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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Fourth Semester

Electronics and Communication Engineering

EC 244 — LINEAR INTEGRATED CIRCUITS

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the characteristics of ideal operational amplifier?

2. Find out the frequency at which the gain of an operational amplifier will be unity. The operational amplifier has a compensating capacitor of 30 pF and g_m of input stage is 45 micro mhos.

3. State the requirements of an instrumentation amplifier.

4. Name four applications of operational amplifier based comparators.

5. What is a four quadrant multiplier?

6. What is a PLL?

7. Name two analog switches. State a requirement of a device to behave as analog switch.

8. Draw the block diagram of a delta modulator.

9. What are the advantages of switched capacitor filters?

10. Name the four kinds of noise.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Define CMRR, PSRR and slew rate of an operational amplifier. (6)

(ii) A 741 op-amp is used as a non-inverting amplifier with a voltage gain of 50. Find the typical output voltage that would result from a common mode input with a peak level of 100 mV. Assume a typical CMRR of 90 dB. (4)

(iii) Find the slew rate of a frequency compensated op-amp at room temperature which has a unity cross-over frequency of 5 MHz. (6)

Or

(b) (i) Explain the working of a simple current source. (8)

(ii) Write notes on dominant-pole compensation used in op-amps. (8)

12. (a) (i) Explain the working of a Schmitt trigger circuit with necessary diagrams. (10)

(ii) Design a phase-shift oscillator for a frequency of oscillation of 200 Hz. Assume $C = 0.1 \ \mu F$. (6)

Or

(b) (i) State the advantages and limitations of active filters. (6)

(ii) A second order low-pass filter is to be designed with $A_0 = 6$, $f_0 = 200$ Hz and $b = 0.6$. Calculate the component values.

(A_0 is the gain of op-amp, $b/2$ is the damping factor). (10)

13. (a) Explain the operation of a four-quadrant multiplier.

Or

(b) (i) Explain the working of phase locked loop. (8)

(ii) Explain one of its applications in detail. (8)

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14. (a) (i) Explain the working of binary-weighted resistor D/A converter. (8)

      (ii) Explain the working of any one type of voltage to frequency converters. (8)

Or

    (b) (i) Explain the working of a dual slope ADC. (8)

      (ii) State its advantages and limitations. (8)

15. (a) Explain in detail about noise occurring in op-amp and make a detail analysis of the same.

Or

    (b) (i) Explain the internal details of 555 timer. (8)

      (ii) Explain its usage as astable multivibrator. (8)

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