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Question Paper Code : 81234

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

Fourth Semester

Electronics and Communication Engineering

EC 3451 — LINEAR INTEGRATED CIRCUITS

(Common to : Electronics and Telecommunication Engineering)

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What is current mirror?
2. Write the expression for slew rate of an op-amp.
3. Draw the circuit of voltage follower using op-amp.
4. List the applications of Log amplifiers.
5. Define lock-in range of PLL.
6. How the square root and square of a signal is obtained with multiplier circuit?
7. Write the advantage of Sigma-Delta ADC.
8. What is the function of a sample-and-hold circuit?
9. The Hartley oscillator has $L_1 = 20$ mH, $L_2 = 10$ mH and $C = 100$ pF. Calculate the frequency of oscillations.
10. Define Low Drop-Out (LDO) regulator.

PART B — ($5 \times 13 = 65$ marks)

11. (a) Explain in detail about Input Bias Current, Input Offset Current, Input offset voltage and thermal drift.

Or

- (b) With neat diagram, derive the AC performance close loop characteristics of op-amp.

12. (a) With neat circuit diagram, explain the operation of a V-to-I and I-to-V converter. Mention their applications.

Or

- (b) (i) With neat figures, describe the working of an integrator using op amp. (7)
(ii) Derive the expression for output voltage of a practical integrator. (6)
13. (a) Describe the basic operation of a phase-locked loop with block diagram. Describe how phase detection and loop filter control the VCO.

Or

- (b) Explain how a PLL can be used for AM detection, FM detection, and FSK demodulation. Compare their principles of operation.
14. (a) With a neat sketch, explain the operational features of 4-bit weighted resistor type D/A converter.

Or

- (b) Explain the operation of Successive Approximation ADC. Compare its performance with a flash ADC.
15. (a) With block diagram, explain the operation of a switched capacitor filter IC (MF 10). Mention its applications in signal processing.

Or

- (b) Explain the operation of ICL8038 function generator. Discuss how sine, square and triangular waves are generated.

PART C — (1 × 15 = 15 marks)

16. (a) A dual slope ADC has a full-scale input of 2 Volts. It uses an integrating time of 10 ms and integrating capacitor of 0.1 μf . The maximum magnitude of the integrator output should not exceed 3 V. Calculate the value of the integrating resistor.

Or

- (b) Describe the 555 timer IC. Design an astable multivibrator circuit to generate output pulses of 25% and 50% duty cycle using a 555 timer with the choice of $C = 0.01 \mu\text{F}$ for the frequency of 5 KHz.