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Question Paper Code : 83356

M.E. DEGREE EXAMINATION, JANUARY 2014.

First Semester

VLSI Design

VL 7103 — SOLID STATE DEVICE MODELING AND SIMULATION

(Regulation 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the characteristics of MOSFET.
2. State the steps involved in AC small signal modeling.
3. What is sparse matrix technique?
4. Define convergence.
5. How is solution of stiff system obtained?
6. List the general purpose circuit simulators.
7. State Schrodinger equation.
8. What is grid generation? State the steps involved.
9. State the parasitic capacitances associated with MOSFET.
10. What are the advantages of small signal analysis?

PART B — (5 × 16 = 80 marks)

11. (a) (i) With neat illustrations, explain the advanced modelling of MOSFET. (8)
- (ii) Draw the equivalent circuit representation of MOS transistor and explain. (8)

Or

- (b) (i) Describe the high frequency behaviour of MOS transistor. (8)
- (ii) How is modelling of parasitic BJT, resistors and capacitors carried out? Discuss on the constraints involved. (8)

12. (a) (i) Explain the modelling of MOS switch. (8)
(ii) Derive nodal, modified nodal and hybrid equations and state the various metrics involved. (8)

Or

- (b) (i) Discuss on Sparse matrix technique. (8)
(ii) Explain the steps involved in obtaining solution of nonlinear network through Newton-Raphson technique. (8)

13. (a) Describe the methods used to obtain the solution to stiff system of equation.

Or

- (b) (i) With example of an electrical network, explain any one multistep method. (8)
(ii) Discuss on circuit simulators. (8)

14. (a) (i) Explain in detail about Poisson equation. (8)
(ii) Discuss briefly on drift-diffusion mathematical technique for device simulation. (8)

Or

- (b) (i) How are hydrodynamic equations implemented for device modelling? Explain. (8)
(ii) Illustrate with example the Grid generation. (8)

15. (a) Write short notes on the following

- (i) Simulation of p-n junction. (8)
(ii) Small signal analysis of MOSFET. (8)

Or

- (b) Illustrate using an example the simulation of MOS capacitor. Also bring out its limitations.