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## Fifth Semester B.E. Degree Examination, Jan./Feb.2021

### Verilog HDL

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

#### Module-1

- 1 a. Explain the typical design flow for designing VLSI IC circuits with neat block diagram. (10 Marks)
- b. Explain the Top down and Bottom up design methodology with an suitable example. (10 Marks)

**OR**

- 2 a. Explain the following components in a simulation (i) Design block (ii) Stimulus block. (06 Marks)
- b. Make use of T-Flip Flop build a 4-bit Ripple carry counter and explain the design hierarchy. (10 Marks)
- c. Explain the Trends in HDLs. (04 Marks)

#### Module-2

- 3 a. List all the lexical convention used is verilog and explain with examples. (08 Marks)
- b. Explain the two methods of connecting ports to external signal with an example. (08 Marks)
- c. Explain the compiler directives in verilog HDL. (04 Marks)

**OR**

- 4 a. What are the data types in verilog? Explain the following data types with suitable example:  
(i) Nets (ii) Parameter (iii) Array (iv) Memory (08 Marks)
- b. Write the Verilog code for SR Latch using gate level mode and also write stimulus code. (06 Marks)
- c. With neat block diagram, explain the components of verilog module. (06 Marks)

#### Module-3

- 5 a. Explain the following gate primitives used in verilog HDL with truth table:  
(i) Bufif (ii) notif (04 Marks)
- b. Construct a 4-bit Ripple carry adder and develop the verilog code using gate level model, also write stimulus code. (08 Marks)
- c. What should be the output of the following:  $A = 4'd_{10}$ ,  $B = 4'd_{13}$ ,  $C = 4'b_{|0x|}$ .  
(i)  $A \wedge B$  (ii)  $|B$  (iii)  $B \gg 2$  (iv)  $A \gg \gg 2$  (v)  $Y = \{3\{A\}, 2\{B\}\}$   
(vi)  $Y = \{A[2:0], B[3:1]\}$  (vii)  $A \& C$  (viii)  $A \parallel B$  (08 Marks)

**OR**

- 6 a. Construct a 4-bit carry look ahead adder and develop the verilog code using data flow description. (08 Marks)
- b. Write the verilog code for 4 to 1 multiplexer using conditional operator. (06 Marks)
- c. What are Rise, Fall and Turnoff delays? How they are specified in verilog? (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

**Module-4**

- 7 a. Explain the blocking and non blocking assignment statements with suitable example. (06 Marks)
- b. What are the different delay based timing controls are associated with verilog HDL and explain with relevant example. (08 Marks)
- c. Using case statement, design an 8-function ALU that takes 4-bit inputs 'a' and b and a 3-bit input signal select 1, and gives a 5-bit output 'out'. The ALU implements the following functions based on a 3 bit input signal select. Ignore any overflow or underflow bits.

Select signal	3'd <sub>0</sub>	3'd <sub>1</sub>	3'd <sub>2</sub>	3'd <sub>3</sub>	3'd <sub>4</sub>	3'd <sub>5</sub>	3'd <sub>6</sub>	3'd <sub>7</sub>
Function (out)	a	a + b	a - b	a/b	a % b	a<<1	a>>1	a>b

(06 Marks)

**OR**

- 8 a. Explain the sequential and parallel blocks with suitable example. (06 Marks)
- b. Write a verilog code for 4 to 2 priority encoder using casex. (08 Marks)
- c. List the loop statements in verilog. Explain the following loops with examples: (04 Marks)
- (i) For loop (ii) Repeat

(08 Marks)

**Module-5**

- 9 a. Compare VHDL and Verilog HDL. (04 Marks)
- b. Explain the synthesis process with a neat block diagram. (08 Marks)
- c. Explain the relationship between a design entity and its entity declaration and architecture body in VHDL? (08 Marks)

**OR**

- 10 a. Explain the following Data Objects in VHDL with examples : (09 Marks)
- (i) Constant (ii) Signals (iii) Variables.
- b. What are the data types in VHDL? Explain the Scalar data types with examples. (07 Marks)
- c. Write the VHDL code for a 4-bit wide register ensure that the input DATA [3 : 0] is stored only when the 'CLOCK' signal is detected on its rising edge. (04 Marks)

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