25900783

Reg.No : ....

Name : ....

MAHATMA GANDHI UNIVERSITY, KOTTAYAM
MGU-BCA (HONOURS) REGULAR /IMPROVEMENT/ REAPPEARANCE EXAMINATION NOVEMBER 2025
FIRST SEMESTER
Core Course (CC) - MG1CCRBCA100 - DIGITAL FUNDAMENTALS
(2024 ADMISSION ONWARDS)

Duration: 2 Hours   **Maximum Marks: 70**

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

Students should attempt at least one question from each course outcome to enhance their overall outcome attainability.

Part A
Very Short Answer Questions

Answer **All** Questions

Each Question carries **2** marks

1. Explain the process of converting a decimal number to binary.   [U] / [CO1]

2. Explain the concept of overflow in binary addition.   [U] / [CO1]

3. Convert the expression into sum-of-product (SOP) form-(A+B)(A+B+C).   [A] / [CO2]

4. Simplify the expression f = A + B[AC + (B + C') D] using basic laws of Boolean algebra.   [A] / [CO2]

5. What is the use of a de-multiplexer?   [K] / [CO3]

6. Draw the block diagram of a combinational logic circuit.   [U] / [CO3]

7. Define sequential circuits and explain their significance.   [U] / [CO4]

8. Explain the concept of toggling in a JK flip-flop.   [U] / [CO4]

9. Convert the binary number 101011 to octal.   [A] / [CO1]

10. What is the primary difference between a half adder and a full adder? [U] / [CO3]

[10x2 = 20]

Part B
Short Answer Questions
Answer any **5** out of **7** Questions
Each Question carries **6** marks

11. Convert the decimal number 357 to its BCD representation using the 8421 code. Show each step of the conversion process. [A] / [CO1]

12. Simplify the expression $F(x,y,z)=\sum(0,6)$ and implement with NOR gate. [A] / [CO2]

13. Explain how a decoder is used for memory address selection in computer systems. [U] / [CO3]

14. Discuss the characteristics and use of a D flip-flop. [U] / [CO4]

15. Compare and contrast the binary, octal, and hexadecimal number systems. Discuss the benefits of each in computing. [U] / [CO1]

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] / [CO2]

17. Compare the behaviour of positive-edge-triggered and negative-edge-triggered flip-flops based on a timing diagram. [An] / [CO4]

[5x6 = 30]

Part C
Essay Questions
Answer any **2** out of **3** Questions
Each Question carries **10** marks

18. Simplify the Boolean function using K-Map:
$F(w,x,y,z)=\Sigma(1,3,4,5,6,9,12,13)$. [A] / [CO2]

19. Design an 8×1 multiplexer using 4×1 and 2×1 multiplexer. [A] / [CO3]

20. Describe the operation of a 4-bit serial-in parallel-out (SIPO) shift register. Include a timing diagram to show how data is shifted in and read out. [U] / [CO4]

[2x10 = 20]