University of Mumbai

Examinations summer 2022

Program: **Electronics and Telecommunication Engineering**

Curriculum Scheme: Rev2019

Examination: TE Semester V

Course Code: ECC503 and Course Name: Digital VLSI

Time: 2 hour 30 minutes Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	In CMOS logic circuit the n-MOS transistor acts as:
Option A:	Load
Option B:	Pull up network
Option C:	Pull down network
Option D:	Not used in CMOS circuits
2.	In CMOS inverter if VDD and VSS is swapped then circuit is called as
Option A:	Weak Buffer
Option B:	Inverter
Option C:	Invalid circuit
Option D:	Buffer
3.	CMOS domino logic is same as one of the following circuit with inverter at the output line.
Option A:	Clocked CMOS logic
Option B:	Gate logic
Option C:	Dynamic CMOS logic
Option D:	switch logic
4.	Which of the following is not property of Dynamic CMOS logic
Option A:	No static power consumption
Option B:	Requires clock
Option C:	Ratio-ed logic
Option D:	Ratio less logic
5.	In dynamic CMOS during pre-charge the load capacitor is
Option A:	Discharged to Zero.
Option B:	Charged to V_{DD}
Option C:	Charged to $V_{DD}/2$
Option D:	Disconnected.
6.	In FSM, any bit output not explicitly assigned any value in a state is implicitly assigned
Option A:	Zero
Option B:	One
Option C:	Invalid
Option D:	Error
7.	For a NOR based ROM Array which of the following is true
Option A:	If active transistor exist at a crosspoint of column and selected row then the column voltage is never affected
Option B:	If active transistor exist at a crosspoint of column and selected row then the column voltage is pulled up to logic high level by the transistor
Option C:	Logic-1 bit is stored as the presence of an active transistor
Option D:	Logic-0 bit is stored as the presence of an active transistor

8.	Which flip-flop is usually used in the implementation of the registers?
Option A:	D flip-flop
Option B:	S-R flip-flop
Option C:	T flip-flop
Option D:	J-K flip-flop
9.	Sense amplifier produces full logic swing at
Option A:	Input terminal
Option B:	Output terminal
Option C:	Ground
Option D:	Voltage supply
10.	Which method of physical clocking is a recursive structure where the memory elements are grouped together to make the use of nearby or same distribution points?
Option A:	H tree
Option B:	Balanced tree clock network
Option C:	Clock skew
Option D:	Single phase two level clocking

Q2.	**Solve any Two** **10 marks each**
A	Describe with neat diagram CMOS fabrication process
B	Realize 3 input NAND Gate using CMOS logic. Draw CMOS inverter equivalent circuit and find equivalent W/L for NMOS and PMOS, if (W/L) p = 10 and (W/L) n = 20. Draw its layout.
C	Implement the 4-bit CLA carry using following design styles 1. Dynamic PMOS 2. Domino

Q3.	**Solve any Two** **10 marks each**
A	Implement the following 1. DFF using Tristate 2. NAND-NOR-NAND chain Using NORA 3. 1-bit 5 stage shift register using pass transistor 4. Inverter using clocked CMOS
B	Describe the operation of 6T SRAM cell with proper diagram and waveforms
C	Implement the following 1. 4-bit array Multiplier 2. 4-bit carry save multiplier

Q4.	**Solve any Two** **10 marks each**
A	Explain any 2 of the following 1. Clock generation and distribution 2. Carry skip adder 3. Scaling
B	Solve any 2 of the following 1. MOSFET Capacitance 2. CNTFET 3. Derive equation for Current, power, power density for Full scaling and constant voltage scaling
C	Design soda dispenser machine using the RTL design process. Draw Datapath, FSM, HLSM

University of Mumbai

Examinations Summer 2022

Program: Electronics and telecommunication Engineering

Curriculum Scheme: Rev2019(C-scheme)

Examination: TE Semester V (Choice based credit grading system)

Course Code: 32228 and Course Name: Data structure and algorithm.

Time: 2 hour 30 minutes Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	What data structure can be used to check if syntax has balanced parenthesis?
Option A:	Stack
Option B:	Queue
Option C:	Tree
Option D:	Graph
2.	What is value of top variable when stack empty
Option A:	1
Option B:	-1
Option C:	0
Option D:	Null
3.	Each node in a singly linked list must contain -------- Fields.
Option A:	Three fields
Option B:	Two fields
Option C:	Four fields
Option D:	Five fields
4.	What is value of front variable when simple queue is empty
Option A:	-1
Option B:	1
Option C:	0
Option D:	Null
5.	Identify the right traversal order for post order traversal
Option A:	LEFT-NODE-RIGHT
Option B:	RIGHT-LEFT-NODE
Option C:	LEFT-RIGHT-NODE
Option D:	NODE-LEFT-RIGHT
6.	Which of the following is a non- linear data structure
Option A:	Arrays
Option B:	Stack
Option C:	Queue
Option D:	Trees
7.	What will be postfix of following infix expression: (9*7)+(6-2)
Option A:	9 7 * 6 2 + -
Option B:	9 7 * 6 2 - +
Option C:	9 +7 * 6 2 -
Option D:	9 7 * 6- 2 +

8.	Breadth First Search is used in
Option A:	Binary trees
Option B:	Graphs
Option C:	Stack
Option D:	None of the above
9.	Which sorting algorithm works on Divide and Conquer Technique
Option A:	Bubble sort
Option B:	Modified bubble sort
Option C:	Selection sort
Option D:	Merge sort
10.	Which one is the most desirable out of these traits of a hash function?
Option A:	It must cause more collisions
Option B:	It must be easy to implement
Option C:	It must cause less collisions
Option D:	It must occupy less space

Q2	**Solve any Four out of Six** **5 marks each**
A	Define Data Structures and list operations of Data structures.
B	Define Linear queue with its operations.
C	Explain Performance Characteristics of an algorithm.
D	Draw the Expression tree for the following Z=(A*B) + (C/D)
E	Differentiate between linked list and array?
F	Define Hashing and explain any Two hashing functions.

Q3	**Solve any Two out of Three** **10 marks each**
A	Sort the given list of numbers using quick sort. Show step by step procedure 14,33,27,57,100,12.
B	Write a program to implement stack using array. In which specify push, pop operation with full or empty condition.
C	Apply Huffman coding for the word 'MALAYALAM'. Give the Huffman code for each symbol.

Q4	
A	**Solve any Two** **5 marks each**
i.	Differentiate between linear search and binary search
ii.	What is stack and write any four applications of Stack
iii.	Explain priority queue and double ended queue.

B	**Solve any One**	**10 mark each**
i.	Explain Depth First Search technique of graph with example in detail	
ii.	Write the In-order, preorder and post-order traversals for the following tree