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Question Paper Code : 81054

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Second Semester

Applied Electronics

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

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

(Regulation 2009/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How does a MOS transistor work in a weak inversion region?

2. Draw the small signal model of the MOS Transistor and obtain its parameters.

3. Draw the simple current source and obtain its equation.

4. Design a bandgap voltage reference circuit if the temperature co–efficient of the diode is $-2mv/^{\circ}C$ and $(TC)_{V_T} = 0.085mV/^{\circ}C$.

5. What is slew rate? Give its equation.

6. Determine the unity gain frequency, given $C_c = 5PF$, $g_m = 0.9mA/V$.

7. Mention the type of circuit used as a VCO give its frequency equation.

8. Draw the noise model of integrated circuits and obtain the noise figure.

9. Draw a Wilson current mirror circuit and give its equation.

10. Mention the features of a class AB output stage.

PART B — (5 × 16 = 80 marks)

11. (a) Describe the working of NMOS device with its characteristics to illustrate the large signal behavior of MOSFET.

Or

(b) Explain the short channel effects in MOSFETS with necessary diagrams.

12. (a) With necessary equations, derive the CMRR equation for a differential pair with active load using FET.

Or

(b) Describe the working of emitter follower as an output stage and derive its efficiency.

13. (a) Explain the working of a two stage op amp with neat diagrams and obtain its gain of individual stages.

Or

(b) Draw the simplified model of the op–amp and derive for its mid frequency gain and frequency.

14. (a) Describe the working of four quadrant Gilbert multiplier with neat diagrams.

Or

(b) Derive for the lock range and capture range of PLL in locked condition.

15. (a) Compare simple, cascode and widlar current sources and obtain its output resistances with necessary equations and diagrams.

Or

(b) Write short notes on

(i) Telescopic operational amplifier.

(ii) Folded cascode operational amplifier.

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