

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: BTECH
BRANCH: ECE+CS+AIML+EEE**

**SEMESTER : III
SESSION : MO/2023**

SUBJECT: EC203 DIGITAL SYSTEM DESIGN

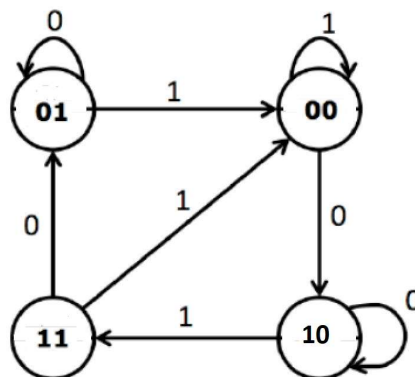
TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

		CO	BL
Q.1(a)	i) Convert the decimal number 165.54 into its hexadecimal equivalent. ii) Define the terms fan-in and fan-out regarding logic gates.	[2+3] 1	1
Q.1(b)	Design a 4 input NAND gate using CMOS transistors and explain the operation.	[5] 1	2
Q.2(a)	Minimize the following function using K-map and implement it using NAND gates. $F = \sum (2, 7, 11, 14, 15) + \sum d (0, 3, 10)$	[5] 2	1
Q.2(b)	The Excess-3 code is generated by adding 0011 to any BCD input. Design the circuit that converts a BCD number to the Excess-3 code.	[5] 2	2
Q.3(a)	What is the drawback in a parallel adder and how it is overcome in look ahead carry adder? Explain the operation of it with diagram.	[5] 3	2
Q.3(b)	i) Represent a logical diagram of 9's complementor circuit of a BCD input with explanation. ii) Realize the following Boolean function using an appropriate multiplexer $F(A, B, C, D) = \sum (0, 1, 3, 6, 15, 21, 25)$	[2.5+2.5] 3	3
Q.4(a)	What is the drawback in J-K Flip Flop? How is it overcome in Master-Slave J-K Flip-Flop? Explain the operation of it with diagram.	[5] 4	2
Q.4(b)	Consider the state diagram shown below, where each state has two bits in the form of Q_1Q_0 and the transition is represented by input X. Design the sequential circuit step by step assuming the required Flip Flop is J-K type.	[5] 4	3



Q.5(a)	Explain the working of a PAL with a standard logic circuit and diagram.	[5] 5	2
Q.5(b)	i) Describe the working principle of a 4:3 (12 bit) diode matrix ROM. ii) What is multivibrator? Discuss their types and applications.	[3+2] 5	2