**Printed Page:- 03** **Subject Code:- ACSE0304 /ACSEH0304**

**Roll. No:**

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**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 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 ___ expression consists of several product terms logically added. (CO1,K1) 1

(a) Sum of products
(b) Canonical POS form
(c) Minterm
(d) Switch

1-b. The Gray code for binary number 110010 is ___. (CO1,K2) 1

(a) 10101
(b) 11011
(c) 1000
(d) 101011

1-c. One that is not the outcome of magnitude comparator is-----. (CO2,K1) 1

(a) a > b
(b) a – b
(c) a < b
(d) a = b

1-d. Multiplexers, demultiplexers, decoders, encoders are _____ logic circuits. (CO2,K1) 1

(a) Sequential circuir
(b) Combinational circuit

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(c) Synchronous sequential circuit

(d) Asynchronous sequential circuit

1-e. A 5-bit asynchronous binary counter is made up of five flip-flops, each with a 12 ns propagation delay. The total propagation delay is _____. (CO3,K1) 1

(a) 12 ms

(b) 24 ns

(c) 48 ns

(d) 60 ns

1-f. The D flip flop obtained from SR flip flop by just putting _____. (CO3,K1) 1

(a) one invertor between S & R terminal

(b) connecting S & R terminal together

(c) feedback the output in feed to the S & R terminal using XOR gate

(d) None of These

1-g. The delay elements provide -----. (CO4,K1) 1

(a) large memory

(b) outputs

(c) clock pulses

(d) short term memory

1-h. The logic circuits whose outputs at any instant of time depends on both, present input and past outputs are called.....(CO4,K1) 1

(a) Combinational circuits

(b) Sequential circuits

(c) Latches

(d) Flip-flops

1-i. The full form of EPROM is _____ (CO5,K1) 1

(a) Easy Programmable Read Only Memory

(b) Erasable Programmable Read Only Memory

(c) Eradicate Programmable Read Only Memory

(d) Easy Programmable Read Out MemoryOR gate

1-j. PLDs with programmable AND and fixed OR arrays is called as_____. (CO5,K1) 1

(a) PAL

(b) PLA

(c) APL

(d) PPL

2. Attempt all parts:-

2.a. Define Canonical form representation of Boolean Function. (CO1,K2) 2

2.b. Draw the circuit diagram of 1 bit binary comparator. (CO2,K2) 2

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| | | |
|---|---|---|
| 2.c. | Write the excitation tables for JK and T flip flops. (CO3,K2) | 2 |
| 2.d. | Define primitive flow table with an example. (CO4,K2) | 2 |
| 2.e. | What is the major difference between DRAM and SRAM? (CO5,K1) | 2 |

**SECTION-B** 30

3. Answer any five of the following:-

| | | |
|---|---|---|
| 3-a. | Explain prime implicants, essential prime implicants and selective prime implicants. (CO1,K2) | 6 |
| 3-b. | Find the minimized form of Y= A'B' C' +A'B C'+ AB'C+ AD using K-map. (CO1,K3) | 6 |
| 3-c. | Explain BCD Adder with proper logic circuit diagram. (CO2,K2) | 6 |
| 3-d. | Implement the following Boolean function with 8:1 multiplexer (CO3,K3) F(A,B,C,D) = ∑m(0,2,4,7, 11 12,15 ) | 6 |
| 3.e. | Explain the different types of shift register in details. (CO3,K2) | 6 |
| 3.f. | Explain the following related to asynchronous circuits. (CO4,K2) a. Hazards b. Oscillations c. Critical Races | 6 |
| 3.g. | Give the comparison between PROM , EPROM and EEPROM. (CO5,K2) | 6 |

**SECTION-C** 50

4. Answer any one of the following:-

| | | |
|---|---|---|
| 4-a. | Minimize the given four variable logic function using K-Map OR Quine Mc-Clusky Method:- (CO1,K3) F(A, B, C, D) = Σm (0,1, 2, 3,5, 7, 8, 9, 11, 14) | 10 |
| 4-b. | What is Hamming Code? Construct the hamming code for data 10110110. Use even parity (CO1,K3) | 10 |

5. Answer any one of the following:-

| | | |
|---|---|---|
| 5-a. | Design 4 bit Gray to binary code converter. (CO2,K3) | 10 |
| 5-b. | Implement a full adder using a decoder. (CO2,K3) | 10 |

6. Answer any one of the following:-

| | | |
|---|---|---|
| 6-a. | Explain Johnson Counter and compare it with simple Ring Counter. (CO3,K3) | 10 |
| 6-b. | What is a flip-flop? Convert D F/F into T F/F. (CO3,K3) | 10 |

7. Answer any one of the following:-

| | | |
|---|---|---|
| 7-a. | Enlist the categories of state machines and Draw the state and flow table of asynchronous counter. (CO4,K2) | 10 |
| 7-b. | Explain state table and state diagram with the help of an example. (CO4,K2) | 10 |

8. Answer any one of the following:-

| | | |
|---|---|---|
| 8-a. | Draw the block diagram of PLA. Also implement the function with PLA OR PROM. (CO5,K3) F1 = ∑m(0,1,4,5) and F2 = ∑m(1,2,5,6) | 10 |
| 8-b. | Compare PROM, PLA & PAL in details. (CO5,K2) | 10 |