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**T.E. (Electronics & Telecommunication Engineering) -II  
(Semester-VI) Examination, December - 2015**

**VLSI Design  
Sub. Code : 45694**

Day and Date : Thursday 03-12-2015

Total Marks : 100

Time : 02.30 p.m. to 05.30 p.m.

- Instructions :
- 1) All questions are compulsory.
  - 2) Numbers to the right indicates full marks.
  - 3) Assume suitable data wherever necessary.

**SECTION- I**

**Q1) Solve any three. [18]**

- a) Briefly write about need of HDL, features and capabilities of VHDL.
- b) What is meant by 'Identifiers' used in VHDL? With suitable examples write about various rules to look after before choosing any identifier.
- c) With suitable examples, briefly differentiate 'Signals' and 'Variables' used in VHDL.
- d) Using two half adder circuits draw the circuit for full adder. Write a VHDL code for full adder using 'Process' statement.

**Q2) Solve any two. [16]**

- a) With the help of neat block diagram explain VLSI system design flow.
- b) Write a VHDL code to implement the following function:  

$$f(x_1, \dots, x_4) = \sum m(0, 1, 2, 4, 5, 7, 8, 9, 11, 12, 14, 15)$$
- c) Write a VHDL code for 4 bit priority encoder using PROCESS statement.

**Q3) Solve any two. [16]**

- a) Which are the different types of 'Operators' that operate on signals, variables and constants in VHDL? Summarize all types and with suitable examples elaborate 'Shift' operators.

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- b) What is meant by 'clock skew' and 'clock jitter'? Briefly write about these concepts with suitable examples.
- c) Draw a circuit for 4 bit serial-in-parallel-out shift register using D flip-flops. Write a VHDL code for the same circuit using structural type of modeling.

### SECTION -II

**Q4) Solve any three.** **[18]**

- a) Which are the different types of 'Attributes' to which VHDL supports? Elaborate 'Signal' type of attributes with proper syntax and its function.
- b) Which are the different forms of 'Wait' statement used in VHDL language? Explain briefly the functioning of each form of 'wait' statement with suitable example.
- c) Explain 'transport' and 'inertial' delay with suitable examples and respective timing diagrams.
- d) Briefly write about role of simulators in VHDL. Which are the different types of simulators used in VHDL. Explain event based simulator.

**Q5) Solve any two.** **[16]**

- a) With the help of neat block diagram explain briefly data path section in general purpose microprocessor EC-2
- b) Draw and briefly explain architectural block diagram of XC9572 CPLD.
- c) Which are the different fault models used while testing combinational logic circuits? Explain any one in detail.

**Q6) Solve any two.** **[16]**

- a) Draw and briefly elaborate control unit test diagram in case of general purpose microprocessor for load, store, add, sub, input, jz, jpos and halt instructions.
- b) Explain briefly boundary scan methodology used for testing circuit boards with many ICs.
- c) Draw and explain general architectural block diagram of Spartan-II family FPGA.

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