Reg. No.									

MANIPAL UNIVERSITY
SCHOOL OF INFORMATION SCIENCES

SECOND SEMESTER MASTER OF ENGINEERING – **ME** (VLSI DESIGN)
DEGREE EXAMINATION (MAKE-UP) – JULY 2016

SUBJECT: **EDA 604 - ADVANCED VLSI DESIGN**

Saturday, July 9, 2016

Time: 10.00 – 13.00 Hrs. Max. Marks: 100

1. Starting from a general 2-port network, derive a complete low frequency, small signal model for a MOSFET.

(10 marks)

2. A) With relevant diagrams, differentiate among current source, current sink and current mirror.
B) Calculate the small-signal voltage gain of the circuit shown in Fig. 2(B).

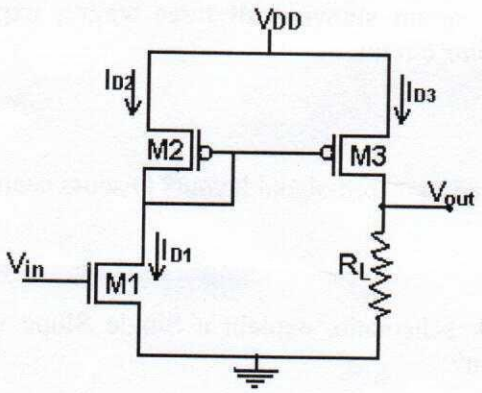

Figure 2(B)

(5+5=10 marks)

3. With a neat schematic diagram, explain the working of Wilson current mirror. How it is different from a simple cascode current mirror?

(10 marks)

4. Derive the expression for the small-signal incremental voltage gain, $\mathbf{A_v}$ of a CMOS Common-Source amplifier with diode-connected load. What are the merits and demerits of this topology over the passive load connected one?

(10 marks)

5. A) What are the characteristics of an ideal current or voltage references?
   B) Design a 3V reference using *MOSFET-Only* voltage divider. Determine the temperature coefficient of the reference. Assume any missing data.
   [Data given: $V_{DD} = +5V$, $Vss = 0V$, $V_{THN} = 0.8V$, $V_{THP} = 0.9V$, $\partial V_{THN}/\partial T = -0.0024V/℃$, $\partial V_{THP}/\partial T = -0.0027V/℃$]

(5+5=10 marks)

6. What is differential amplification? What are its advantages over single-ended amplification?

(10 marks)

7. What is Common Mode Rejection Ratio (CMRR) of a differential amplifier? Explain the diagram used to measure it.

(10 marks)

8. With a neat schematic diagram showing all three stages, explain the working of a *CMOS nonlinear analog comparator* circuit.

(10 marks)

9. What are the issues involved in mixed-signal layout? Discuss each of them briefly.

(10 marks)

10. With the help of a block schematic, explain a Single Slope Integrating ADC. What are the accuracy issues related to it?

(10 marks)

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