

Dr. Babasaheb Ambedkar Open University
Term End Examination July – 2026

Course	: BCA	Date	: 08/07/2026
Subject Code	: BCA-203	Time	: 03.00pm to 5.15pm
Subject Name	: Digital Electronics and Computer Organization	Duration	: 02.15 Hours
		Max. Marks	: 70

Section A

Answer the following (Attempt any three) (30)

1. Explain positional and non-positional number systems.
2. Explain Boolean Algebra and DeMorgan's Theorems in detail.
3. List Logic Gates and Explain the AND Gate and OR Gate with their truth tables.
4. Explain Decoder, Encoder, Multiplexer and Demultiplexer.
5. List and Explain various types of Flip-Flop.

Section B

Answer the following (Attempt any four) (20)

1. Explain Gray Code and state its advantages over Binary Code.
2. Explain 1's Complement and 2's Complement methods.
3. Differentiate between Combinational Circuits and Sequential Circuits.
4. Define Half Adder in brief.
5. Explain Shift Registers and mention different types of shift registers.
6. Write a short note on Digital-to-Analog Converter (DAC) and its applications

Section C

Part – A (Multiple Choice Questions) (10)

Q.1 A digital system uses a numbering scheme in which each digit position has a weight based on the radix. Which characteristic does this indicate?

- | | |
|---------------------------------|-----------------------------|
| A) Signed number representation | B) Positional number system |
| C) Gray code encoding | D) Excess-3 coding |

Q.2 Which coding technique minimizes output errors caused by simultaneous bit changes during position sensing?

- | | |
|---------------|---------------------|
| A) BCD Code | B) Gray Code |
| C) ASCII Code | D) Hexadecimal Code |

Q.3 A combinational circuit produces two output bits representing Sum and Carry after adding two single-bit inputs. Which circuit performs this operation?

- | | |
|------------|---------------|
| A) Decoder | B) Half Adder |
| C) Encoder | D) Comparator |

Q.4 Which combinational circuit is most suitable for selecting one data line from several input lines using control signals?

- | | |
|------------------|----------------|
| A) Decoder | B) Multiplexer |
| C) Demultiplexer | D) Register |

Q.5 A digital designer wants a storage element that changes its state only on the triggering of a clock pulse. Which device is most appropriate?

- A) Logic Gate
B) Flip-Flop
C) Decoder
D) Encoder
- Q.6 Which device converts multiple input lines into a coded binary output?
A) Encoder
B) Demultiplexer
C) Multiplexer
D) Register
- Q.7 A sequential circuit divides the input clock frequency by two after every stage. Which circuit exhibits this characteristic?
A) Decoder
B) Ripple Counter
C) Comparator
D) Priority Encoder
- Q.8 Which statement best describes the primary purpose of the Arithmetic Logic Unit (ALU)?
A) Permanent data storage
B) Program execution control
C) Arithmetic and logical data processing
D) Secondary memory management
- Q.9 Which memory element is primarily used for temporary storage of binary information in sequential circuits?
A) Register
B) Multiplexer
C) Decoder
D) Adder
- Q.10 During Boolean expression simplification, which technique generally reduces the required number of logic gates in hardware implementation?
A) Binary Division
B) Karnaugh Map
C) Decimal Encoding
D) Floating-point Representation

Part – B (State whether the following statements are true or false)

(10)

- 1 A positional number system determines the value of a digit using both its symbol and its position.
- 2 Gray Code guarantees that two adjacent code words always differ by more than one bit.
- 3 Every Full Adder can be implemented using two Half Adders and an OR gate.
- 4 A Demultiplexer routes one input to one of several outputs according to selection lines.
- 5 The ALU performs arithmetic operations independently of control signals.
- 6 A Flip-Flop can retain one binary state until a valid triggering condition occurs.
- 7 Every asynchronous counter changes all flip-flops simultaneously with the clock edge.
- 8 Shift Registers are capable of serial data transfer as well as temporary data storage.
- 9 Karnaugh Map simplification always increases the number of logic gates required for implementation.
- 10 Digital-to-Analog Converters are commonly used when digital systems communicate with analog devices.
