

QP CODE: 24900064



Reg No:.....

Name:.....

**MAHATMA GANDHI UNIVERSITY, KOTTAYAM**  
**FIRST SEMESTER MGU-UGP (HONOURS) REGULAR**  
**EXAMINATION NOVEMBER 2024**

**First Semester**

**Core Course - MG1CCRBCA100 - DIGITAL FUNDAMENTALS**

(2024 ADMISSION ONWARDS)

Duration: 2 Hours

Maximum Marks: 70

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Interest (I),  
Appreciation (Ap), and Skill (S)**

*Students should attempt atleast one question from each course outcome to enhance their overall  
outcome attainability.*

[Learning Domain][CO No(s)]

**Part A**

Very Short Answer Questions

Answer all questions.

Each question carries 2 marks

- |   |   |      |     |
|---|---|------|-----|
| 1 | Explain the concept of overflow in binary addition.   | [U]  | [1] |
| 2 | Draw the truth table for a half adder.  | [U]  | [3] |
| 3 | Describe the steps to convert a decimal number into BCD (8421) representation.              | [U]  | [1] |
| 4 | Draw the truth table for an RS flip-flop and analyse the output states based on the inputs. | [An] | [4] |
| 5 | Add the following two BCD numbers: 1000 0011 and 0001 0101                                  | [A]  | [1] |
| 6 | Explain how the NAND gate acts as an OR gate.   | [U]  | [2] |
| 7 | Convert the expression into canonical form $f = AB + B'C$ .                                 | [A]  | [2] |
| 8 | Define sequential circuits and explain their significance.                                  | [U]  | [4] |
| 9 | Determine the use of flip-flop.   | [U]  | [4] |

- 10 Draw the logic circuit for a 3-to-8 decoder. [U] [3]

(10 × 2 = 20)

**Part B**

Short Answer Questions

Answer any 5 questions.

Each question carries 6 marks

- 11 Perform binary subtraction on the numbers 1010 1101 - 0101 1011, and discuss overflow if any. Show each step in detail. [A] [1]
- 12 Simplify the following using Boolean laws only. (i)  $F = AB + A(B+C) + B(B+C)$  (ii)  $F = A'B + BC' + BC + AB'C'$ . [A] [2]
- 13 Design an 8×1 multiplexer using 4×1 and 2×1 multiplexer. [A] [3]
- 14 Describe the working of the RS flip-flop with a truth table and diagram. [U] [4]
- 15 Convert the decimal number 256 to its BCD representation using the 8421 code. Show each step of the conversion process. [A] [1]
- 16 Apply De Morgan's theorems to each of the following expressions (i)  $[(A + B + C)D]'$  (ii)  $(ABC + DEF)'$  (iii)  $(AB' + C'D + EF)'$ . [A] [2]
- 17 Draw the circuit diagram graphic symbol and truth table for a D flip-flop. [U] [4]

(5 × 6 = 30)

**Part C**

Essay Questions

Answer any 2 questions .

Each question carries 10 marks

- 18 State the basic laws of Boolean algebra. Simplify the expression  $AB + A(B + C) + B(B + C)$ . [A] [2]
- 19 Explain how the R-S and J-K flip-flops work. [U] [4]
- 20 Explain the working of a digital encoder. Describe their applications, and advantages. [U] [3]

(2 × 10 = 20)

**END OF THE QUESTION PAPER**

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