

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**

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. 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?	05 Marks
(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"? ii. In hex, a) $2BFC + 54A7$ b) $AC74 - B3F$.	05 Marks
(b)	$M = F(w,x,y,z) = \sum m(2,9,10,11,13,14,15)$ 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. $(Z+X) \cdot (Z+X'+Y) = (Z+X) \cdot (Z+Y)$ ii. Reduce the following to its simplest form using laws of Boolean algebra. At each step state the law used for simplification. $AB'+A'BC'+(AC)'+BC$	05 Marks
(b)	What is BiCMOS Technology? What are the basic processing steps involved in BiCMOS process? What are four generations of Integration Circuits?	05 Marks

4 (a) Simplify the sum-of-products solution using Tabulation Method(QM Method)
 $F(A, B, C, D, E) = m(0, 2, 6, 7, 8, 10, 11, 12, 13, 14, 16, 18, 19, 29, 30) + d(4, 9, 21)$

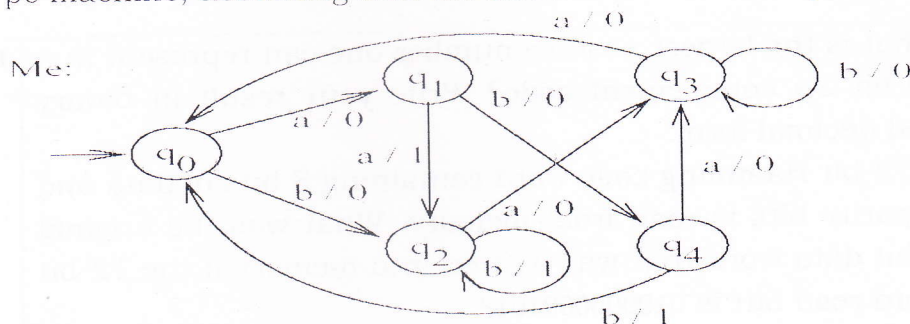
05 Marks

(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 'q₀'.

05 Marks



(b) Determine a minimum sum-of-products expression for
 $f(a, b, c, d, e) = (a' + c + d)(a' + b + e)(a + c' + e')(c + d + e')(b + c + d' + e)(a' + b' + c + e')$
 (a) Why is $a'd'e'$ an essential prime implicant?
 (b) Which minterms are adjacent to m3 and m19?
 (c) Is there an essential prime implicant which covers m3 and m19?
 (d) Is there an essential prime implicant which covers m21?
 (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. $F(A, B, C, D) = \Sigma(0, 1, 2, 4, 6, 9, 12, 14)$

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)
 $F(a, b, c, d) = \Sigma(0, 4, 8, 10, 12, 13, 15) + d(1, 2)$

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