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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER M.TECH DEGREE EXAMINATION

DECEMBER 2017

Electronics & Communication Engineering

VLSI and Embedded Systems

04 EC 6501—VLSI TECHNOLOGY

Max. Marks : 60   Duration: 3 Hours

PART A

Answer All Questions

Each question carries 3 marks

1. What are the different etching methods in silicon wafer processing? expalin
2. Derive the expression for invariance of fermi level in a system at thermal and electrical equilibrium
3. What is Early voltage in a BJT
4. What are the advatages of MOSFET as the active device in VLSI design?
5. Draw the low frequency circuit model of MOSFET including body effect.
6. Explain body effect in MOSFET.
7. What is velocity saturation?
8. Explain Explain about monolithic Capacitors

PART B

Each question carries 6 marks

9. a) With necessary diagrams explain the float zone method for crystal growth (4 marks)
   b) What is De Broglie wavelength? Explain   (2 marks)

OR

10. With neat sketches explain photolithographic technique

11. With neat sketches explain what are the different types of carrier generation and recombination methods?

OR

12. Calculate the charge density using density of states function and fermi – Dirac probability function.

13. With necessary diagrams derive the current equations of BJT

OR

14. Derive diode equation for P N junction

15. Find the maximum depletion width, minimum capacitance, and threshold voltage of an ideal MOS capacitor with a 10nmgate oxide (SiO_2) on P type silicon with $Na=10^{16}/cm^3$. Include the effects of Flat band voltage assuming an n+ polysilicon gate and fixed oxide charge of $5x10^{10}$ q (C/Cm^2)
($ni= 1.5x10^{10}/ cm^2, \varepsilon 0=8.854x10^{-14}$ F/cm, $\varepsilon_{si}=11.8, \varepsilon_{ox}=3.9$, $q=1.6x10^{-19}$ C)

OR

16. Derive the expression for drain current of a MOSFET.

17. Draw the High frequency model of a common source amplifier using MOSFET. Derive an expression for the voltage gain of amplifier.

OR

18. Draw the circuit diagram of a common Drain amplifier and explain. Also find the voltage gain

19. What is scaling? What are the advantages of scaling? Compare constant voltage scaling with constant field scaling

OR

20. What is isolation of monolithic components? Explain different Types of Isolation techniques