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

CLASS: BTECH. **SEMESTER : III/ADD**
BRANCH: ECE+CS+AIML+EEE **SESSION : MO/2024**

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) Perform the operation (+12-17) in 2's complement representation. ii) Define each of the following electrical characteristics of logic gates: V_{OH}, V_{IL}, I_{OL}, I_{IH}.	[2+3]	1	1
Q.1(b)	i) What is totem pole configuration in TTL circuit? Mention its advantages. ii) Implement the logic function using CMOS, F=[(A+B)(C+D)(E+F(G+H))]'.	[2+3]	1	2
Q.2(a)	Minimize the following Boolean function using K-Map and further implement using NAND gates: F (A, B, C, D) =∑m (0,4,5,6,8,9) +d (10,11,12,13,14,15)	[5]	2	2
Q.2(b)	Design the parity bit generator circuit using necessary steps and logic diagram.	[5]	2	3
Q.3(a)	Design a BCD-adder circuit following the necessary steps, find the logic expression for BCD-carry and draw the logic diagram.	[5]	3	2
Q.3(b)	What is decoder? Design a 4:16 decoder circuit using 3:8 decoders and explain the operation.	[5]	3	3
Q.4(a)	(i) What is D-flip-flop? Draw the circuit for it. (ii) What is shift register? Explain the working of a serial-in-parallel out shift register (4-bit) with necessary inputs and outputs and circuit diagram.	[2+3]	4	2
Q.4(b)	Design a clocked sequential circuit using J-K flip-flop that would go through the following states: 00→10→11→10→00... (Follow the steps as: state table, excitation table, simplification and circuit diagram)	[5]	4	3
Q.5(a)	What is programmable logic device? Mention the advantages of it. Explain the working of a PLA with a standard logic circuit and diagram.	[5]	4	2
Q.5(b)	Explain the working of an astable multivibrator using any technique and mention the equation for time-period of the output square wave. Write the expression of duty cycle of the output signal.	[5]	5	3

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