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Roll No. :

328844(28)

APR-MAY 2022

B. E. (Eighth Semester) Examination, 2020

(New Scheme)

(Et&T Engg. Branch)

**MICROELECTRONIC DEVICES
& VLSI TECHNOLOGY**

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

*Note ; Part (a) is compulsory. Attempt any two parts
from (b), (c) and (d) from each questions.*

Unit-I

1. (a) What are the advantages of Integrated circuits over discrete component circuits.

2

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- (b) Explain float zone process with suitable diagram. 7
- (c) The segregation coefficient of oxygen is 0.25. Find the concentration of oxygen in the silicon ingot at a fraction solidified of 0.3. The concentration of oxygen in the silicon at the top of the crystal is 12.5×10^{17} atoms/cm³ at fraction solidified of 0.1. 7
- (d) Explain CZ-Method. 7

Unit-II

2. (a) What is the purpose of film deposition? 2
- (b) Compare wet oxidation with dry oxidation. 7
- (c) Explain kinetics of thermal oxidation. 7
- (d) Calculate the oxide thickness when it is grown by wet oxidation & when it is grown by dry oxidation at a temp of 1000°C. Assume for wet oxidation $A = 0.226 \mu\text{m}$, $B = 0.287 \mu\text{m}^2/\text{h}$ $\tau = 0$ and for dry oxidation $A = 0.165 \mu\text{m}$, $B = 0.047 \mu\text{m}^2/\text{h}$ & $\tau = 0.37 \text{h}$. 7

[3]

Unit-III

3. (a) Why ion implantation is preferred over diffusion? 2
- (b) Explain diffusion mechanics. 7
- (c) Draw and explain ion implantation system. 7
- (d) Explain low energy and high energy implantation. 7

Unit-IV

4. (a) Define Etching. 2
- (b) Explain molecular Beam Epitaxy. 7
- (c) Explain X-ray Lithography with neat diagram. 7
- (d) Explain process simulation & integration. 7

Unit-V

5. (a) What do you understand by threshold voltage? 2
- (b) Explain spice modeling of MOSFET. 7
- (c) Explain scaling of MOSFET. What are the benefits of scaling. 7

(d) Explain short channel effects.

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- 3 (a) Why are impurities implanted over diffusion?
- 3 (b) Explain diffusion mechanics.
- 3 (c) Draw a schematic diagram of an implantation system.
- 3 (d) Explain low energy and high energy implantation.

Unit-IV

- 3 (a) Define channeling.
- 3 (b) Explain molecular beam epitaxy.
- 3 (c) Explain X-ray fluorescence with neat diagram.
- 3 (d) Explain process simulation & integration.

Unit-V

- 3 (a) What do you understand by threshold voltage?
- 3 (b) Explain spice modeling of MOSFET.
- 3 (c) Explain scaling of MOSFET. What are the benefits of scaling?