53 (EC 403) LINC

2014

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.*

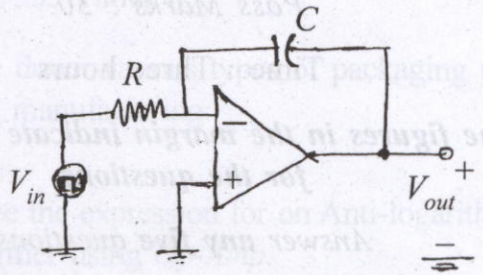
1. *(a)* Describe the individual blocks of a phase Locked Loop with its functionality and write the Applications of PLL. 10

   (b) Mention different types of ADCs. 10
   Write the operation of SAR ADC.

2. *(a)* How an Instrumentation Amplifier is superior in performance as compared to operational Amplifier ? Derive the expression for the output voltage of an *B-op-Amp*-Instrumentation Amplifier. 10

(b) Design a band pass filter having $f_L = 200Hz$ & $f_\pi = 10\,kHz$. Find the Quality factor and plot the frequency response. 5+5

3. (a) Describe how *DC*-non idealities effect the performance of the following circuit and how the effect can be nullified 10

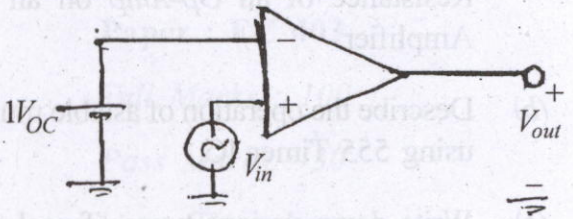


(b) Describe the operation of a Square-wave generator with proper timing waveforms and expressions. 10

4. (a) Write the measurement techniques required for measuring input offset voltage, input bias currents. 5

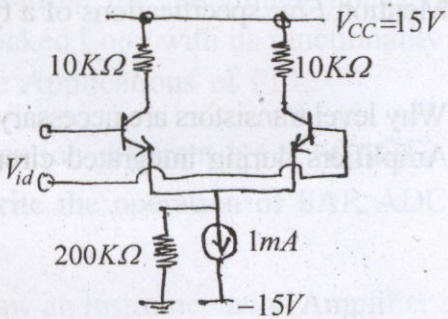
(b) Why frequency compensation is important in *Op-Amp* circuits ? Explain. Mention types of compensation techniques. 10

(c) 5



Describe the operation of the above circuit ; plot the input and *O/P* waveforms ; given $V_{in}(+) = 3\,Sin\,2\pi\left(1\times10^{3}\right)t$.

5. (a) 12



Shown above is a circuit of differential Amplifier ; Find differential input resistance, Small-signal voltage gain, common-mode gain, common-mode input resistance and CMRR in *dB*.

(b) Describe the operation of a precision Half-wave Rectifier using *Op-Amp*. 8

6. (a) Describe the effect of non-zero output-Resistance of an *Op-Amp* on an inverting-Amplifier. 5

(b) Describe the operation of astable multi-vibrator using 555 Timer IC. 10

(c) Write down various types of packaging used in IC manufacturing. 5

7. (a) Derive the expression for on Anti-logarithmic Amplifier using *Op-Amp*. 10

(b) Mention *Five* specifications of a typical ADC. 5

(c) Why level transistors are necessary in cascaded Amplifiers during integrated circuit design ? 5
