

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
Third Semester B.Tech Degree Examination December 2020 (2019 Scheme)

Course Code: ECT203

Course Name: LOGIC CIRCUIT DESIGN

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks

		Marks
1	Convert $(3A9E.B)_{16}$ to binary and decimal.	(3)
2	Convert $(25)_{10}$ to binary, gray and BCD.	(3)
3	Express the boolean function $F(A, B, C) = A + \overline{B}C$ as sum of minterms.	(3)
4	Write Verilog Code for a NAND gate.	(3)
5	Implement a 4-input binary decoder using basic gates.	(3)
6	Explain the working of a 4-bit parallel adder.	(3)
7	Obtain the excitation table and characteristic equation of a T flip-flop.	(3)
8	Convert a JK flip-flop to D flip-flop.	(3)
9	Distinguish between fan-in and fan-out.	(3)
10	Explain noise margin.	(3)

PART B

Answer any one full question from each module. Each question carries 14 marks

Module 1

- | | | |
|----|--|-----|
| 11 | (a) Subtract 27 from 75 using 2's and 1's complement arithmetic | (8) |
| | (b) Explain fixed and floating point representation of numbers | (6) |
| 12 | (a) What is Hamming code? How is the Hamming codeword generated? Encode the data bits 1011 into 7-bit even Hamming code. | (8) |
| | (b) Give a brief description of identifiers and keywords in Verilog | (6) |

Module 2

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|----|--|-----|
| 13 | (a) Implement an EX-OR gate using universal gates | (6) |
| | (b) Simplify the Boolean expression $F(A, B, C, D) = \sum m(1, 3, 10) + d(0, 2, 8, 12)$ using K-Map and implement the simplified expression using universal gates. | (8) |

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- 14 (a) Reduce the Boolean expression $F = \prod M(1,2,3,4,10,11,15)$ using K-Map (7)
(b) Write Verilog code for implementing the above function (7)

Module 3

- 15 (a) Design a BCD adder circuit. (8)
(b) Write Verilog code for full subtractor circuit. (6)
- 16 (a) Design a 3-bit magnitude comparator. (8)
(b) Implement the logic function $F(A,B,C,D) = \sum m(1,3,4,11,12,13,14,15)$ using 8 : 1 MUX (6)

Module 4

- 17 (a) Explain the operation of a 4-bit Johnson counter with truth table and waveforms. (7)
(b) Design a mod-10 asynchronous counter using T flip-flop. (7)
- 18 Design a mod -16 synchronous counter using JK flip-flop. (14)

Module 5

- 19 (a) Explain the working of a transistor level TTL NAND gate. (8)
(b) Draw and explain the working of a transistor level CMOS inverter. (6)
- 20 (a) Explain the working of a transistor level CMOS NOR gate. (8)
(b) Compare TTL & CMOS logic families in terms of fan-in, fan-out, supply voltage, power supply and propagation delay and power dissipation. (6)
