Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER 2012

Subject code: 725203 **Date: 01-01-2013**

Subject Name: Analog and Mixed Signal IC Design

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain the operation of an n channel MOSFET in linear, triode and saturation regions.	**06**
	(b)	Draw and explain the schematic and small signal equivalent circuit of a source follower circuit and explain its operation. What is the gain of the source follower?	**08**
Q.2	**(a)**	State and explain the Miller theorem. Explain one instant where the Miller theorem is used.	**07**
	(b)	Draw the circuit diagram of a cascode current mirror and explain its operation. What is the advantage of a cascode current mirror? **OR**	**07**
	(b)	Draw and explain the topology of voltage-voltage feed amplifier and obtain the expression for the gain of the amplifier with feedback.	**07**
Q.3	**(a)**	Draw and explain the circuit diagram of a single stage operational amplifier with a high gain amplifier and explain how a high gain is achieved in a single stage.	**08**
	(b)	Explain what is meant by slew rate of an operational ampler. Explain the factors that will affect the slew rate of a single stage operational amplifier.	**06**
		OR	
Q.3	**(a)**	Explain what is meant by output swing of an operational amplifier and explain the factors that affect the output swing of the amplifier. Compare the output swing performance of a cascode operational amplifier and a two stage operational amplifier.	**08**
	(b)	Explain the need for frequency compensation in operational amplifiers and a simple technique of frequency compensation.	**06**
Q.4	**(a)**	Explain the basic principle behind supply independent biasing. Draw and explain a self biasing circuit for generating supply independent biasing.	**09**
	(b)	Explain the operation of a proportional to absolute temperature (PTAT) voltage generator.	**05**
		OR	
Q.4	**(a)**	Draw the circuit diagram of a multiply by two switched capacitor circuit and explain its operation. What are the advantages and disadvantages of switched capacitor amplifiers?	**07**
	(b)	Explain what is meant by ring oscillator and how it can be used as a voltage controlled oscillator.	**07**
Q.5	**(a)**	Explain the operation of a Flash ADC with the help of neat diagrams. What are the advantages and disadvantages of flash ADC	**07**
	(b)	Draw the circuit diagram of a decoder based DAC and explain its operation.	**07**
		OR	
Q.5	**(a)**	Draw and explain the basic architecture of a Phase Locked Loop (PLL). What are the applications of PLLs	**07**
	(b)	Explain what is meant by quantization noise in analog to digital converters. Obtain expression for the rms value of quantization noise for an ADC.	**07**

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