Printed Page:-03 Subject Code: BMICA0101

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

MCA (Integrated)

SEM: I - THEORY EXAMINATION (2024 - 2025)

Subject: Digital Logic & Circuit 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. A+B=B+A is called as --------. (CO1,K1) 1

(a) Associative law

(b) Commutative law

(c) Idempotent law

(d) None

1-b. Gray code of binary number 0101 is: (CO1,K1) 1

(a) 0010

(b) 0001

(c) 0111

(d) 0110

1-c. A combinational circuit that takes only 1 input and gives multiple output is--- (CO2,K1) 1

(a) MUX

(b) DEMUX

(c) Decoder

(d) Encoder

1-d. A code converter is a logic circuit that _____ (CO2,K1) 1

(a) Inverts the given input

(b) Converts into decimal number

.

(c) Converts data of one type into another type

(d) Converts to octal

1-e. Latch is the basic building block of: (CO3,K1) 1

(a) Flip flop

(b) Buffer

(c) Gate

(d) None

1-f. The arithmetic operation that can be performed by doing a Left shift is: (CO3,K1) 1

(a) Addition

(b) Subtraction

(c) Multiplication

(d) Division

1-g. The diagram that shows the transition of states is known as: (CO4,K1) 1

(a) Transition diagram

(b) State Table

(c) Both of above

(d) None

1-h. A type of FSM where the outputs depend only on the current state. (CO4,K1) 1

(a) Deterministic FSM

(b) Mealy machine

(c) Moore machine

(d) Non- Deterministic

1-i. The fundamental building blocks of IoT networks are: (CO5,K1) 1

(a) Sensors

(b) Object

(c) Physical thing

(d) Sensor network

1-j. GPS stands for: (CO5,K1) 1

(a) Global positioning system

(b) Global parity system

(c) Geo positioning system

(d) Global position software

2. Attempt all parts:-

2.a. Find the decimal equivalent of (101101.1)2 (CO1,K2) 2

2.b. Draw the circuit diagram of 1-bit magnitude comparator. (CO2,K1) 2

2.c. How many types of shift registers are there and write their names also? (CO3,K1) 2

2.d. Write the significance of State Table. (CO4,K2) 2

2.e.	Write some advantages of IoT. (CO5,K2)	2

SECTION-B 30

3. Answer any five of the following:-

3-a.	Perform A-B using 1's and 2's complements for A= 1100 and B= 0111. (CO1,K2)	6
3-b.	Discuss with truth table NAND, NOR &, EXOR gates. (CO1,K2)	6
3-c.	Design a full Adder using two half adders. (CO2,K2)	6
3-d.	Design a 3-bit Binary to Gray code convertor. (CO2,K3)	6
3.e.	Discuss Ring counter and its working. (CO3,K2)	6
3.f.	Compare Mealy and Moore Machines in detail. (CO4,K2)	6
3.g.	Discuss the following: a) Temperature sensor b) Proximity sensor and c) IR sensor (CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Simplify the function F (A,B.C,D) = ∑(0,,2,5,7,8,10,13,15) + d(6,14) in SOP form and implement using logic gates. (CO1,K3)	10
4-b.	Explain the following terms with suitable example: a) Maxterm and b) Minterm (CO1,K3)	10

5. Answer any one of the following:-

5-a.	Implement F (A, B, C, D) = ∑ (0,1,3,4,8,9,11,15) using 8x1 multiplexer: If MSB i.e. A is used as input variable and B, C, D as select lines. (CO2,K3)	10
5-b.	Implement full subtractor using Decoder. (CO2,K3)	10

6. Answer any one of the following:-

6-a.	Realize T flip flop using D flip flop. (CO3,K3)	10
6-b.	Design MOD-5 synchronous counter. (CO3,K3)	10

7. Answer any one of the following:-

7-a.	Explain static and dynamic hazard with proper examples. (CO4,K3)	10
7-b.	Explain propagational delay and its role in hazard occurrence. (CO4,K3)	10

8. Answer any one of the following:-

8-a.	Discuss the core components of Machine-to- machine (M2M) architecture and explain their roles in enabling seamless communication between devices. (CO5,K3)	10
8-b.	With circuit diagram, explain the working of Node MCU board. (CO5,K3)	10