

B. Tech. Sem -VI (E & TC Engg.) (2014 COURSE) (CBCS) :

SUMMER - 2019

SUBJECT : VLSI DESIGN

Day : Monday
Date : 27/05/2019

S-2019-2779

Time : 02.30 PM TO 05.30 PM
Max. Marks : 60

N. B. :

- 1) All questions are **COMPULSORY**.
 - 2) Figures to the right indicate **FULL** marks.
 - 3) Draw neat and labeled diagram **WHEREVER** necessary.
 - 4) Use of non-programmable calculator is **ALLOWED**.
 - 5) Assume suitable data, if necessary.
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Q.1 a) How will you define concept of modularity, regularity, locality and design hierarchy? Discuss using suitable example. **(05)**

b) Draw stick diagram of 2-input NAND. **(05)**

OR

Q.1 a) What are the benefits of VLSI? Discuss VLSI design flow. **(05)**

b) Why layout design rules are used? Which are the layout design rules? **(05)**

Q.2 a) What is scaling? Compare full scaling and constant voltage scaling. **(05)**

b) For CMOS inverter, $V_{DD}=5V$, $V_{90\%}=4.5V$, $V_{10\%}=0.5V$, $\mu_n C_{ox}=20\mu A/V^2$, $(W/L)_n=5$, $V_{T,n}=0.8V$. Using average current method, calculate τ_{fall} if $C_{Load}=10pF$. **(05)**

OR

Q.2 a) What is channel length modulation? Explain channel length modulation using Current-Voltage characteristics of MOSFET. **(05)**

b) For CMOS inverter, $V_{DD}=5V$, $\mu_n C_{ox}=110\mu A/V^2$, $\mu_p C_{ox}=50\mu A/V^2$, $(W/L)_n=8$, $(W/L)_p=25$, $V_{T,n}=0.8V$ and $V_{T,p}=-1V$. Calculate τ_{PLH} and τ_{PHL} if $C_{Load}=100fF$. **(05)**

Q.3 a) What is the difference between Signal and Variable used in VHDL? Explain with example. **(05)**

b) Write VHDL code for full adder using dataflow model. **(05)**

OR

Q.3 Draw the block diagram of 16 X 1 MUX using 4 X 1 MUX and 2 X 1 MUX as component. Write VHDL code for the same. **(10)**

P. T. O.

Q. 4 Design a state machine for sequence detector to detect a sequence “ 1011” . **(10)**
Write VHDL code for the same.

OR

Q. 4 a) What are the different methods of configuring CPLD and FPGA? **(05)**

b) Write VHDL code for 4-bit down counter. **(05)**

Q. 5 How Voltage Scaling is used for low power operation? Discuss using suitable example. **(10)**

OR

Q. 5 What are the different factors affecting power consumption? Explain using suitable equations. **(10)**

Q. 6 Using suitable example, explain how physical defects result in logical faults. **(10)**
List physical defects, electrical faults and logical faults.

OR

Q. 6 How BIST is implemented? **(10)**

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