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20/6/13 AN

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Question Paper Code : 71870

M.E. DEGREE EXAMINATION, JUNE/JULY 2013.

First Semester

VLSI Design

VL 9213/VL 913/10244 VL 105 – SOLID STATE DEVICE MODELLING AND
SIMULATION

(Regulation 2009/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the equivalent circuit of MOS capacitor and define each element.
2. What are the issues involved in developing MOSFET model for RF applications?
3. What is DIBL effect?
4. List the non ideal effects of MOS.
5. Define inversion layer quantisation.
6. Differentiate between metal and poly resistor.
7. Give any four attractive features of EKV model.
8. State the effect of reverse short channel on MOS transistor performance.
9. What is physical model?
10. Name any two benchmark circuits.

PART B — (5 × 16 = 80 marks)

11. (a) Discuss the equivalent circuit of MOSFET for RF applications and explain how HF model parameters are extracted.

Or

- (b) Explain the modelling of parasitic BJT, Resistors and capacitors using various methods.

12. (a) Define the various non linearities in CMOS devices and modelling using any one method for each.

Or

- (b) (i) What are the various sources of distortion in analog CMOS circuits? How is calculated? (8)
- (ii) Draw the small signal schematic of noise sources and discuss how they are calculated analytically. (8)
13. (a) Elaborate on the various options for modelling gate electrode resistance in MOSFET. Draw the schematic.

Or

- (b) Explain :
- (i) Threshold voltage model and (8)
- (ii) Layout – dependent parasitics model. (8)
14. (a) How is velocity saturation and channel length modulation taken into account in EKV model? Explain.

Or

- (b) (i) Depending on layout difference, how are parasitics modelled in BSIM4? (6)
- (ii) Describe the MOSAI model. (10)
15. (a) What is a physical model? Explain the modeling of device mismatch in Resistor , MOS transistor for RF applications.

Or

- (b) Discuss the test automation of CMOS RF circuits.