Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014

Subject code: 2725204 **Date: 12-06-2014**

Subject Name: Designing with Modeling and FPGA's

Time: 02:30 pm - 05:00 pm **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	Draw the structure of MOSFET and explain its behavior when its terminal voltages V_{GS} and V_{DS} vary. Obtain the relationship between the drain current of a MOSFET and its terminal voltages (Neglecting Second order effects).	**07**
	(b)	Draw the Common Source stage with resistive load, diode connected load, current source load and triode load. Discuss Proôs and Conôs of each configuration.	**07**
Q.2	**(a)**	Describe the operation of Basic current mirror with a circuit diagram. Derive an equation for current gain. Specify your assumptions.	**07**
	(b)	Discuss various feedback topologies and their effect on input and output impedances.	**07**
		OR	
	(b)	Briefly explain MOSFET second-order effects. Discuss channel length modulation in detail.	**07**
Q.3	**(a)**	Discuss Performance parameters of an OPAMP.	**07**
	(b)	Design a fully differential telescopic op amp with the following specifications: V_{DD} = 3V, Power dissipation = 10mW, voltage gain = 1400. Assume $\varepsilon_n C_{ox} = 60\ \varepsilon A/V^2$, $\varepsilon_p C_{ox} = 30\ \varepsilon A/V^2$, $\boldsymbol{\lambda_n} = 0.1\ V^{-1}$, $\boldsymbol{\lambda_p} = 0.2\ V^{-1}$ (for an effective channel length of 0.5εm) $V_{THN} = \lvert V_{THP}\rvert = 0.7$v.	**07**
		OR	
Q.3	**(a)**	Explain the condition for oscillation and condition for stability in a negative feedback system. Discuss in detail two frequency compensation techniques.	**07**
	(b)	Which properties of noise can be predicted? Explain any two in detail.	**07**
Q.4	**(a)**	Draw and explain the circuit implementation of generating supply independent current and generation of temperature independent voltage.	**07**
	(b)	Discuss speed and noise issues in bandgap reference circuits with the help of an example.	**07**
		OR	
Q.4	**(a)**	Discuss the behavior of MOSFET as a sampling switch.	**07**
	(b)	Explain the following in detail (i) Ring oscillator (ii) Voltage controlled oscillator	**07**
Q.5	**(a)**	Discuss the necessity, operation and implementation of simple Charge pump PLL with appropriate diagrams.	**07**
	(b)	List ADC specifications. Discuss briefly any two ADC architectures.	**07**
		OR	
Q.5	**(a)**	Explain the terms below. (i) Bus functional modeling (ii) Timed and untimed functions (iii) TLM	**07**

(b) Draw the high frequency model of a common-source stage. Explain what Millers theorem is and how it is useful in analyses of frequency response of the amplifier. **07**

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