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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 $F(a,b,c,d) = \sum (0,1,2,5,7,8,9,10,11,13,15)$ using K map (7)

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 number (8)

b) Design a 4x2 encoder circuit (6)

Module 4

17 a) Explain 3 bit binary asynchronous counter with a logic diagram and timing sequence (8)

b) Explain asynchronous BCD counter (6)

18 a) Explain i) SR flip-flop ii) JK flip-flop iii) master-slave flip-flop with excitation table and characteristic equation (12)

b) Explain edge triggered flip-flop (2)

Module 5

19 a) Explain a ring counter with a logic diagram, timing sequence and state diagram (10)

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 with an example (8)

b) Explain with an example how simple functions can be implemented using PLA (6)

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