JAYPEE UNIVERSITY OF ENGINEERING & TECHNOLOGY

A.B. ROAD, P.B. No. 1, RAGHOGARH, DIST: GUNA (M.P.) INDIA

DIGITAL ELECTRONICS (14B11EC317)

TUTORIAL -6

Q.1 Simplify the following Boolean functions together with the don't care conditions using Karnaugh Map :

a) $F(x,y,z) = \sum(2,3,4,6,7)$
$d(x,y,z) = \sum(0,1,5)$

b) $F(A,B,C,D) = \sum(0,6,8,13,14)$
$d\ (A,B,C,D) = \sum(2,4,10)$

c) $F(A,B,C,D) = \sum(4,5,7,12,13,14)$
$d\ (A,B,C,D) = \sum(1,9,11,15)$

d) $F(A,B,C,D) = \sum(1,3,8,10,15)$
$d\ (A,B,C,D) = \sum(0,2,9)$

Where ***d*** represent don't care condition.

Q.2 Simplify the following Boolean functions using Quine-McCluskey method:

c) $F(x,y,z) = \sum(0,1,2,5,7)$

d) $F(A,B,C,D) = \sum(0,1,2,3,5,7,8,9,11,14)$

Q.3 Draw a NAND logic diagram that implements the complement of the function:

$F(A,B,C,D) = \sum(0,1,2,3,4,8,9,12)$

Q.4 Draw a NOR logic diagram that implements following function:

$F(A,B,C,D) = \sum(0,1,3,5,7,9,10,11,12,15)$

JAYPEE UNIVERSITY OF ENGINEERING & TECHNOLOGY

Digital Systems & Microprocessor (1811EC311)

TUTORIAL-7

Topic: Combinational Circuits

Q.1 Design a combinational circuit with three inputs and one output.
(a) The output is 1 when the binary value of the inputs is less than or equal to 3. The output is 0 otherwise.
(b) The output is 1 when the binary value of the inputs is an even number.

Q.2 A majority circuit is a combinational circuit whose output is equal to 1 if the input variables have more 1's than 0's. The output is 0 otherwise.
Design a 3-input majority circuit by finding the circuit's truth table, Boolean equation, and a logic diagram.

Q.3 Design a four-bit combinational circuit 2's complementer. (The output generates the 2's complement of the input binary number.) Show that the circuit can be constructed with exclusive-OR gates. Can you predict what the output functions are for a five-bit 2's complementer?

Q.4 Design a combinational circuit that generates the 9's complement of a BCD digit.

Q.5 Design half adder and half subtractor using five NAND gates only.

JAYPEE UNIVERSITY OF ENGINEERING & TECHNOLOGY, GUNA

TUTORIAL -8, Digital Systems & Microprocessor (18B11EC311) 2023-24

Q.1 Implement the following Boolean expression using:

$F(A,B,C,D) = \pi(5,6,7,10,11,12,13,14)$

(b) 16 x 1 Multiplexer b) 8 x 1 Multiplexer c) 4 x 1 Multiplexer

Q.2 A combinational circuit is defined by the following three Boolean functions:

$F_1 = x'y'z' + xz$ $F_2 = xy'z' + x'y$ $F_3 = x'y'z + xy$

Design a combinational circuit with decoder and or gates only.

Q3. Implement the function using 3x8 decoder and OR gate.

$F(w_1,w_2,w_3) = m(0, 1, 3, 4, 6, 7)$

Q4. Design Full subtracter using suitable

(ii) Decoder and logic gates. (ii) Multiplexer

Q5. Implement using 4x1 Mux , taking B, C as select lines:

$F(A, B, C) = m(1, 3, 5, 6)$

Q6. Implement the function using suitable decoder: -

$F = ABD + CD + ACD + ABC + ABCD$

Q7. Implement using 8x1 Mux , taking B, C, D as select lines: $F(A, B, C, D) = m(0, 1, 3, 4, 8, 9, 15)$

Q8. Implement Full adder using 4x1 Mux.

Q9. Implement using 8x1 Mux , taking A, C, D as select lines: $F(A, B, C, D) = \Pi (0, 3, 5, 6, 8, 9, 10, 12, 14)$

Q.10 Construct 5x32 decoder with the help of suitable number of 3x8 line decoder and 2x4 line decoder.

Q.11 Implement 16x1 Mux using 8x1, 4x1, and 2x1 Mux.

Q12. Implement a 4:16 decoder with only 2:4 decoder.