

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree Examination December 2020 (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 | Convert $(456.78)_{10}$ to a) binary b) octal and c) hexadecimal | (3) |
| 2 | Write a) 1's complement and 2) 2's complement representations of (-126) | (3) |
| 3 | State and prove De Morgan's Theorem | (3) |
| 4 | Design a circuit using NAND gates for implementing EXCLUSIVE-OR function | (3) |
| 5 | Design a half adder circuit using any universal gate. | (3) |
| 6 | Draw the logic diagram of a 2×1 multiplexer circuit | (3) |
| 7 | Derive the characteristic equation of a D flip flop from its excitation table. | (3) |
| 8 | How is a sequential circuit different from a combinational circuit? Give an example for each circuit. | (3) |
| 9 | Distinguish between a ring counter and Johnson counter | (3) |
| 10 | When do you implement a combinational circuit using ROM and when do you implement a combinational circuit using PLA in preference to ROM. | (3) |

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

- | | | |
|----|---|------|
| 11 | a) Convert i) $(13AF)_{16}$ to octal ii) $(10110101.101)_2$ to decimal | (6) |
| | b) Add i) BCD numbers 1567 and 968 ii) octal numbers 2376 and 5677 | (8) |
| 12 | a) Perform the following operations using 2's complement representation | (10) |
| | i) $(-34) + (+21)$ ii) $(+26) - (-12)$ iii) $(-33) + (-22)$ iv) $(+45) - (+32)$ | |
| | b) Convert i) (10011010) in 2's complement form to decimal | (4) |
| | ii) (10111001) in 1's complement form to decimal | |

Module 2

- | | | |
|----|---|-----|
| 13 | a) Using K Map simplify the function | (8) |
| | $F(w, x, y, z) = \sum (0, 1, 2, 3, 5, 7, 8, 9, 10, 13, 15)$ | |
| | b) Express the above function in product of maxterms form. | (6) |

- 14 a) Using tabulation method simplify the function (8)

$$F(w,x,y,z) = \sum (0,2,4,5,6,7,8,12,13,14,15)$$

- b) Express the following functions in a canonical form (6)

i) $F = D + BC'$ ii) $F = AB' + BC'$

Module 3

- 15 a) Design a full subtractor circuit. (6)

- b) Design a code converter for converting a BCD to excess-3 code. (8)

- 16 a) Explain BCD adder using a block diagram. (7)

- b) Design a 2 bit magnitude comparator. (7)

Module 4

- 17 a) With a logic diagram explain how a master slave flip flop overcomes race around problem. (7)

- b) Design a 2 bit synchronous counter. (7)

- 18 a) Draw the state diagram and logic diagram of a BCD ripple counter. (6)

- b) Design a 3 bit synchronous up-down counter. (8)

Module 5

- 19 a) Explain the working of a 3 stage Johnson ring counter with a block diagram (7)

- b) Explain the working of a 3 bit bidirectional shift register with parallel load. (7)

- 20 a) Illustrate the algorithm for addition and subtraction of two floating point numbers. (7)

- b) Illustrate the algorithm for addition and subtraction two binary numbers in sign magnitude form. (7)
