CBCS SCHEME

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15EC663

# Sixth Semester B.E. Degree Examination, June/July 2018
## Digital System Design Using Verilog

Time: 3 hrs. Max. Marks: 80

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





### Module-1

1 a. What are the two sources of power consumption in digital components? Explain. **(04 Marks)**

b. Develop a verilog model for a 4 : 1 multiplexer. **(04 Marks)**

c. Design an encoder for the buglar alarm that has sensors for each of the 8 zones as a priority encoder with zone 1 having highest priority down to zone 8 having lowest priority. **(08 Marks)**

**OR**

2 a. Explain the simple design methodology followed in IC industry. **(08 Marks)**

b. Develop a datapath to perform complex multiplication of two complex number whose real and imaginary parts are represented as signed fixed point numbers with 4-pre binary points and 12 post-binary points. Real and imaginary parts of the product are represented with 8 pre-binary points and 24 post-binary points. Area is the main constraint. Also write the verilog model of the complex multiplier datapath. **(08 Marks)**

### Module-2

3 a. Design a $1m \times 8$ bit composite memory using 512 K $\times 8$ bit memory component. **(04 Marks)**

b. Design a $16K \times 48$ – bit memory using $16K \times 16$ – bit memory component. **(04 Marks)**

c. Explain flowthrough and pipelined SSRAM with the help of timing diagram. **(08 Marks)**

**OR**

4 a. Determine whether there is an error in the ECC word 000111000100 and if so, correct it. **(06 Marks)**

b. Develop a verilog model of a dual – port $4K \times 16$ bit flow through SSRAM. One port allows data to be written and read, while the other port allows data to be read. **(06 Marks)**

c. Explain dynamic RAM operation. **(04 Marks)**

### Module-3

5 a. Write and explain the internal organization of a CPLD. **(08 Marks)**

b. What are the two main design and manufacturing techniques for ASIC's. Explain. **(08 Marks)**

**OR**

6 a. Write and explain the internal organization of FPGA. **(08 Marks)**

b. Explain differential signaling in detail. **(08 Marks)**

### Module-4

7 a. Explain Flash ADC and successive approximation ADC with the help of necessary diagrams. **(08 Marks)**

b. Design an input controller that has 8-bit binary-coded input from a sensor. The value can be read from an 8-bit input register. The controller should interrupt the embedded Gumnut core when the I/P value changes. The controller is the only interrupt source in the system. Also develop a verilog model of the I/P controller. **(08 Marks)**

**OR**

8 a. Explain the following serial interface standards for connecting I/O devices:
(i) $I^2C$ (ii) USB **(08 Marks)**

b. With a neat diagram, explain R-string DAC and R/2R ladder DAC. **(08 Marks)**

## Module-5

9 a. Explain the design flow of hardware/software co-design. **(10 Marks)**

b. Explain floorplan, placement and routing of ASIC physical design. **(06 Marks)**

**OR**

10 a. Explain Built-In Self Test (BIST) techniques. **(08 Marks)**

b. Explain the terms scan design and boundary scan. **(08 Marks)**

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