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Semester III (B.Tech.)

Er. No. 22103178

Academic Year: 2023-24

# Jaypee University of Engineering & Technology, Guna

**T-2 (Odd Semester 2023)**

18B11EC311 - Digital Systems and Microprocessor

Maximum Duration: 1 Hour 30 Minutes

Maximum Marks: 25

Notes:

1. This question paper has five questions.
2. Write relevant answers only in proper order.
3. Do not write anything on question paper (Except your Er. No.).

| | | Marks | CO Number(s) description |
|---|---|---|---|
| **Q1.** | Minimize the following and implement the reduced expression using NAND gates.<br>$F(A, B, C, D) = \Sigma m(1, 3, 4, 6, 8, 9, 11, 13, 15)$<br>$d(A, B, C, D) = \Sigma d(0, 2, 14)$ | [05] | CO3 |
| **Q2.** | Explain and draw the following for full adder circuit:<br>(a) Logic circuit and truth table<br>(b) Circuit diagram using two half adders and OR gate | [05] | CO4 |
| **Q3.** | Design a 3-bit lookahead adder with carry generator circuit. How it speeds up the addition process. | [05] | CO5 |
| **Q4. (a)** | Design a comparator, which compares the magnitude of two numbers X and Y, each consisting of two bits and giving three outputs $F_1$, $F_2$ and $F_3$ such that:<br>$F_1 = 1$, if $X > Y$<br>$F_2 = 1$, if $X = Y$<br>$F_3 = 1$, if $X < Y$ | [03] | CO5 |
| **(b)** | Design a combinational circuit with three inputs and one output for the condition given as,<br>(a) The output is 1 when the binary value of the inputs is less than or equal to 4. The output is 0 otherwise.<br>(b) The output is 1 when the binary value of the inputs is an even number. | [02] | |
| **Q5. (a)** | Construct $F(A, B, C, D) = \Sigma m(1, 3, 5, 6, 8, 9, 12, 14, 15)$ function using,<br>(a) One 8x1 multiplexer (using A, B, D as select lines)<br>(b) 16x1 multiplexer | [03] | CO2 |
| **(b)** | Draw a 4-to-16 line decoder using suitable number of 2-to-4 line decoder. | [02] | |