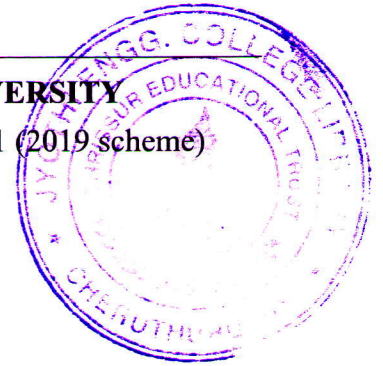


Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
Third Semester B.Tech Degree Examination December 2021 (2019 scheme)

**Course Code: CST203****Course Name: Logic System Design**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer all questions. Each question carries 3 marks*

Marks

- |    |  |     |
|----|--|-----|
| 1  | Do the following base conversions  | (3) |
|    | a) $(96DE)_{16}$ to octal  |     |
|    | b) $(1011011000)_2$ to octal   |     |
| 2  | Subtract -12 from 23 using 2's complement representation and 1's complement representation | (3) |
| 3  | State and prove extended De Morgan's theorem   | (3) |
| 4  | Using Huntington's postulates prove that   | (3) |
|    | a) $x + x = x$   |     |
|    | b) $x + 1 = 1$   |     |
| 5  | Distinguish between decoder and demultiplexer  | (3) |
| 6  | Design a half adder circuit from its truth table   | (3) |
| 7  | Distinguish between T flip-flop and D flip-flop  | (3) |
| 8  | Explain race around problem. How can it be eliminated?                                     | (3) |
| 9  | Write the algorithm for addition of two binary numbers in 2's complement form              | (3) |
| 10 | What is programmable logic array? Where is it useful?                                      | (3) |

**PART B***Answer any one full question from each module. Each question carries 14 marks***Module 1**

- |    |   |     |
|----|---|-----|
| 11 | a) Convert i) $(214)_{10}$ to binary, octal, BCD and hexadecimal              | (4) |
|    | ii) $(128)$ to binary, octal, BCD and hexadecimal                             | (4) |
|    | b) Represent -219 and -114 in   | (6) |
|    | i) sign magnitude form   ii) 1's complement form                              |     |
|    | iii) 2's complement form  |     |
| 12 | a) Add 127 and 765 assuming the numbers are i) octal ii) BCD iii) hexadecimal | (6) |
|    | b) Subtract 157 from 615 assuming the numbers are i) octal ii) BCD            | (6) |
|    | iii) hexadecimal iv) 2's complement form                                      | (2) |

**Module 2**

- 13 a) Define Boolean algebra. Give an example (8)  
b) Show that any digital circuit can be implemented using universal gates (6)
- 14 a) Simplify the Boolean function  $F(a,b,c,d) = \sum (0,1,2,5,7,8,9,10,11,13,15)$  (7)  
using K map  
b) Verify your answer using tabulation method. (7)

**Module 3**

- 15 a) Explain parallel adder/subtractor circuit with a logic diagram (8)  
b) Design a carry look ahead adder circuit for four bit binary addition (6)
- 16 a) Design a code converter circuit for converting binary number to BCD (8)  
number  
b) Design a 4x2 encoder circuit (6)

**Module 4**

- 17 a) Explain 3 bit binary asynchronous counter with a logic diagram and timing (8)  
sequence  
b) Explain asynchronous BCD counter (6)
- 18 a) Explain i) SR flip-flop ii) JK flip-flop iii) master-slave flip-flop with (12)  
excitation table and characteristic equation  
b) Explain edge triggered flip-flop (2)

**Module 5**

- 19 a) Explain a ring counter with a logic diagram, timing sequence and state (10)  
diagram  
b) Explain with a logic diagram a serial in parallel out shift register (4)
- 20 a) Illustrate the algorithm for addition and subtraction of two BCD numbers (8)  
with an example  
b) Explain with an example how simple functions can be implemented using (6)  
PLA

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