Printed Page:- 03 **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 (2024- 2025)
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. Which of following are known as universal gates? (CO1, K1) 1

(a) NAND & NOR
(b) AND & OR
(c) NOR & OR
(d) EX-NOR & XOR

1-b. The logic expression AB + A' B' can be implemented by giving inputs A and B to a two-input (CO1,K6) 1

(a) NOR gate
(b) XNOR gate
(c) XOR gate
(d) NAND gate

1-c. A half adder circuit has two inputs and (CO2, K1) 1

(a) one output
(b) two output
(c) three output
(d) none of these

1-d. The output of SUM is equal to output of (CO2,K1) 1

(a) OR gate
(b) AND gate

.

(c) X-OR gate

(d) X-Nor gate

1-e. Why latches are called memory devices? (CO3,K1) 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. Whose operations are more faster among the following? (CO3,K1) 1

(a) Combinational circuits

(b) Sequential circuits

(c) Latches

(d) Flip-flop

1-g. The basic function of TTL gate is which of the following functions? (CO4,K1) 1

(a) AND

(b) OR

(c) NOR

(d) NAND

1-h. CMOS gates are commercially available as which of the following series? (CO4, K2) 1

(a) 1000

(b) 2000

(c) 3000

(d) 4000

1-i. A typical SRAM cell is made up of .....Transistors. (CO5,K1) 1

(a) two

(b) four

(c) six

(d) eight

1-j. For 5K memory, how many address lines are needed? (CO5,K6) 1

(a) 10

(b) 13

(c) 12

(d) 9

2. Attempt all parts:-

2.a. Explain the Demorgan's Theorem using example. (CO1,K1) 2

2.b. Define Multiplexer. (CO2,K1) 2

2.c. Write the truth table of T flip Flop.(CO3,K1) 2

2.d. List out the advantages of CMOS logic family. (CO4,K1) 2

2.e.	Compare EPROM to EEPROM. (CO5,K1)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Design basic gates using only NAND gates. (CO1,K6)	6
3-b.	Explain Binary Codes.(CO1,K1)	6
3-c.	Explain 2 bit magnitude comparator with the help of diagram. (CO2,K1)	6
3-d.	Draw full adder using two half-adders and explain in detail (CO2,K2)	6
3.e.	Draw JK flip-flop and derive its characteristic equation. Explain how will you convert it into T flip-flop. (CO3,K1)	6
3.f.	List out the advantages and disadvantages of TTL logic families.(CO4,K1)	6
3.g.	Write a short note on PAL. (CO5,K1)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	What is Hamming code? Construct the Hamming code for the data 1100 with (CO1,K6) a. even parity b. odd parity	10
4-b.	Implement function f(A,B,C,D) = Σm(0,1,3,5,8,9,10) using 8:1 mux. (CO1,K6)	10

5. Answer any one of the following:-

5-a.	Design 4-bit Binary to Gray code convertor. (CO2,K6)	10
5-b.	Explain encoder using proper diagram. (CO2,K1)	10

6. Answer any one of the following:-

6-a.	What is counter? Design Mod-5 Synchronous counters. (CO3,K6)	10
6-b.	Differentiate between Ring and Johnson counter. (CO3,K1)	10

7. Answer any one of the following:-

7-a.	Explain the following with respect to logic families: Fanout, Fan-In, Propagation delay and noise margin. (CO4,K1)	10
7-b.	Draw and explain working of TTL NAND gate and list out its prominent features. (CO4, K1)	10

8. Answer any one of the following:-

8-a.	Draw the block diagram of PLA and explain the function of each block. (CO5,K1)	10
8-b.	Discuss in detail about internal structure of ROM and write types of ROM. (CO5,K2)	10