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Question Paper Code : 71026

M.E. DEGREE EXAMINATION, JUNE/JULY 2013.

Second Semester

Applied Electronics

AP 9221/AP 921/10244 AE 201 — ANALYSIS AND DESIGN OF ANALOG INTEGRATED CIRCUITS

(Common to M.E. VLSI Design and Embedded Systems)

(Regulation 2009/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Draw the small signal model of the MOS transistor.

2. What are the short circuit effects in MOS transistor?

3. Compare & Contrast Emitter follower and source follower.

4. What is the need for an active load?

5. Define Slew rate.

6. What are the methods to achieve low input bias current in Op-Amps?

7. Define Noise figure.

8. What are the various sources of noise?

9. What is the reason for not using Beta-Helpers in simple MOS current mirrors to reduce the gain error?

10. Compare & Contrast MOS Op-Amps & Op-Amps using transistors.

PART B — (5 × 16 = 80 marks)

11. (a) With an aid of small signal equivalent circuit of the bipolar transistor, derive the various elements in the small signal model.

Or

(b) Explain depiction region of a PN Junction and derive for the total voltage across the junction.

12. (a) Explain the operation of a bipolar Widlar current source and find the output current and using small signal model derive its output resistance.

Or

(b) Explain the working of a band gap reference bias circuit with necessary diagrams.

13. (a) What are the factors which limit slew rate in Op-Amp and explain the methods to improve slew rate.

Or

(b) Determine the input resistance, output resistance and trans-conductance of 741 Op-Amp with an aid of small signal model.

14. (a) Derive the expression for the differential output current in Gilbert Multiplier which is suitable for four quadrant multiplication.

Or

(b) Explain the principles and applications of PLL with necessary diagrams.

15. (a) Explain the two stage MOS operational amplifier with a neat sketch.

Or

(b) Write Explanatory note on (i) CMOS Class AB output Stage (ii) MOS Folded cascode op-amp. (8+8)

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