Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **B.Tech**
PEEI5404

8th Semester Regular / Back Examination 2016-17
ANALOG VLSI DESIGN
BRANCH(S):AEIE, BIOMED, EIE, IEE
Time: 3 Hours
Max Marks: 70
Q.CODE: Z144

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) What is the importance of level of abstraction in Analog VLSI Design?
b) What aspects of the performance of an amplifier are important?
c) Write the expression of the output of a Common Source Stage when the transistor goes into (i) triode region and (ii) saturation region.
d) What is a Diode-connected NMOS? Mention some of its properties.
e) Mention the drawbacks of a Source Follower.
f) What is a cascode topology? Draw a basic configuration.
g) Differentiate between single ended and differential ended signals. Which is better?
h) Why Gilbert Cell can work as an Analog Voltage Multiplier?
i) What is a current mirror? Why is it called so?
j) Enlist different Feedback topologies.

Q2 **a)** Differential between a transimpedence and a transconductance amplifier. **(2)**
b) For a differential pair with MOS connected load calculate the small signal voltage gain. What is the major drawback of this topology? Give one method to alleviate the same. **(8)**

Q3 **a)** For large value of load resistance, RD the effect of channel length modulation in the common source stage increases. How? **(5)**
b) Explain the linear behaviour of a Common Source stage with a diode connected load. **(5)**

Q4 **a)** For the given circuit in Figure Q4 (a), calculate the gm and Av. Also draw its small signal equivalent model. **(5)**

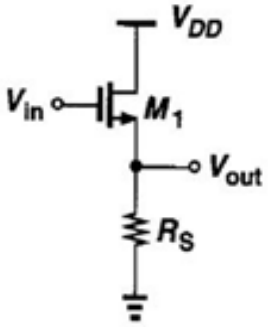

Figure Q4 (a)

b) Suppose in the Source Follower circuit given in Figure Q4 (b) $\left(\frac{W}{L}\right)_1 = \frac{10}{0.5}, I_1 = 100\,\mu A, V_{TH0} = 0.9\,V, 2\emptyset_F = 0.7\,V, \mu_n C_{ox} = \frac{50\mu A}{V^2} and \gamma = 0.3V^2$. Calculate $V_{out1} for V_{in} = 1.5V$. If I_1 is implemented as M2 as seen in Figure Q4 (c), find the minimum value of $\left(\frac{W}{L}\right)_2$ for which M2 remains in saturation. **(5)**

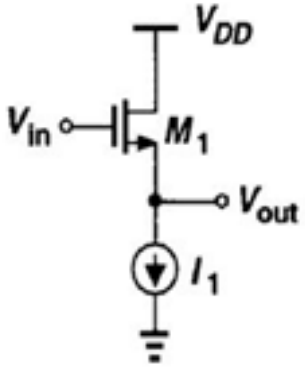

Figure Q4 (b)

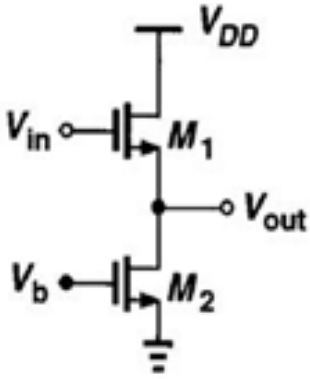

Figure Q4(c)

Q5 **a)** For the Differential Pair with Current Source Load shown in Figure Q5 calculate G_m and R_{out}. **(5)**

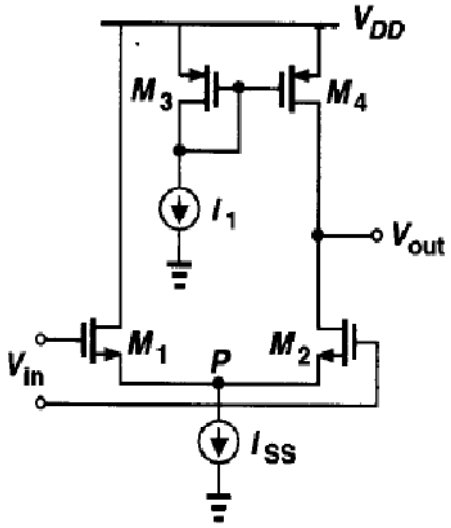

Figure Q5

b) Calculate V_{out}/V_{in} for the above circuit in Figure Q5. **(5)**

Q6 **a)** What are the properties of Feedback circuit? **(5)**

b) Discuss the effect of Loading in Voltage-Voltage Feedback. **(5)**

Q7 Discuss the performance parameters of OPAMP. **(10)**

Q8 **Write short answer on any TWO:** **(5 x 2)**

a) Band gap Reference
b) Voltage-Controlled Oscillators
c) Cascode Current Mirrors
d) Miller Effect