

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third semester B.Tech examinations (S) September 2020

Course Code: CS203**Course Name: SWITCHING THEORY AND LOGIC DESIGN**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer all questions, each carries 3 marks.*

Marks

- 1 (a) Express each decimal number as an 8-bit number in the 2's complement form (3)
 i) +101 ii) -125
- (b) Given $\sqrt{(224)_r} = (13)_r$, then what is the value of r?
- 2 (a) If $(73)_x = (54)_y$, then what are the possible values of x and y? (3)
- (b) The 16-bit 2's complement representation of an integer is
 1111 1111 1111 0101. What is its decimal representation?
- 3 (a) What is the result of the operation $(10111)_2 * (1110)_2$ in hexadecimal. (3)
- (b) Perform $(110101)_2 - (111111)_2$ by using 2's complement method.
- 4 (a) Prove the Boolean identities using laws of Boolean algebra (3)
 i) $x+x'y = x+y$ ii) $x+xy=x$
- (b) Express the following functions:
 i) $F1=AB+BD'$ in sum of Minterms form.
 ii) $F2=AB+B'C$ in product of Maxterms form.

PART B*Answer any two full questions, each carries 9 marks.*

- 5 (a) The value of a float type variable is represented using the single-precision 32-bit (5)
 floating point format IEEE-754 standard that uses 1 bit for sign, 8 bits for biased
 exponent and 23 bits for mantissa. A float type variable X is assigned the
 decimal value of -14.25. What is the representation of X in hexadecimal
 notation?
- (b) The following bit pattern represents a floating point number in (4)
 IEEE 754 single precision format
 1 1000011 10100000000000000000000. What is the value of the number in
 decimal form?

- 6 (a) Reduce the following expression using K-Map. $AB'C+B'+BD'+ABD'+A'C$ (5)
(b) Perform the following operations (4)
i. $(C45A)_{\text{HEX}} + (4B26)_{\text{HEX}}$ ii. $(76)_{\text{OCT}} + (23)_{\text{OCT}}$
- 7 (a) Simplify the Boolean function $F(w, x, y, z) = \Sigma m(0, 5, 7, 8, 9, 10, 11, 14, 15)$ (9)
using Quine-McCluskey method.

PART C

Answer all questions, each carries 3 marks.

- 8 Differentiate combinational and sequential circuits. Give one example for each. (3)
9 Implement the Exclusive OR operation using NAND gates only. (3)
10 Give the truth table, characteristics table, excitation table and characteristic (3)
equation of SR flip-flop.
11 Explain state table and state diagram with an example. (3)

PART D

Answer any two full questions, each carries 9 marks.

- 12 (a) What is the disadvantage of binary parallel adder? Explain how a look ahead (9)
adder speeds up the addition process. Clearly show the derivations of equations.
13 (a) Explain race around condition in JK flip-flop. Explain how a master slave flip (6)
flop avoids race around condition.
(b) Compare the working of edge-triggered flip flop and level-triggered flip flop. (3)
14 (a) Design a code converter for converting BCD to Excess 3 code. (5)
(b) Explain the procedure to convert JK flip flop into T flip flop. (4)

PART E

Answer any four full questions, each carries 10 marks.

- 15 (a) Design and implement a 4 bit binary synchronous down counter. (10)
16 (a) Draw and explain 4 bit Johnson counter with its timing sequence. (10)
17 (a) Implement a 4-bit bidirectional shift register with parallel load. (6)
(b) With a block diagram, explain the use of shift registers for serial transfer of data. (4)
18 (a) Describe the working of Programmable Logic Array (PLA) with a block (10)
diagram and a simple example.
19 (a) Write notes on Read Only Memory (ROM) and give any 2 applications of ROM. (6)
(b) Write notes on Random Access Memory. (4)
20 (a) Draw a flow chart and explain the addition / subtraction of two floating point (10)
numbers.
