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Question Paper Code : 40983

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2024.

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. How does the change in supply voltage affect the operating point in the transistor?
2. How is the figure of merit of a differential amplifier calculated?
3. Suggest a circuit to generate triangular waveform from square waveform using OPAMP.
4. Name a comparator with positive feedback.
5. What is the function of voltage-controlled oscillator in PLL?
6. What is the function of a logarithmic multiplier?
7. An 8-bit D/A converter has an output voltage ranging from 0 to 2.55 V. Find the resolution of the system.
8. Suggest two methods to enhance the performance of an A/D converter.
9. How is current limit protection provided in a voltage regulator?
10. How is PLL used as a frequency translator?

PART B — ($5 \times 13 = 65$ marks)

11. (a) Elaborate on a low value current source designed by using an emitter resistor in conjunction with a differential amplifier.

Or

- (b) Discuss the impact of frequency response, gain, bandwidth, slew-rate and phase-shift on OPAMP performance in real-time.

12. (a) Analyze a voltage to current converter circuit with load floating and ground. How does this affect the current drawn from the source?

Or

- (b) Design a multiple feedback narrow bandpass filter with $f_r = 1 \text{ kHz}$, $Q = 3$ and $A_f = 10$.

13. (a) Perform the dc analysis of the Gilbert cell and comment on the linearity of the output.

Or

- (b) In a FSK based satellite communication system, how could the PLL design be configured to perform both FSK modulation and demodulations?

14. (a) Convert a 2-bit analog signal into a digital signal using a simultaneous fastest A/D converter.

Or

- (b) Explain the principle of operation of a first order sigma-delta modulator.

15. (a) Draw and explain how an IC 723 voltage regulator could be modified to supply a voltage range from 2 V to 7 V.

Or

- (b) Draw and explain the circuit diagram of IC 733 video amplifier along with its features.

PART C — ($1 \times 15 = 15$ marks)

16. (a) Design a square wave generator using 555 timer to generate a frequency of 150 Hz with 70% duty cycle. Assume $C = 0.1 \mu\text{F}$.

Or

- (b) Design a continuously adjustable power supply for the range of 2 V to 5 V with a current limit of 1 A using IC LM 723.
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