

4-bit parallel adder is designed by cascading 4 full adders (see fig. 1). If response time of AND, OR and NOT gate is 0.5 μ sec, 0.25 μ sec and 1 μ sec respectively. Compute time required to generate valid Sum bits S_3 and S_1 S_0 . Show your working to earn full credit. [CLO1, C2] [1]

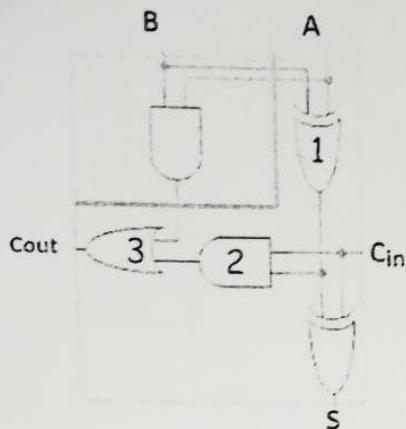


Fig. 1

Working:

For 1 full adder:

$$t = (t_{\text{AND}} + t_{\text{XOR}}) + (t_{\text{XOR}} + t_{\text{AND}} + t_{\text{NOT}}) \\ = (0.5 + 1 + 1 + 0.5 + 0.25) \\ = 3.25 \mu\text{sec}$$

For 4 full adders:

$$T = 4 \times t \\ = 4 \times 3.25$$

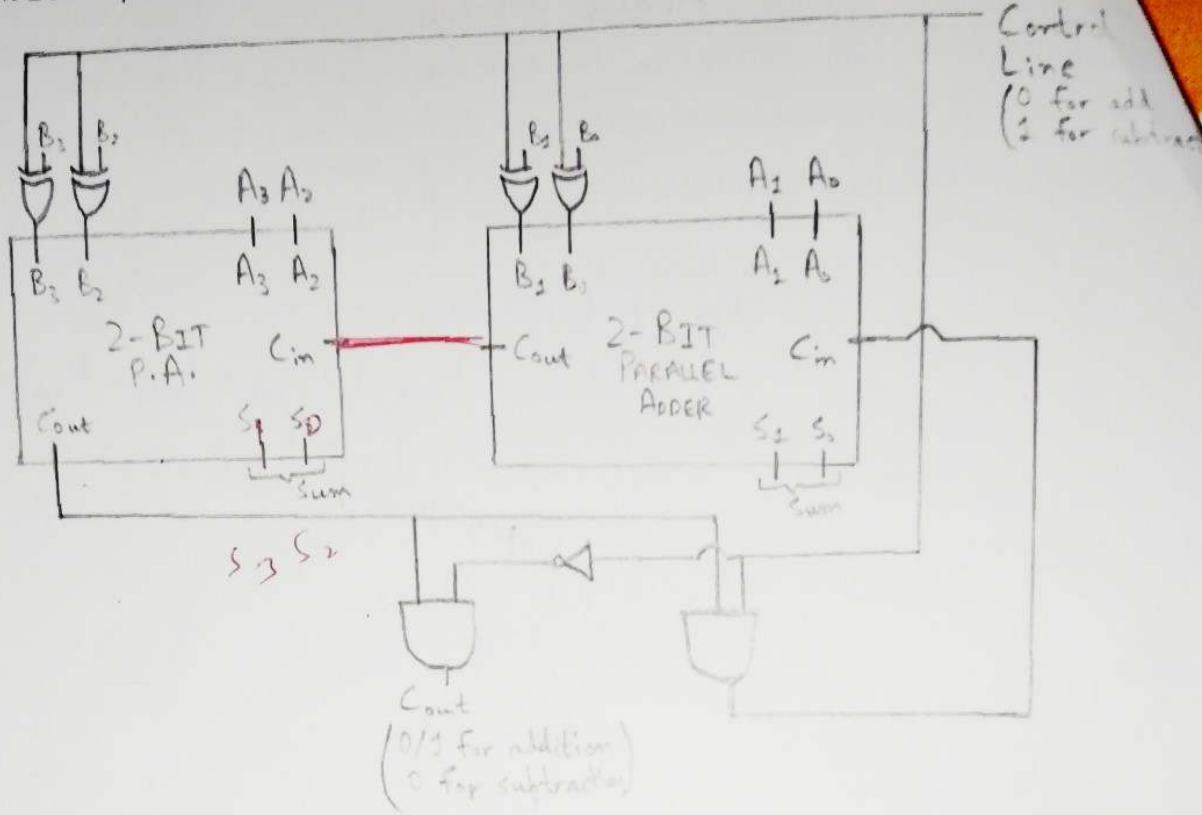
$$T = 13 \mu\text{sec} \quad \text{Ans.}$$

Q2. Simplify given logic expression using Boolean algebra.

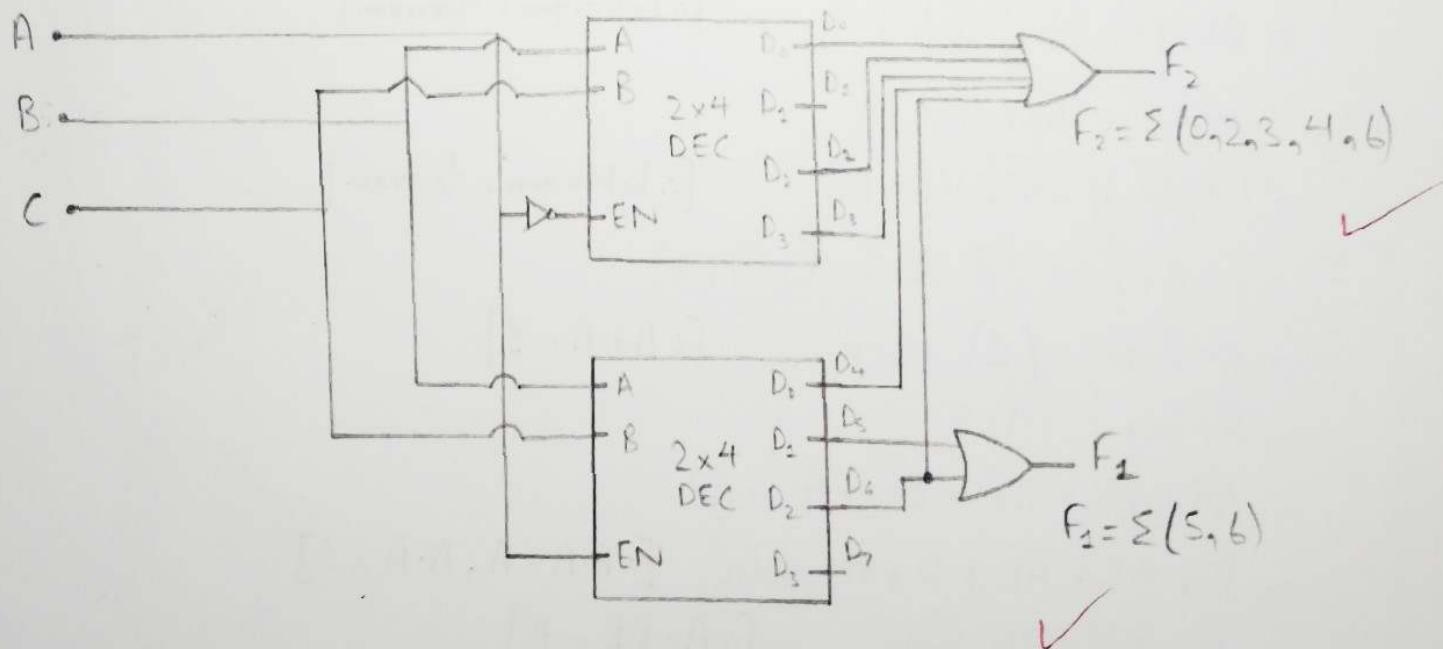
[CLO1, C2] [2]

$$\begin{aligned}
 F(A, B, C) &= \overline{AB(B\bar{C} + \bar{A}B)} + A\bar{B} \\
 &= \overline{AB}(\overline{B\bar{C} + \bar{A}B})(\overline{A\bar{B}}) \quad [\because \text{DeMorgan's theorem}] \\
 &= \overline{AB}\overline{B} + \overline{A}\overline{B}B (\bar{A} + B) \\
 &= (\overline{AB}\overline{B})(\overline{A}\overline{B}B)(\bar{A} + B) \quad [\because \text{DeMorgan's theorem}] \\
 &= \bar{A} + \bar{B} + \bar{B} + C (\bar{A} + A + \bar{B} + \bar{B})(\bar{A} + B) \\
 &= \bar{A} + \bar{B} + C (1) (\bar{A} + B) \quad [\because A + \bar{A} = 1] \\
 &= \bar{A} + \bar{B} + C (\bar{A} + B) \\
 &= \bar{A}\bar{A} + \bar{A}B + \bar{A}\bar{B} + B\bar{B} + \bar{A}C + BC \\
 &= \bar{A} + \bar{A}B + \bar{A}\bar{B} + 0 + \bar{A}C + BC \quad [\because A \cdot A = A, A \cdot \bar{A} = 0] \\
 &= \bar{A} + \bar{A}\bar{B} + \bar{A}C + BC \quad [\because A + AB = A] \\
 &= \bar{A} + \bar{A}C + BC \quad [\because A + AB = A] \\
 &= \bar{A} + BC \quad \text{Ans.}
 \end{aligned}$$

Q3. Design a 4-bit 1's complement adder/subtractor circuit by cascading two 2-bit parallel adders. [CLO2]

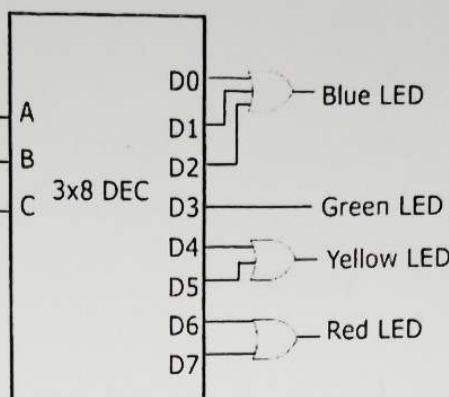
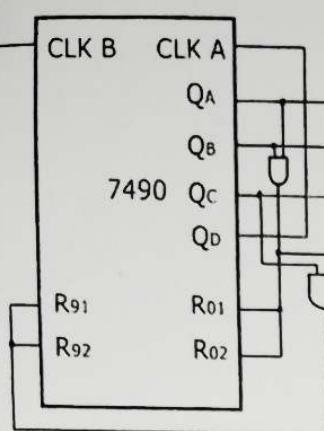


Q4. Design a 3x8 line decoder by cascading few 2x4 decoders that have active high enable pin and both fan-in and fan-out indices are 2. Now **implement** given logic functions using this 3x8 decoder. Clearly label all input-output connections. $F_1(A, B, C) = \sum(5,6)$, $F_2 = \bar{A}B + \bar{C}$ [CLO2, C2] [3]



See the figure and the reference table of counter 7490 and answer the following questions: [CLO-1, C2, PLO-1]

Pulse



Reset Inputs				Output			
R91	R92	R91	R92	QD	QC	QB	QA
H	H	L	X	L	L	L	L
H	H	X	L	L	L	L	L
X	X	H	H	H	L	L	H
X	L	X	L	COUNT			
L	X	L	X	COUNT			
L	X	X	L	COUNT			
X	L	L	X	COUNT			

Assume the counter 7490 is initially RESET. (QA is the LSB in 7490 and A is the LSB in DEC.) [8]

- i. What is the MOD of the given counter?

MOD-9

For one cycle of above configuration of 7490, answer the following:

- ii. For how many counts / pulses red LED will be ON?

2

- iii. For how many counts / pulses yellow LED will be ON?

2

- iv. For how many counts / pulses green LED will be ON?

0

- v. For how many counts / pulses blue LED will be ON?

5

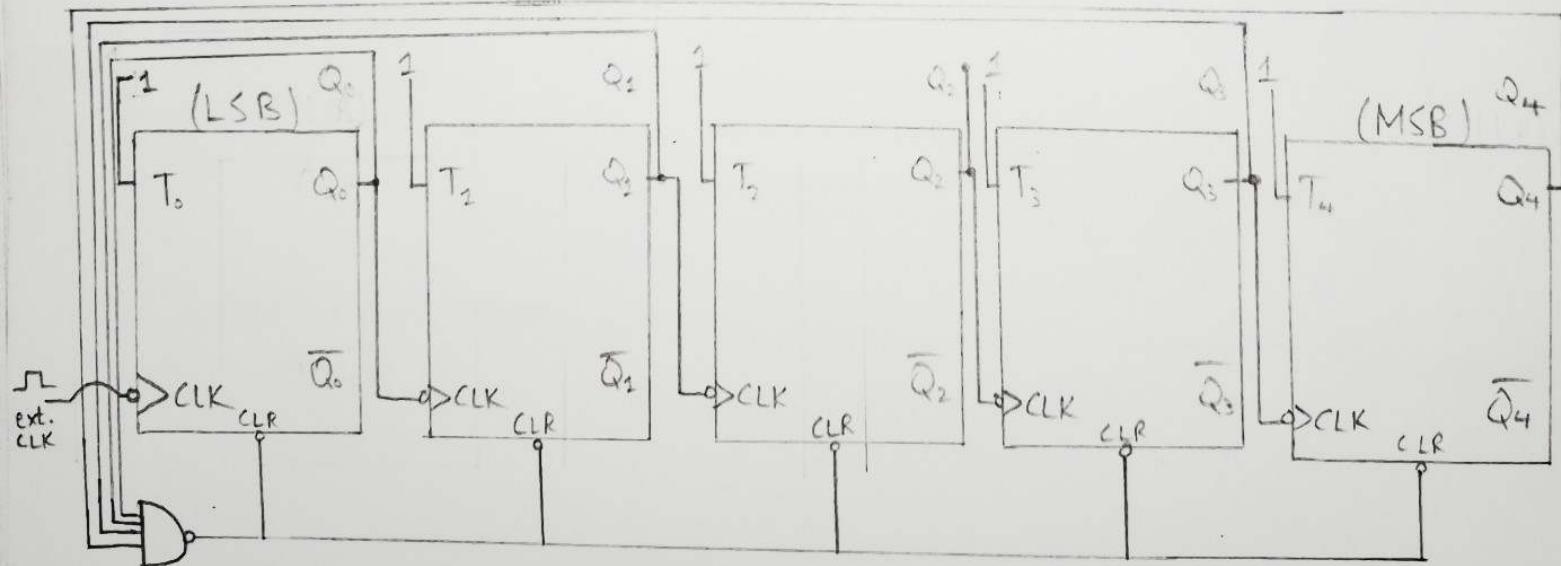
- vi. Which LED will be ON when the count value is 9? Count cannot be 9

5

- vii. Which LED will be ON if R91 and R92 are connected to Vcc? Blue LED

- viii. Are there any LEDs that can be turned ON simultaneously? No

- Q2. Design an asynchronous Mod-27 Up counter. (Indicate LSB clearly) [CLO-2, C3, PLO-2] [4]

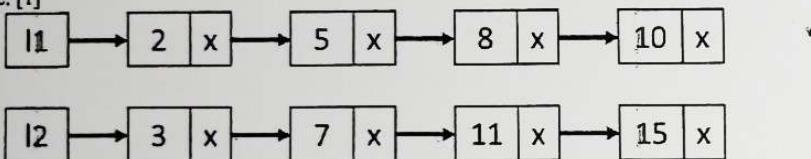


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NED UNIVERSITY OF ENGINEERING AND TECHNOLOGY
 DEPARTMENT OF COMPUTER AND INFORMATION SYSTEMS ENGINEERING
 MIDTERM EXAMINATION SE CS 2023 FALL SEMESTER 2024
CS-218 DATA STRUCTURES AND ALGORITHMS
 DATE: 7 OCT 2024 TIME: 1.5 HOURS MARKS: 20

CLO-1: Elaborate fundamental data structures. C2, PLO-1

Calculate the address of 5 and 4 from the array A= {3,5,1,8,4,2}. Note that each integer is stored in two bytes in the memory and base address of A is 0FC0H. [2]
 Consider an algorithm merge (11, 12) that accepts the pointer 11 to a sorted linked list and the pointer 12 to another sorted linked list, and returns the head pointer to a linked list which contains ALL values in both the input linked lists in sorted order. Draw the linked list returned by the function for the linked lists shown here. [1]



Complete the code for the function merge (11, 12) to work properly. Rewrite the entire function in your answer book. [6]

```
def merge(11, 12):
    if 11 is None:
        return _____
    if 12 is None:
        return _____
    a = 11
    b = 12
    if a.data <= b.data:
        h = ListNode(a.data)
        a = a.next
    else:
        h = ListNode(____)
        b = _____
    c = h
    while a is not None _____ b is not None:
        if a.data <= _____:
            c.next = ListNode(____)
            a = _____
        else:
            c.next = ListNode(____)
            b = _____
        c = _____
    if a is None:
        c.next = b
    else:
        c.next = _____
    return h
```

CLO-2: Analyze time and space complexity of algorithms. C4, PLO-2

4. Figure out the number of iterations of the while loop for any given value of n, and the time complexity of the function. [2]
- ```
def func1(n):
 c = 0
 x = 0
 while x < n^3:
 c = c + 1
 x = x + 3
 return c
```
5. Investigate the given function for its best and worst cases and the relevant time complexities. Assume the pointer a points to singly linked list of nodes and is not None. [4]
- ```
def func2(a):
    q = a
    while q is not None:
        if q.data < 0:
            p = q.next
            q.next = None
            return [a, p]
        q = q.next
    return [a, None]
```

CLO-3: Practice with algorithms for widely used computing operations. C3, PLO-3

6. Modify the binary search algorithm to find the position of the first occurrence of a value that can occur multiple times in a sorted list. [3]
7. Develop the function to calculate the number of live neighbors for Game of Life. Note that the neighbors are the eight cells immediately surrounding a cell: vertically, horizontally, and diagonally. [2]

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CS-23038

NED UNIVERSITY OF ENGINEERING AND TECHNOLOGY
Department of Computer and Information System Engineering
Mid Term Exam , SECS , Fall 2024
Complex Variable and Fourier Analysis (MT-224)

Duration: 90 mints

[CLO-1]

Total Marks: 20

Q.1: Solve the given Differential Equation by using Laplace Transform. (06)

$$y'' - y' = e^t \cos t, \quad y(0) = 0, y'(0) = 0$$

Q.2: Evaluate the given integral using Laplace transform. (06)

$$\int_0^{\infty} e^{-4t} \frac{\sin 3t}{t} dt$$

Q.3: Find Laplace transform of $f(t) = t^2 e^{-t} \sin 3t$. (04)

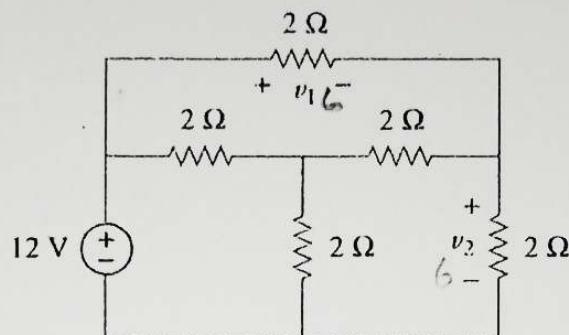
Q.4: Find Fourier series representing $(x) = x, \quad 0 < x < 2\pi$. (04)

OR

Prove that $L[t^3] = \frac{3!}{s^4}$

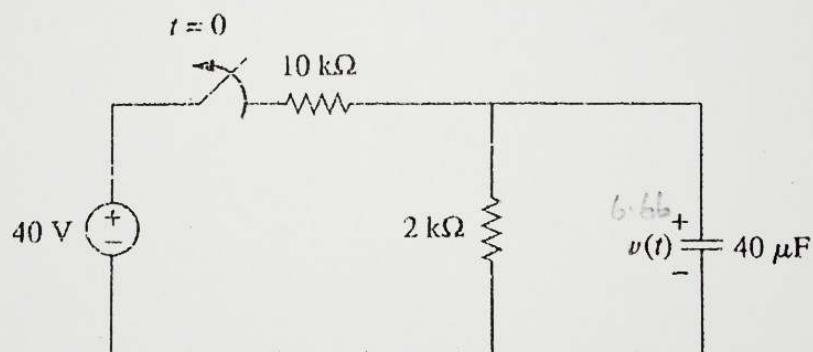
Q.1 Solve for v_1 and v_2 in the following circuit using mesh analysis and nodal analysis.

Explain which method is more efficient in finding the required parameters. [7 marks] [CLO 1].

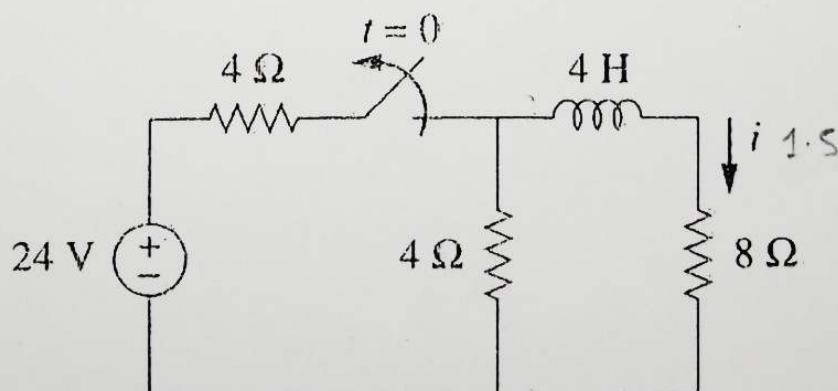


Q.2 Explain why non-ideal voltage sources and non-ideal current sources have internal resistances. Draw their circuits and graphs of Load Voltage vs R_{LOAD} and Load Current vs R_{LOAD} . [3 marks] [CLO 1]

Q.3 Solve and plot $v(t)$ illustrating transient and steady state responses. [5 marks] [CLO 2]



Q.4 Solve and plot $i(t)$ illustrating transient and steady state responses. [5 marks] [CLO 2]





NED UNIVERSITY OF ENGINEERING AND TECHNOLOGY
SECOND-YEAR (CIS ALL SECTIONS) BUSINESS COMMUNICATION (EA-218)
MID-TERM EXAMINATION FALL SEMESTER 2024

Attempt all the questions. | Time: 1.5 Hrs | Max. Marks: 20

Course Instructor: Ms Nimrah Irfan

Q1. Write down a memorandum up to 3 paragraphs long followed by the appropriate structure/ format for the scenario below. [(5 Marks) CLO 3]

You are an administrative assistant. You want to inform 10 people about an upcoming computer training workshop. You are attaching a brochure about the training session provided by the facilitator. Still, you need to inform: (1) what the training is for, (2) who the presenter is along with a brief statement about his/her educational and professional background, (3) where the training will be held including the date and time, (4) whether or not session fee has to be paid, (5) whether or not lunch/ any refreshments will be served.

Q2. Identify Directions and Levels of communication from the following statements: [(10 Marks) CLO 2]

Sno.	Statements	Level	Direction
1	Received a text message from a friend on WhatsApp, informing me about plans for the weekend.		
2	As the Sales Manager at the office ask the HR Manager to send someone to help on Saturday (the busiest day).		
3	Collected customer feedback through an online survey form to improve our product.		
4	A team of five engineers is meeting to brainstorm ideas for a new project.		
5	A CEO addresses shareholders during an annual meeting, outlining the company's financial performance and future strategic goals in a formal, structured presentation		

Q3: Effective communication is essential in the global world today. Using this strategy, rewrite the following statements below using the 7C's of communication. [(5 Marks) CLO 2]

1. Mr Adil cannot be asked to greet the delegation tomorrow as he has an obesity issue and can damage our first impression.
2. I have told you repeatedly that we cannot afford to waste too much printing paper and yet you don't take me seriously. If you don't start saving paper then we will soon face a shortage.
3. Hello dr. William, let us meet tomorrow to chitchat about the upcoming robotic seminar. Waiting for you at 2 o'clock. Thanks, XYZ
4. You always turn in your reports late, and it's really frustrating. If you can't be on time, don't bother submitting them at all.
5. I'm not happy with the quality of work you've been producing.