Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 21359

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Fourth Semester

Electronics and Communication Engineering

EC 2254/EC 44/10144 EC 405/EC 1254/080290022 — LINEAR INTEGRATED CIRCUITS

(Regulation 2008/2010)

(Common to PTEC 2254 Linear Integrated Circuits for B.E. (Part-Time) – Third Semester ECE — Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the limitations of discrete circuits.
2. Why do we use Aluminium for metallization?
3. Define CMRR.
4. Give an application of an Inverting Amplifier.
5. Mention any two applications of PLL.
6. A PLL frequency multiplier has an input frequency of "f" and a decade counter is included in the loop. What will be the frequency of the PLL output?
7. Mention any two specifications of a D/A converter.
8. For an n-bit flash type A/D converter, how many comparators are required? State the disadvantage of that type of converter.
9. Give the formula for period of oscillations in an op- amp astable circuit.
10. Define duty cycle of a periodic pulse wave form.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Compare different configurations of Differential Amplifier. (8)

(ii) For a dual input, balanced output differential amplifier, $R_C = 2.2k\Omega$, $R_E = 4.7\ k\Omega$, $R_{S1} = R_{S2} = 50\Omega$. The supply voltages are ± 10V. The hfe for the transistor is 50. Assume silicon transistors and hie = $1.4k\Omega$. Determine the operating point values, differential gain, common mode gain and CMRR. (8)

Or

(b) (i) State the advantages of Integrated circuits over discrete components. (4)

(ii) Explain the fabrication process of Monolithic Integrated circuits with necessary diagrams. (12)

12. (a) (i) What do you understand by an Instrumentation Amplifier? (2)

(ii) State the requirements of a good Instrumentation Amplifier. (4)

(iii) Draw the circuit diagram and explain the working of Instrumentation Amplifier. (6)

(iv) Mention the specific advantages of three op-amp Instrumentation Amplifier circuit. (4)

Or

(b) (i) What do you understand by an Integrator? (2)

(ii) Draw and explain an ideal active op-amp Integrator ckt. (4)

(iii) Draw the I/O waveforms for: integrator ($3 \times 1/2 = 1\frac{1}{2}$)

(1) Step input signal

(2) Square wave input signal

(3) Sine wave input signal

(iv) Derive the expression for change in output voltage. (3)

(v) List the applications of practical Integrator. (1½)

(vi) Design a practical integrator circuit with a dc gain of 10, to integrate a square wave of 10 KHZ. (4)

13. (a) (i) What do you mean by variable Transconductance Analog multiplier? (3)

(ii) State the advantages of variable Transconductance technique for analog multiplication. (5)

(iii) Draw the circuit and explain the working of one quadrant variable transconductance analog multiplier. (8)

Or

(b) Draw the block diagram and explain principle of working, characteristics and applications of:

(i) Frequency synthesizer. (8)

(ii) Frequency shift keying (FSK) Demodulator. (8)

14. (a) (i) Compare single slope ADC and dual slope ADC. (3)

(ii) Draw the circuit and explain the working of dual slope A/D converter. (8)

(iii) For a particular dual slope ADC, t_1 is 83.33 ms and the reference voltage is 100mv. Calculate t_2 if

(1) v_1 is 100 mv and

(2) 200 mv. (5)

Or

(b) Draw the block diagram and explain the working of:

(i) Charge Balancing VFCS (8)

(ii) Voltage to Time converter. (8)

15. (a) State the advantages of IC voltage regulator. Explain the features and internal structure of general purpose Linear IC 723 Regulator. Design a regulator using IC 723 to meet the following specifications: $V_o = 5V$; $I_o = 100mA$; Vin = $15 \pm 20\%$; $I_{sc} = 150mA$; $V_{sense} = 0.7v$.

Or

(b) Write detailed notes on the following:

(i) Low noise op-amps (8)

(ii) Integrated fiber optic system. (8)
