Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 714203N **Date: 03-01-2014**

Subject Name: Advanced MOSFET Modeling

Time: 10.30 am – 01.00 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)**	With the use of analogy explain MOS transistor operation in weak inversion, moderate inversion, strong inversion and cutoff.	**07**
	(b)	Explain effect of gate-substrate voltage on surface condition. Assume n-type substrate.	**07**
Q.2	**(a)**	Explain weak inversion in two terminal MOS. Derive the upper limit Q'_{M0} of weak inversion.	**07**
	(b)	Explain strong inversion in three terminal MOS.	**07**
		OR	
	(b)	With appropriate diagram and equations derive V_P as "V_{CB} Control" point of view.	**07**
Q.3	**(a)**	What are the advantages of source referenced modeling.	**07**
	(b)	Explain complete symmetric strong-inversion model.	**07**
		OR	
Q.3	**(a)**	How does the temperature affect MOS transistor? Explain various breakdowns in MOS.	**07**
	(b)	What is channel length modulation? Explain with all derivations.	**07**
Q.4	**(a)**	With appropriate diagrams and equations explain LOCOS isolation.	**07**
	(b)	Explain scaling of MOS quantities with the introduction of new technology.	**07**
		OR	
Q.4	**(a)**	Explain terminal currents in quasi-static operation when the MOS transistor is in dynamic operation.	**07**
	(b)	What are the limitations of quasi-static model?	**07**
Q.5	**(a)**	Evaluate various charges in quasi-static operation for different regions.	**07**
	(b)	What are the requirements of CAD models for analog and mixed analog/digital circuit design?	**07**
		OR	
Q.5	**(a)**	Give a briefing to carryout benchmark tests to evaluate MOSFET models.	**07**
	(b)	Mention the types of compact models of MOS transistor. Give a brief about all of them.	**07**

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