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BIELE-011

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

December, 2016

00093

BIELE-011 : DIGITAL SYSTEM DESIGN

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is allowed.*

1. Draw the logic diagram of a 4-bit look ahead carry adder and calculate the speed-up compared to a 4-bit binary ripple adder. *10*

2. Reduce the state diagram shown in Figure 1 and also write the reduced state table. Consider the input sequence as "0 1 0 1 0 1 1 0 1 0 0" starting from the initial condition '0'. *10*

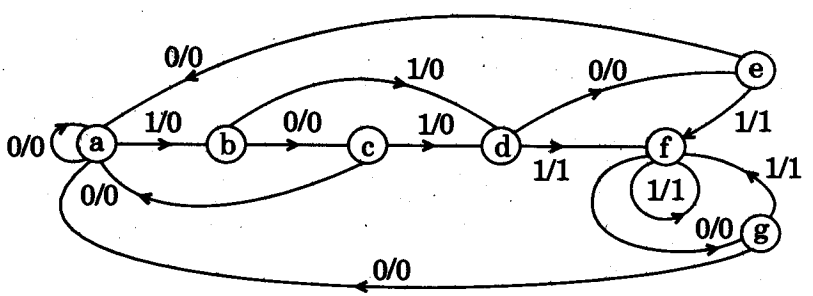

Figure 1

3. Design the controller whose state diagram is shown in Figure 2. Write the RTL model of the controller. *10*

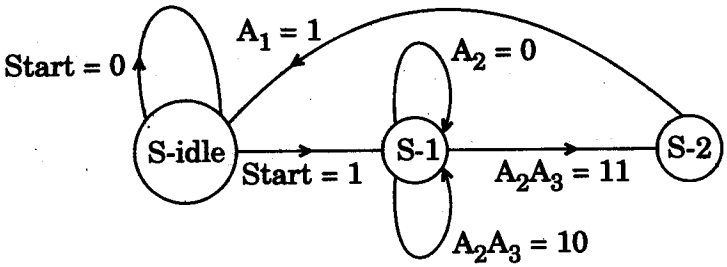

Figure 2

4. Implement the Boolean function

$$F(A, B, C, D) = \sum m(0, 2, 5, 7, 11, 14) \text{ and}$$

$$P(A, B, C, D) = \Pi M(1, 4, 5, 7, 9, 12, 15)$$

with multiplexer. *10*

5. Write the working principle of ROM matrix for implementing a truth table of a full subtractor. *10*

6. (a) Differentiate between Synchronous state machine and Asynchronous state machine. *5*

   (b) Design a Mod-6 up counter using J-K flip-flop. *5*

7. Explain the types of operators in VHDL design. Write a program for a 4-bit binary to BCD conversion using data flow model. *10*

8. Draw a multilevel NOR and multilevel NAND gate circuit to implement the Boolean function $F(A, B, C, D, E) = (A\bar{B} + C\bar{D})E + B\bar{C}(A + B)$. *10*

9. Write the data flow description for a 4-bit comparator. The output of the comparator is '1' when both the inputs are unequal and is '0' for equal input. *10*

10. Design a logic circuit that controls an elevator in a four-storied building. The circuit has two inputs for user to indicate the desired floor to reach. The lift starts moving when start input = 1. M is an output signal that indicates if the desired floor is reached (i.e., M = 1) and stops the lift for opening of gate. 'M' remains in low state (i.e., '0'), when the lift is moving. F_1 and F_2 are two outputs to show the floor level that the lift has reached. *10*