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# P.E.S. College of Engineering, Mandya - 571 401

***(An Autonomous Institution affiliated to VTU, Belgaum)***

**Sixth Semester, B.E. - Electronics and Communication Engineering**

**Make-up Examination; July - 2016**

**Analog CMOS VLSI Design**

*Time: 3 hrs* *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
*ii) Assume missing data suitably.*

**UNIT - I**

1 a. Derive an expression for $I_D$ of a NMOS transistor in triode and saturation region. 8

b. Discuss the second order effects; 8
(i) Body effect (ii) Sub threshold conduction.

c. Explain the MOS derive capacitances. 4

2 a. With neat diagram, explain the diode connected NMOS and PMOS using the small signal equivalent circuit. Derive expression for equivalent resistance of these diode connected devices. Also derive the expression for Av for CS stage with diode connected load. 8

b. Derive an expression for $|A_V|$ of common-gate stage amplifier with resistive load. 6

c. Calculate the gain of the circuit shown in Fig. 2(c). Assume $I_o$ is ideal. 6

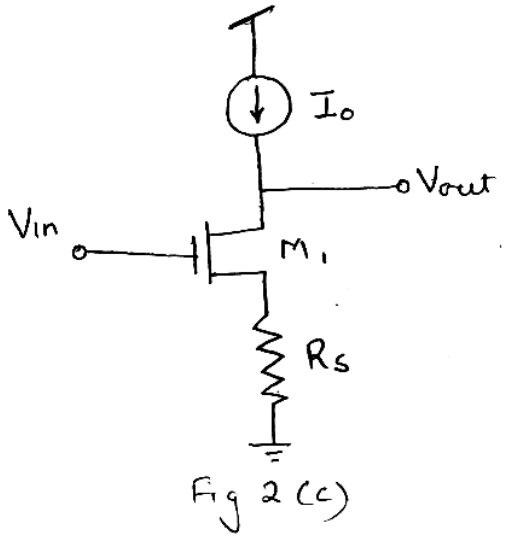


Fig 2 (c)

**UNIT - II**

3 a. With the help of relevant diagram, explain the working of a basic differential pair using qualitative analysis. 8

b. Derive the expression for CMRR for a differential amplifier. 6

c. Write a short note on Gilbert's cell. 6

4 a. Describe the operation of cascade current mirror circuits. 7

Contd…2

b. Derive the expression for voltage gain of Active current mirror circuit using small signal analysis. 7

c. In Fig. 4(c) Assuming all of transistors is identical, sketch. $I_x$ and $V_B$ as $V_x$ drop from a large positive value. 6

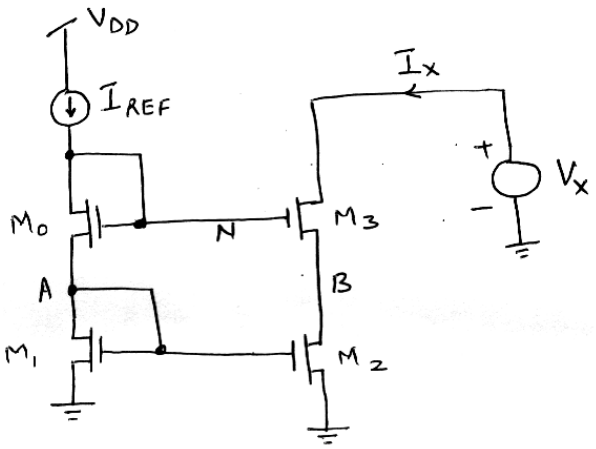


Fig 4 (c)

**UNIT - III**

5 a. Explain the concept of supply independent biasing. 8

b. Explain the constant $G_M$ biasing. 6

c. Write a note on speed and noise issues in reference generators. 6

6 a. Explain the precision consideration and speed. Consideration of a unity gain sampler/buffer. 10

b. Explain the switched capacitor integrator 10

**UNIT - IV**

7 a. Describe the working of a two pole feedback system in a ring oscillator with relevant diagrams. 10

b. Explain the working of a LC oscillator using negative resistance (one port oscillators). 10

8 a. Explain the basic principle of working of a voltage controlled oscillator with a block diagram and characteristic diagram. Also explain the performance parameters of VCOs. 10

b. Write a note on Colpitts oscillator. 10

**UNIT - V**

9 a. With the help of a block diagram explain the working of a simple PLL. Draw and explain the waveform in PLL under locked conditions. 10

b. Explain the working of a phase/ frequency detector with relevant diagrams. 10

10 a. Explain the PFD/CP Non-idealities. 10

b. Explain the process of frequency multiplication and frequency synthesis. 10

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