Exam.Code:0976
Sub. Code: 7114

2054

M. Tech. (Microelectronics)

Second Semester

MIC-203: Analog and Mixed Signal Device Design

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

a) Write a short note on successive approximation multiplier with block diagram.

b) Explain about CMOS sample and Hold circuit.

c) Explain the working simple MOS current mirror.

d) What is slew rate and derive the linear settling response.

e) What is common mode response and CM gain with its significance? (5x2)

UNIT - I

II. What is an analog multiplier? Explain the concept of 2-quadrant analog multiplier. Discuss the significance of Gilbert Cell over 2-quadrant multiplier and its applications. (10)

III. a) Derive and explain the small signal gain of source follower.

b) Calculate the small signal output resistance and Body effects included in source follower. (2x5)

IV. Evaluate the voltage gain of a MOSFET based two input differential amplifier. Differentiate between a MOS based and bipolar based differential amplifiers. (10)

UNIT - II

V. What is need of compensation in op-amp amplifiers? Describe any two techniques used for compensation in two stage op-amp amplifiers. (10)

VI. What are Widlar and Wilson current sources? Explain their working and temperature dependence. (10)

P.T.O.

VII. a) Design a circuit to obtain a current I_D of 80 μA in fig 1. Find the value required for R and find the DC voltage V_D. NMOS transistor has V_t=0.6V, $\mu_n C_{ox}$=200μA/V^2, L=0.8μm and W=4μm (Assume λ=0).

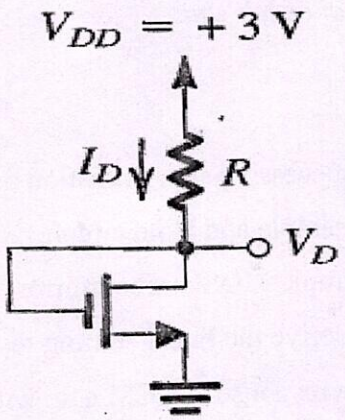

Fig 1

b) Derive the integral and differential non-linearity of the voltage scaling DAC. Also, illustrate the application with an example. (2x5)

x-x-x