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

(An Autonomous Institution affiliated to VTU, Belagavi)

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

Semester End Examination; July / Aug. - 2022

Analog CMOS VLSI Design

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1 - Apply the knowledge of physics circuit elements and circuit analysis tom understand the MOS devices and analog COMS.

CO2 - Analyse different analog COMS VLSI circuits amplifiers, Op-amps, Oscillators.

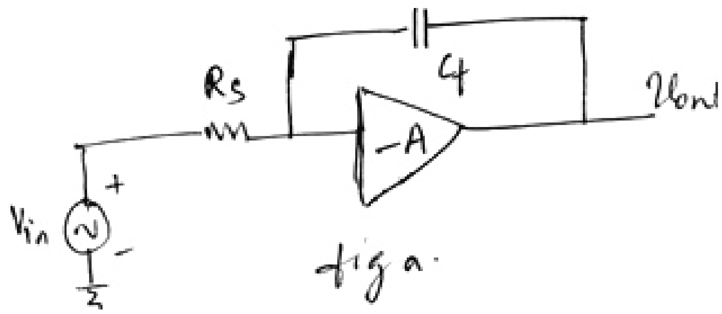
CO3 - The Design the analog CMOS circuits for the given Specifications.

CO4 - The Develop analog CMOS circuits for Different applications.

CO5 - To Simulate the analog CMOS circuits using modern tools.

Note**:*****I)PART - A*** *is compulsory.* ***Two*** *marks for each question.*

II)PART - B*: Answer any* ***Two*** *sub questions (from a, b, c) for Maximum of* ***18 marks*** *from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
I a.	Give the advantages of cascade stage over simple common source amplifier.	2	L1	CO1	PO1
b.	Sketch the small signal differential gain of a differential pair as a function of the input CM level.	2	L1	CO2	PO2
c.	Calculate the pole associated with node x shown in fig. a 	2	L2	CO2	PO2
d.	List any two drawbacks of the telescopic cascade op amps.	2	L1	CO1	PO1
e.	Define VCO.	2	L1	CO1	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	Derive an expression for voltage gain and output resistance of common source stage with source degeneration $\lambda \neq 0$ and $\gamma \neq 0$.	9	L2	CO4	PO3
b.	For the source follower obtain the expression for small single voltage gain and output resistance taking $\lambda = 0$.	9	L2	CO2	PO2
c.	For the circuit shown below Fig.1c find ACM-DM (common mode to differental mode conversion). M1 and M2 are not indentical, $R_{D1} = R_{D2} = R_D$.	9	L1	CO1	PO1

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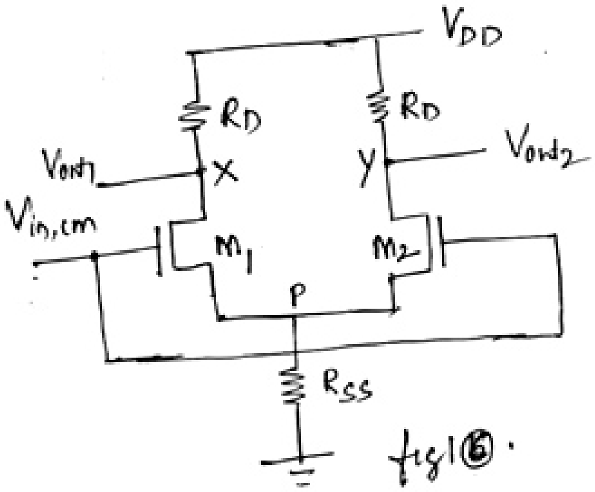

		Marks	
	UNIT - II	**18**	
2 a.	With neat circuit diagram, explain Gilbert cell.	9	L2 CO2 PO2
b.	Explain the basic current mirror with relevant equation? Explain how channel length is eliminated?	9	L2 CO2 PO2
c.	With neat circuit diagram, explain the operation of Cascode current mirror.	9	L2 CO2 PO2
	UNIT - III	**18**	
3 a.	Explain miller effect. calculate the input capacitance of the circuit Fig. 3 (a) by using miller's theorem.	9	L2 CO2 PO2

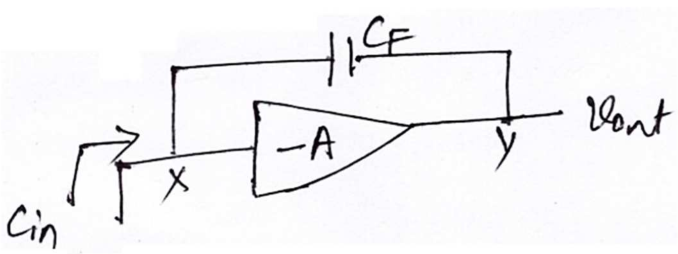

Fig. 3 (a)

b.	For the circuit shown in Fig 3. (b), calculate the transfer function ($\lambda = 0$) and explain why miller effect vanishes on C_{DB} increases?	9	L3 CO4 PO3

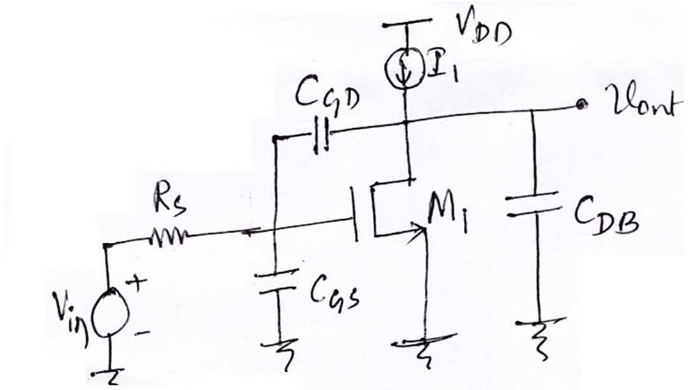

Fig 3 (b)

c.	With neat diagram derive the input And output impedance and transfer function of a source followers.	9	L5 CO4 PO3

UNIT - IV **18**

4 a. Explain briefly the following performance parameter of a OP-amp: 9 L2 CO2 PO2

i) Gain

ii) Small single B.W

iii) Output swing

iv) Noise and offset

b. Explain the operation and advantages of two stage OP-amp with a neat circuit diagram. 9 L2 CO2 PO2

c. Define PSRR. Calculate the low frequency PSRR of the feedback circuit shown in Fig. 4 (c). 9 L2 CO2 PO2

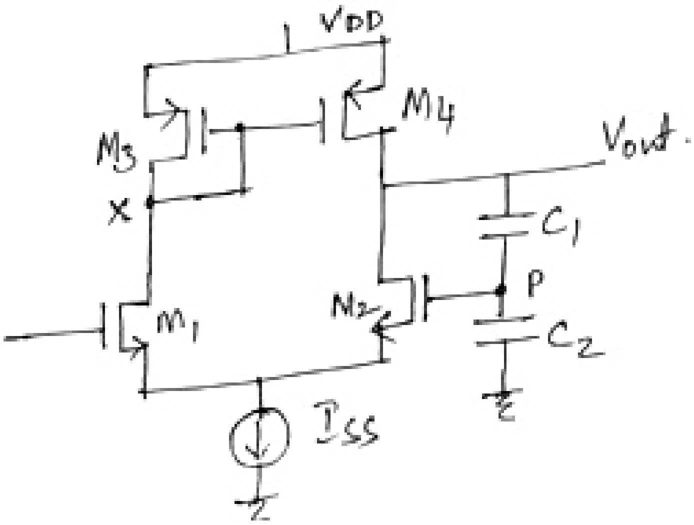

Fig. 4 (c).

UNIT - V **18**

5 a. Write a short note on; 9 L1 CO2 PO2

i) Thermal Noise

ii) Flicker Noise

b. With a neat circuit diagram, design and explain a 3-stage ring-oscillator. 9 L2 CO3 PO4

c. Explain the important performance parameter of VCOS. 9 L2 CO2 PO2

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