Printed Page:- 04 **Subject Code:- AEC0301**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III - THEORY EXAMINATION (2023- 2024)

Subject: Digital System Design

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 20

1. Attempt all parts:-

1-a. Hamming code is capable of (CO1) 1

(a) Only detect single-bit error

(b) Only correct single-bit error

(c) Detect and correct single bit error

(d) Detect and correct multiple bit errors

1-b. The logical expression Y = Σm(0, 3, 6, 7, 10, 12, 15) is equivalent to (CO1) 1

(a) πM(0, 3, 6, 7, 10, 12, 15)

(b) πM(1, 2, 4, 5, 8, 9, 11, 13, 14)

(c) Σm(1, 2, 4, 5, 8, 9, 11, 13, 14)

(d) Σm(0, 2, 4, 6, 8, 10, 12, 14)

1-c. How many data select lines are required for selecting eight inputs? (CO2) 1

(a) 1

(b) 2

(c) 3

(d) 4

1-d. The output of SUM is equal to output of (CO2) 1

(a) OR gate

(b) AND gate

(c) X-OR gate
(d) X-Nor gate

1-e. Why latches are called memory devices? (CO3) 1

(a) It has capability to stare 8 bits of data
(b) It has internal memory of 4 bit
(c) It can store one bit of data
(d) It can store infinite amount of data

1-f. When both inputs of SR latches are high, the latch goes _____. (CO3) 1

(a) Unstable
(b) Stable
(c) Indeterminate state
(d) Bistable

1-g. Which of the following is the most widely employed logic family? (CO4) 1

(a) Emitter-coupled logic
(b) Transistor-transistor logic
(c) PMOS logic
(d) NMOS logic

1-h. Which of the following is the propagation delay of TTL circuits? (CO4) 1

(a) 1 s
(b) 1 ms
(c) 1 ns
(d) 1 ps

1-i. A typical SRAM cell is made up of .....Transistors. (CO5) 1

(a) two
(b) four
(c) six
(d) eight

1-j. For 5K memory, how many address lines are needed? (CO5) 1

(a) 10
(b) 13
(c) 12
(d) 9

2. Attempt all parts:-

2.a. Write the Demorgan's Theorem. (CO1) 2

2.b. Define Multiplexer. (CO2) 2

2.c. Write the advantages of sequential circuits? (CO3) 2

2.d. Define the terms : a) power dissipation b) Figure of merit. (CO4) 2

2.e.	What is an EPROM? (CO5)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Convert the binary number 11011110 into the decimal, octal and Hexadecimal equivalent. (CO1)	6
3-b.	Explain weighted binary code. (CO1)	6
3-c.	Explain encoder using proper example. (CO2)	6
3-d.	Implement the Boolean function f (A,B,C,D) = $\sum(2,4,6,9,10,11,13)$ with 8:1 multiplexers. (CO2)	6
3.e.	Draw JK flip-flop and derive its characteristic equation. Explain how will you convert it into T flip-flop. (CO3)	6
3.f.	Draw the TTL NAND gate. (CO4)	6
3.g.	Differentiate between SRAM & DRAM. (CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Represent the decimal number $(396)_{10}$ in (CO1) (i) Binary code (straight binary) (ii) BCD code (iii) Excess-3 code (iv) Octal code (v) Hexa decimal code	10
4-b.	What is Hamming code? Construct the Hamming code for the data 1010 with (CO1) a. even parity b. odd parity	10

5. Answer any one of the following:-

5-a.	Write an expression for sum and carry output of full added and design a full adder using two half adder. (CO2)	10
5-b.	What is the difference between encoder and decoder? Explain with example. (CO2)	10

6. Answer any one of the following:-

6-a.	Name the four basic types of shift register, and draw a block diagram for each. (CO3)	10
6-b.	Explain the Master-Slave Flip-Flop. How it overcome the race condition of J-K flip-flop. Use proper logic diagram. (CO3)	10

7. Answer any one of the following:-

7-a.	What do you mean by RTL logic families explain in detail? (CO4)	10
7-b.	Compare TTL, ECL and CMOS logic families. (CO4)	10

8. Answer any one of the following:-

8-a.	Draw the block diagram of PLA and explain the function of each block. (CO5)	10

8-b. Describe the working of flash memory in detail with the help of a neat diagram. (CO5) 10