STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 86
(For candidates admitted from the academic year 2023 – 2024)

B.C.A. DEGREE EXAMINATION, NOVEMBER 2023
FIRST SEMESTER

COURSE : MAJOR CORE
PAPER : DIGITAL LOGIC FUNDAMENTALS
SUBJECT CODE: 23CS/MC/DL13
TIME : 3 HOURS MAX. MARKS: 100

Q. No.	SECTION A (20 x 1=20) Objective Type Questions	CO	KL
1.	_____ number system is commonly used in digital computers to represent data. A) Octal B) Decimal C) Binary D) Hexadecimal	CO1	K1
2.	_____ represents the basic theorem of Boolean algebra that states A + A' = 1. A) Commutative Law B) Idempotent Law C) Associative Law D) Distributive Law	CO1	K1
3.	In a decimal adder, _____ digits can be added simultaneously. A) 2 B) 4 C) 8 D) It varies	CO1	K1
4.	_____ are the basic building blocks of sequential circuits that can store one bit of information. A) Flip-flops B) Multiplexers C) Decoders D) Adders	CO1	K1
5.	_____ is a characteristic of ROM. A) Volatile memory B) Allows write operations C) Stores permanent data D) Used for temporary storage	CO1	K1
6.	_____ is the purpose of using 1's and 2's complement in digital arithmetic. A)To simplify binary addition B) To represent negative numbers C) To convert binary to gray code D) To perform BCD addition	CO2	K2
7.	In gate-level minimization using the Map Method, what do "Don't-Care" conditions represents _____. A) Conditions that are irrelevant in Boolean algebra B) Conditions that cannot occur in a logic circuit C) Conditions for which the output can be either 0 or 1 D) Conditions that must be met for gate-level optimization	CO2	K2
8.	_____is the primary function of an encoder in digital circuits. A) To perform addition B) To perform subtraction C) To compress data D) To convert a set of inputs into a binary code	CO2	K2
9.	_____ is the main purpose of data shifting in a shift register. A) To multiply data B) To count events C) To store data D) To move data from one stage to another	CO2	K2

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<table>
<tr><td>10.</td><td>_____ type of memory is typically used to store a computer's BIOS.
A) RAM B) Cache memory
C) EEPROM D) DRAM</td><td>CO2</td><td>K2</td></tr>
<tr><td>11.</td><td>_____is the Gray code equivalent of the binary number 1101.
A) 1101 B) 1001 C) 1011 D) 1111</td><td>CO3</td><td>K3</td></tr>
<tr><td>12.</td><td>The logical operation performed by an XOR gate is _____.
A) OR B) AND C) NOT D) Exclusive OR</td><td>CO3</td><td>K3</td></tr>
<tr><td>13.</td><td>In a 2-to-4 decoder, _____ input lines are required to select one of the four outputs.
A) 2 B) 4 C) 6 D) 8</td><td>CO3</td><td>K3</td></tr>
<tr><td>14.</td><td>_____ is a type of flip-flop which is known for its ability to toggle its state when both of its inputs are active.
A) RS flip-flop B) JK flip-flop
C) D flip-flop D) T flip-flop</td><td>CO3</td><td>K3</td></tr>
<tr><td>15.</td><td>_____ bits, including the parity bit, are set to 1 in an 8-bit data word with even parity.
A) 3 bits B) 4 bits C) 5 bits D) 6 bits</td><td>CO3</td><td>K3</td></tr>
<tr><td>16.</td><td>The binary equivalent of octal number "36" is _____.
A) 11100 B) 11010 C) 11011 D) 10101</td><td>CO4</td><td>K4</td></tr>
<tr><td>17.</td><td>Analyze a given truth table and determine the simplified Boolean expression using the Map Method for inputs A, B, C, D.
<table><tr><td>A</td><td>B</td><td>C</td><td>D</td><td>Output</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr></table>A) A'BD' + ACD
B) AB' + C'D
C) A' + B + C + D'
D) A'B + C'D'</td><td>CO4</td><td>K4</td></tr>
<tr><td>18.</td><td>The number of data select lines required for selecting 8 inputs from 8x1 multiplexer is _____.
A) 1 B) 2 C) 3 D) 4</td><td>CO4</td><td>K4</td></tr>
<tr><td>19.</td><td>_____ number of flip-flops are required to make a mod-32 binary counter.
A) 5 B) 10 C) 12 D) 16</td><td>CO4</td><td>K4</td></tr>
<tr><td>20.</td><td>The Von Neumann architecture emphasizes on _____ in computer design.
A) Parallel processing
B) Separate data and instruction memory
C) Shared memory for data and instructions
D) Centralized control unit</td><td>CO4</td><td>K4</td></tr>
<tr><td>Q. No.</td><td>SECTION B (4 x 5=20)
Answer all the questions</td><td>CO</td><td>KL</td></tr>
<tr><td>11.</td><td>a) What is D-flip flop? Draw its circuit diagram and mention its advantages.
(or)
b) Explain the concept of a Ripple counter.</td><td>CO1</td><td>K1</td></tr>
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12.	a) Discuss about Huntington Postulates with examples. (or) b) State and Prove De-Morgan′s theorem using truth tables.	CO2	K2
13.	a) Identify and explain the key components and connections in a full adder circuit design. (or) b) Use a 4-input decoder to illustrate how the numbers 0 to 9 can be displayed in a digital clock.	CO3	K3
14.	a) Compare and contrast PLA and PAL. (or) b) Differentiate between machine language and assembly language.	CO4	K4
Q. No.	**SECTION C (6 x 10=60)** **Answer all the questions**	**CO**	**KL**
15.	a) Describe the basic binary logic gates. Provide truth tables and logic symbols for each gate. (or) b) Define BCD numbers and their significance. Perform BCD addition and subtraction operations with examples.	CO1	K1
16.	a) Discuss common methods for detecting and correcting errors in RAM and ROM. (or) b) Explain Von Neumann Architecture with a neat diagram.	CO2	K2
17.	a) Simplify the Boolean function using Tabulation method. F(w,x,y,z) = (1,4,6,7,8,9,10,11,15) (or) b) Simplify the Boolean function using K-Map i) Sum of Products ii) Product of Sums F=A'B'C'+B'CD'+A'BCD'+AB'C'	CO3	K3
18.	a) Compare and contrast between encoder and multiplexer. (or) b) Design a 4-to-1 multiplexer circuit using logic gates and explain how do they work?	CO4	K4
19.	a) Differentiate the following: i) RS and JK Flip-Flops ii) Synchronous and Asynchronous Sequential Circuits (or) b) How a register stores binary data? Discuss the internal components of a register.	CO4	K4
20.	a) Subtract the following numbers : i) 11010 – 1101 (2's complement & 1's complement) ii) 753 – 864 (Using 10's complement & 9's complement) (or) b) Convert the following numbers from one base to another: i) $(76.4)_8$ to Decimal ii) $(0.6875)_{10}$ to Binary iii) $(11110110101)_2$ to Hexadecimal iv) $(10011010101)_2$ to Octal	CO5	K5

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