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Reg No.: _____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (S, FE) / S4 (PT) (S, FE) Examination January 2024 (2015 Scheme)

Course Code: EC304

Course Name: VLSI

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks

Marks

- 1 a) Explain the principle of crystal growth by the Czochralski method with necessary diagrams (9)
- b) Write short notes on Fick's laws of diffusion (6)
- 2 a) With the aid of neat diagrams explain the fabrication process of a transistor (7)
- b) Explain the principle of molecular beam epitaxy with schematic diagrams. (8)
What are its advantages and disadvantages?
- 3 a) What is photolithography? illustrate the steps involved in the photolithography process with diagrams (10)
- b) Explain the Deal and Grove model of oxidation (5)

PART B

Answer any two full questions, each carries 15 marks

- 4 a) Derive the expression for a CMOS inverter's rise time and fall time. (8)
- b) Draw the stick diagram of two input CMOS NAND and NOR gate (7)
- 5 a) Explain pass transistor logic. What are its limitations and how it can be corrected? (9)
- b) Implement the functions $u = A'B + AB'$ and $v = AB + A'B'$ using complementary pass transistor logic. (6)
- 6 a) Explain the different operating regions of a transmission gate with the help of characteristics (7)
- b) What is layout design rule? What are the differences between λ rule and the micron rule? (8)

PART C

Answer any two full questions, each carries 20 marks

- 7 a) Draw the circuit schematic of a 4x4 NAND ROM to store the words 1010, 0101, 1001 and 0001. (10)
- b) Draw the circuit diagram of the 6T SRAM cell. Briefly explain the read-and-write operation by drawing the simplified models (10)
- 8 a) Explain the 4x4 bit-array multiplier with a block diagram. (10)
- b) Explain the 16-bit linear carry select adder with neat figures and show the critical path. (10)
- 9 a) What is FPGA? What are its applications? With block diagram explain its internal architecture. (10)
- b) With necessary diagrams and equations, explain the design of the carry bypass adders (10)
