**THEORY EXAMINATION**

Question Paper

Month and Year of the Examination: **May- 2018**

Programme: **B.Tech** Semester: **2nd**

Subject: **Digital System Design.** Course No: **CSPC 10**

Total number of questions given: **7** Maximum Marks: **50**

Number of Questions to be Attempted: **5** Time allowed: **3 hrs**

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| 1. (a) | i. | What is the largest positive number one can represent in a 12-bit 2's complement code? Write your result in binary and decimal form. | **05 Marks** |
| | ii. | A 12-bit Hamming code word containing 8 bits of data and 4 parity bits is read from memory. What was the original 8-bit data word that was written into memory if the 12-bit word read out is 010000000101? | |
| (b) | | A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is $x^3 + 1$. Show the actual bit string transmitted. Suppose the third bit from the left is inverted during transmission. Show that this error is detected at the receivers end. | **05 Marks** |
| 2. (a) | i. | What are the 8-bit patterns used to represent each of the characters in the string "EVM MACHINE"? | **05 Marks** |
| | ii. | In hex, a) 2BFC + 54A7 b) AC74 – B3F. | |
| (b) | | M = F(w,x,y,z) = $\sum$m(2,9,10,11,13,14,15)<br>Simplify M using three variables MEV K-map. Assign z as the MEV. | **05 Marks** |
| 3 (a) | i. | Verify the given expression using laws of Boolean algebra.<br>(Z+X) .(Z+X'+Y) = (Z+X).(Z+Y) | **05 Marks** |
| | ii. | Reduce the following to its simplest form using laws of Boolean algebra. At each step state the law used for simplification. AB'+A'BC'+(AC)'+BC | |
| (b) | | What is BiCMOS Technology? What are the basic processing steps involved in BiCMOS process? What are four generations of Integration Circuits? | **05 Marks** |

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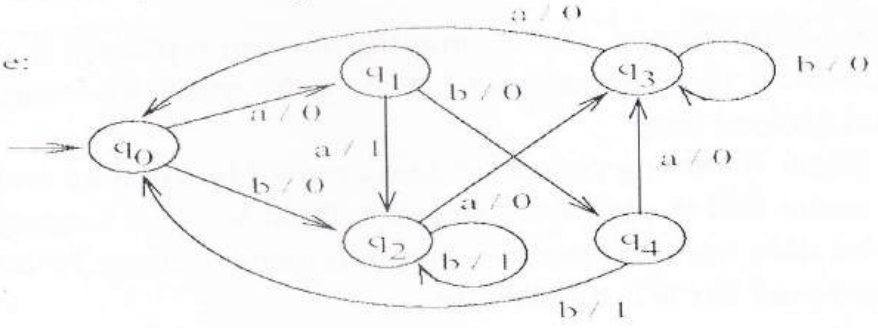
|---|---|---|
| 4 (a) | Simplify the sum-of-products solution using Tabulation Method(QM Method)<br>F(A, B, C, D, E) = m(0, 2, 6, 7, 8, 10, 11, 12, 13, 14, 16, 18, 19, 29, 30) + d(4, 9, 21) | **05 Marks** |
| (b) | Explain the parameter to characterize logic families (At Least 5)? | **05 Marks** |
| 5 (a) | Consider the Mealy machine shown. Convert it into a Moore type machine, assuming that the initial state is state '$q_0$'.<br>  | **05 Marks** |
| (b) | Determine a minimum sum-of-products expression for<br>$f(a, b, c, d, e) = (a` + c + d)(a` + b + e)(a + c` + e`)(c + d + e`)(b + c + d` + e)(a` + b` + c + e`)$<br>(a) Why is a`d`e` an essential prime implicant?<br>(b) Which minterms are adjacent to m3 and m19?<br>(c) Is there an essential prime implicant which covers m3 and m19?<br>(d) Is there an essential prime implicant which covers m21?<br>(e) Why is there no essential prime implicant which covers m11 and m28? | **05 Marks** |
| 6 (a) | Implement the following Boolean function using a single 4x1 and 8x1 Multiplexer. F (A,B,C,D) = Σ ( 0, 1, 2, 4, 6, 9, 12, 14 ) | **05 Marks** |
| (b) | Design and implement a 4-bit Excess-3 -to-Gray Code Converter. | **05 Marks** |
| 7 (a) | Simplify the following expression to sum of product using Tabulation Method(QM Method)<br>F(a,b,c,d)=∑(0,4,8,10,12,13,15)+d(1,2) | **05 Marks** |
| (b) | How to implement 8:1 line multiplexer using two 4:1 line multiplexers? Also design 8:1 multiplexer using 2:1 multiplexers with truth table. | **05 Marks** |