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Code No.: 6133 M

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
M.E. (CBCS : ECE) I-Semester Make up Examinations, March-2017

(Embedded Systems & VLSI Design)

Analog IC Design

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. List the Characteristics of analog signals.
2. Mention various types of loads in analog circuits.
3. Derive the expression for the output resistance of a simple COMS current mirror.
4. Compare Wilson current mirror & Cascode current mirror.
5. Draw the small signal low frequency equivalent of a CS and CD amplifiers with current mirror load.
6. Define PSRR, CMRR and Common mode gain of an OP-AMP.
7. What is OTA? How is it different from OP-AMP?
8. How Gilbert cells function as an analog multiplier?
9. What is the condition for sustained oscillations in an oscillator?
10. Explain how a tank circuit operates? Draw the variations in impedance and phase as function of frequency of a LC tank circuit.

Part-B (5 × 10 = 50 Marks)

11. a) Explain how passive elements are realized in ICs. [6]
b) What are the various coupling techniques employed in Amplifiers? [4]
12. a) In a source degenerated current mirror the input current $I_{in} = 100\mu A$, each transistor has $W/L = (100\mu m) / (1.6\mu m)$ and $R_S = 5K\Omega$, $\mu_n C_{ox} = 92 \mu A / V^2$, $V_{in} = 0.8V$ and $r_{ds} = [8000 L (\mu m)] / [ID (mA)]$. Find r_{out} for the current mirror. Assume $g_s = 0.2 g_m$. [5]
b) Describe band gap reference bias circuits using BJT. Explain how temperature independent voltage is generated. [5]
13. a) Derive voltage gain expression for a common source amplifier with a current mirror load. [4]
b) Obtain the expression for the voltage gain in MOS single ended differential pair. [6]
14. a) Explain why current feedback is preferred in Op-Amps. What is a current feedback Op-Amp? [6]
b) Define input & output offset voltage, slew rate and offset voltage drift in emitter Coupled Differential pair. [4]
15. a) Classify Voltage controlled oscillators. Explain the principle of operation of voltage controlled tuned Oscillator. [6]
b) Explain about the tuning delay in ring oscillators & LC oscillators. [4]

- 16. a) Explain the principle of operation of a Zener diode based voltage reference circuit. [5]
- b) Draw the small signal high frequency equivalent circuit of MOSFET. What are the various parameters involved in the model? [5]
- 17. Write short notes on any *two* of the following:
 - a) Biasing techniques in amplifiers [5]
 - b) Sensitivity in Current Mirrors [5]
 - c) Noise in Amplifiers. [5]

