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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

BCA

SEM: II - THEORY EXAMINATION (2025 - 2026)

Subject: Digital logic & 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:-

(1.1) POS terms are known as:(K2,CO1)

1

- (a) Minterm
- (b) Maxterm
- (c) Midterm
- (d) Modterm

(1.2) Convert $(56)_{10} = (?)$ in BCD(K3,CO1)

1

- (a) 00100110
- (b) 01010111
- (c) 01010110
- (d) 11010011

(1.3) Memory unit is not present in:(K1,CO2)

1

- (a) Combinational circuit
- (b) Sequential circuit
- (c) RAM
- (d) Flip-flop

(1.4) A decoder translates:(K2,CO2)

1

- (a) Decimal to binary
- (b) Binary to decimal
- (c) Binary to octal
- (d) Hexadecimal to binary

(1.5) Circuits that use a clock are known as:(K1,CO3)

1

- (a) Combinational Circuits
 - (b) Sequential Circuits
 - (c) Asynchronous Circuits
 - (d) Synchronous Circuits
- (1.6) A 32-bit register can store:(K2,CO3) 1
- (a) 16 values
 - (b) 32 values
 - (c) 64 values
 - (d) 2^{32} values
- (1.7) In Moore machines:(K1,CO4) 1
- (a) Output depends on input and state
 - (b) Output depends only on present state
 - (c) Output depends on previous input
 - (d) Output is random
- (1.8) A hazard in a digital circuit causes:(K2,CO4) 1
- (a) Permanent error
 - (b) Temporary fluctuation in output
 - (c) Increase in clock speed
 - (d) Reduction in states
- (1.9) The term IoT was coined in?(K1,CO5) 1
- (a) 1995
 - (b) 1999
 - (c) 2005
 - (d) 2010
- (1.10) RFID stands for:(K1,CO5) 1
- (a) Radio Frequency Identification
 - (b) Random Frequency Integrated Device
 - (c) Real Field Interactive Data
 - (d) Radio Field Internal Device

2. Attempt all parts:-

- (2.1) Compare digital and analog systems highlighting their advantages and limitations.(K4,CO1) 2
- (2.2) Apply the concept of subtraction to describe a Half Subtractor.(K3,CO2) 2
- (2.3) Show how a 4-bit register stores binary data.(K3,CO3) 2
- (2.4) Discuss the role of outputs in a Moore machine?(K2,CO4) 2
- (2.5) Discuss proximity sensor with example.(K2,CO5) 2

SECTION-B

30

Answer any one of the following:-

- (3.1) Evaluate the effectiveness of binary representation in reducing hardware complexity.(K2,CO1) 6

(3.2)	Perform the 2's complement of 16 and add it to 10 in binary.(K4,CO1)	6
Answer any one of the following:-		
(3.3)	Implement a Full Adder using Decoder.(K5,CO2)	6
(3.4)	Construct a 2-bit Magnitude Comparator with truth table and diagram.(K5,CO2)	6
Answer any one of the following:-		
(3.5)	Compare synchronous and asynchronous counters.(K4,CO3)	6
(3.6)	Assess the applications of shift registers in communication.(K2,CO3)	6
Answer any one of the following:-		
(3.7)	Explain the concept of sequence detection in FSM with example.(K2,CO4)	6
(3.8)	Discuss the working of hazards in POS circuits with an example.(K3,CO4)	6
Answer any one of the following:-		
(3.9)	Explain the concept of a smart city using IoT.(K2,CO5)	6
(3.10)	Explain actuator and its working.(K3,CO5)	6
SECTION-C		50
4. Answer any <u>one</u> of the following:-		
(4.1)	Design an algorithm for converting any decimal fraction into binary representation with an example.(K4,CO1)	10
(4.2)	Evaluate Excess-3 and Gray code with suitable example.(K3,CO1)	10
5. Answer any <u>one</u> of the following:-		
(5.1)	Perform the design of a 2-bit comparator and analyze its working.(K3,CO2)	10
(5.2)	Differentiate Multiplexer and Demultiplexer with applications.(K4,CO2)	10
6. Answer any <u>one</u> of the following:-		
(6.1)	Which is more efficient: ripple counter or synchronous counter? Support your answer.(K2,CO3)	10
(6.2)	Draw and explain master slave flip flop.(K5,CO3)	10
7. Answer any <u>one</u> of the following:-		
(7.1)	Discuss in detail the types of hazards and their prevention methods.(K2,CO4)	10
(7.2)	Explain FSM types with examples (Moore, Mealy, Autonomous).(K2,CO4)	10
8. Answer any <u>one</u> of the following:-		
(8.1)	Explain the following: (a) Sensor (b) Actuator (c) Smart Objects.(K2,CO5)	10
(8.2)	Explain temperature, smoke, IR, motion, and humidity sensors with examples.(K3,CO5)	10