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Question Paper Code:U2524

Ph.D. COURSE WORK EXAMINATION, APRIL 2024

Elective

Communication Systems

21PCM524- VLSI DEVICE MODELING

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

1. (a) Analyze the different voltage regions of CMOS models to reduce the noise in VLSI circuits with suitable techniques and choose the best region CO5- Ana (20)
Or
(b) Analyze the various types of modes based on the supply voltage with respect to the threshold voltage and justify your answer. CO5- Ana (20)
2. (a) Derive the MOSFET Current Equation for different gate to source voltages under the conditions $V_{GS} > 0$. CO4- App (20)
Or
(b) An NMOS transistor has the following parameters: $W = 10 \mu\text{m}$, $L = 5 \mu\text{m}$, $V_{TO} = 0.6\text{V}$, $\gamma = 1.0$, $\phi = 0.7\text{V}$, $\mu_n C_{ox} = K_n = 50 \mu\text{A/V}^2$. Plot the transfer characteristics (I_D vs. V_{GB}) of the transistor using the EKV model showing the conduction and saturation branch of the drain current. CO4- App (20)
3. (a) Analyze the Effect of scaling laws on MOSFET device circuit performance and choose the best. CO5- Ana (20)
Or
(b) Analyze the Various techniques to scaling the MOSFET to optimize the area in VLSI circuits. CO5- Ana (20)
4. (a) Apply the Triangular Well Method in Quantum Phenomena for MOS Transistors to reduce DIBL. CO2- App (20)

Or

(b) Apply the suitable methods to avoid second order effects using the Quantum Phenomena techniques in MOS Transistors using the relevant parameters. CO2- App (20)

5. (a) Design Symmetric double gate MOSFET structure using non-classical SOI CMOS Techniques. CO4- App (20)

Or

(b) Design the High electron mobility transistor using device modeling techniques for reduce to Power dissipation. CO4- App (20)