Code : 104504

B.Tech 5th Semester Exam., 2021

(New Course)

LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

Time : 3 hours *Full Marks* : 70

Instructions :

(i) *The marks are indicated in the right-hand margin.*

(ii) *There are* ***EIGHT*** *questions in this paper.*

(iii) *Attempt* ***FIVE*** *questions in all.*

(iv) *Question No.* ***1*** *is compulsory.*

1. Answer any *seven* of the following questions : 2×7=14

(a) What is a comparator?

(b) Define settling time of D/A converter.

(c) How does a precision rectifier differ from the conventional rectifier?

(d) What output voltage would be produced by a D/A converter whose output range is 0 to 10 V and whose input binary number is 0101 for a 4-bit DAC?

(e) What is the main drawback of dual slope ADC?

(f) Give the classification of voltage regulators with example.

(g) 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?

(h) Why is frequency. compensation required in operational amplifiers?

(i) Draw a sample and hold circuit.

(j) Which is fastest ADC? Give proper reasoning.

2. (a) With the help of neat circuit diagram, explain the working of a basic bandgap voltage reference. 7

(b) Explain the steps used for fabrication of integrated diodes with necessary diagrams. 7

3. (a) Sketch the basic circuit using OPAMP to perform the mathematical operation of differentiation and explain its working. What are the limitations of the basic differentiator? 7

(b) Define output offset voltage. Explain the methods to nullify offset voltage. 7

4. (a) Explain the working of multiplier using suitable OPAMP circuit diagram and supporting equations. 7

(b) Draw the circuit diagram of a phase locked loop (PLL) used as amplitude modulation (AM) detector and explain its operation. 7

5. (a) Draw the block diagram and explain principle of working, characteristic and applications of a frequency synthesizer. 7

(b) Explain the working of a switched capacitor filter with supporting circuit dingram. How can a resistor be realized using switched capacitor? 7

6. (a) Explain the working of weighted resistor D/A converter with circuit diagram. 7

(b) With a suitable diagram, explain the working of successive approximation type A/D converter. 7

7. (a) Discuss the principle of operation of NE565 PLL circuit. 7

(b) If an IC 555 timer is used to generate a ramp voltage with constant collector current of 1 mA, V_{CC} = 15 V and C = 0·1 μF, what would be the slope of the ramp generated? How much is the peak value of the ramp generated? What is the duration of the ramp? 7

8. (a) Design a timer which should turn on heater immediately after pressing a push button and should hold heater in ON state for 6 seconds. 7

(b) Explain the monostable operation of 555 timer. 7

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