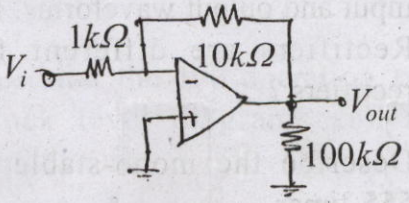
Derive the closed loop transfer function for the above circuit and find the DC gain, $-3dB$ frequency and unity gain frequency.

(b An op-Amp has following data : 5

Input offset voltage $7mV$ (typ)

Input BIAS current $50nA$ (typ)

This op-Amp is used as an inverting amplifier whose circuit diagram is shown below :



Find out the output offset Voltage.
