# Past Papers 2018

Binary 1's 2's
base 10 9's 10's
octal 7's 8's

(ii) obtain 1's & 2's Complement of the following binary function

10110110 11010101

1's Complement

01001001 00101010

2's Complement

01001010 00101011

(iii) Represent the decimal No 1122 in

(1) Excess-3

0100010010001000

(2) 84-2-1

0111011101100110

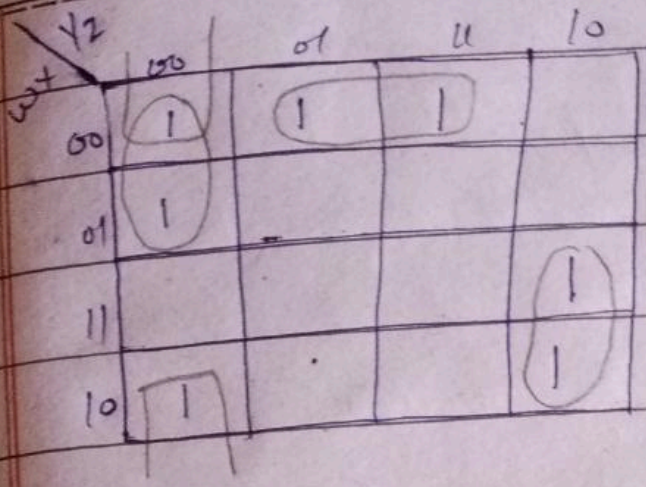
(iii) Simply the function

(1) $F(w,x,y,z) = \Sigma(0,1,3,4,8,10,14)$

# What is S-R latch? Draw logic diagram using NAND gates.

## Latch

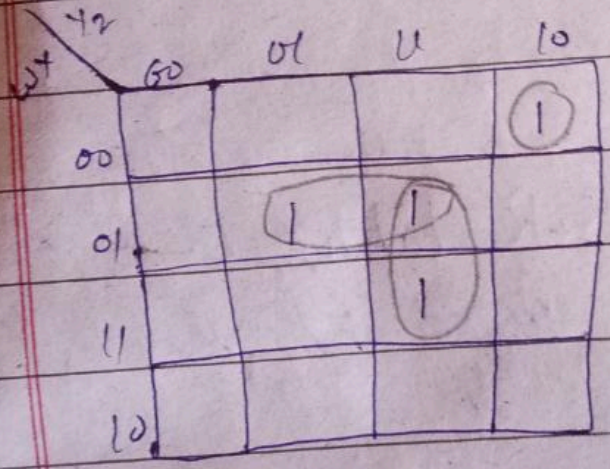
Latches are digital circuits that stores a single bit of information and hold its values until it is updated by new Input signals.




0 0000
1
8421
1010

$F = \bar{X}\bar{Y}\bar{Z} + \bar{W}\bar{Y}\bar{Z} + \bar{W}\bar{X}Z + WY\bar{Z}$

(iii) $D(W,X,Y,Z) = \Sigma(2,5,7,8)$




$D = \bar{W}\bar{X}Y\bar{Z} + \bar{W}XZ + XYZ$

⇒ (iv)

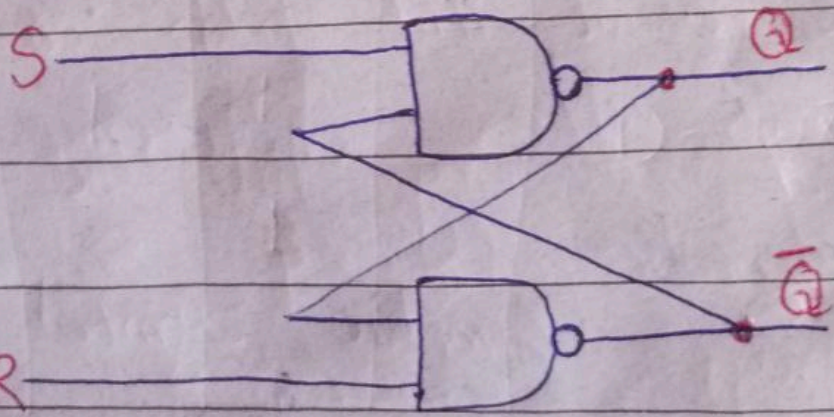
Simplify the following Boolean function to minimize the number of literal

$F(W,X,Y,Z) = \Pi(0,1,2,3,4,5,6,12)$

M T W T F S

SR (Set - Reset) latches are the simplest form of latches and are implemented using two inputs The S input sets the output to 1 while the R input sets the output 0

When both are at 1 the latch said to be undefined



# What is the difference b/w Combinational & Sequential Circuits

## Combinational Circuit

- The output is dependent by on the current Input
- The Process is quick
- It is simple to use and manage

## Sequential circuit

- This output is dependent on both current & Previous output
- The Process is slow
- It is difficult to use & handle

M T W T F S

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★ Combinational circuits are incapable of storing any state

★ Sequential circuits can store any state or retain Previous states.

What is 4-bit binary Parallel

## What is Carry Propagation Time?

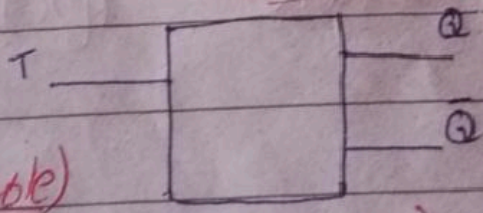
The carry Propagation Time is equal to the carry

Propagation delay. The Time required for a signal or waves to travel from one Point of a transmission medium to another

## What is T flip flop? Define Graphics Symbol, Charteristic table & equation.

T flip flop is a single input logic circuit that holds or toggles its output according to the input state.

(Graphic Symbol)




(Characteristic Table)

| T | Q(t) | (Q(t+1)) |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

(Equation)

$Q(t+1) = \bar{T}(Q(t)) + T(\overline{Q(t)})$

# 2020

(i) State the De Morgan's Theorem?

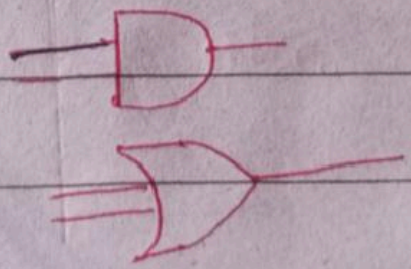
(i) $(x+y)' = \bar{x} \cdot \bar{y}$

(ii) $(xy)' = \bar{x} + \bar{y}$

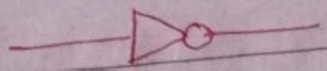
(ii) What are the Basic logic gates?

There are three basic logic gates

- AND
- OR



M T W T F S

Not 

(iii) Convest Decimal to binary

471

~~$(100111001)_2$~~

$(111010111)_2$

| | |
|---|---|
| 2 | 471 |
| 2 | 235 - 1 |
| 2 | 117 - 1 |
| 2 | 58 - 1 |
| 2 | 29 - 0 |
| 2 | 14 - 1 |
| 2 | 7 - 0 |
| 2 | 3 - 1 |
| | 1 - 1 |

(iv) Convest Decimal to octal

103

$(147)_8$

| | |
|---|---|
| 8 | 103 |
| 8 | 12 - 7 |
| | 1 - 4 |

(v) Take 15's Complement of 546700 decimal Number

(Basically This is a Wrong Q because Not mention ~~which~~ the Given Question ~~bag~~ belong to ~~which~~ base)

546700

(-15)

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AB98~~FF~~

1

AB985~~F~~ Ans

Take 9's Compliment of 7291161 binary number.

7291161

0111001010010010110000 1

9's Compliment

1000110101101101001111 0

Convert $(F00EC2)_h$ to binary Number

$(1111\ 0000\ 0000\ 1110\ 1100\ 0010)_2$

write the truth table for

$F = x + x \cdot y + y$

| x | y | x.y | x+x.y | x+x.y+y |
|---|---|---|---|---|
| 0 | 0 | 0 | | 0 |
| 0 | 1 | 0 | | 1 |
| 1 | 0 | 0 | | 1 |
| 1 | 1 | 1 | | 1 |

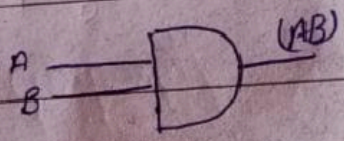
## Complement of the function $F = x \cdot y + y \cdot x$?

$$(F)' = (x \cdot y + y \cdot x)'$$

$$\bar{F} = (x \cdot y)' \cdot (y \cdot x)'$$

$$\boxed{\bar{F} = (\bar{x} + \bar{y}) \cdot (\bar{y} + \bar{x})}$$

## Graphical Symbol for AND Gate




## Registe in CPU:-

A register is a memory device in digital electronics that can store a specific amount of data bits. It is a group of flip-flops connected in series used to store multiple bits of data. The information stored within these registers can be transferred with the help of shift register.

# Reduce A.B.A

$A.B.A = A.B$

## Application of Flip-Flop

Flip-Flop application are use for

* Temporary data storage as
* frequency dividers, and in Counters

For Data storage application a group of flip flops are connected to Parallel data lines and clocked together. Data is stored until the next clock Pulse.

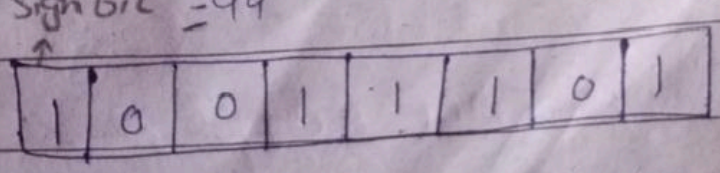
## Define even Parity

Parity bit is an optional parameter, used in Serial Communication to determine if the data character being transmitted is correctly received by the remote device.

Parity bit may be even or odd even Parity when we add Zero as a extra Parameter then this is called even Parity.

# 2017

(iii) Express -99 as an 8 bit number in the Sign magnitude 2's Complement form.




1100011

1's comp

00111100

2's comp +1

00111101

1100011

2 | 99
2 | 49-1
2 | 24-1
2 | 12-0
2 | 6-0
2 | 3-0
2 | 1-1

M T W T F S

## Add the following binary

$10110110 + 10011101$

$$\begin{array}{r} {\scriptstyle 1\ 1\ 1\ 1\ \ \ } \\ 1\ 0\ 1\ 1\ 0\ 1\ 1\ 0 \\ +\ 1\ 0\ 0\ 1\ 1\ 1\ 0\ 1 \\ \hline 1\ 0\ 1\ 0\ 1\ 0\ 0\ 1\ 1 \end{array}$$

## Simplify using Boolean Algebra techniques

$$A.B + A.(B+C) + B.(B+C)$$

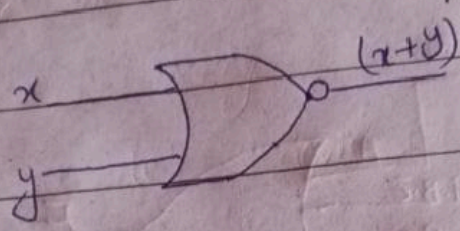
$A.B + A.B + A.C + B.B + B.C$ According to distributive law

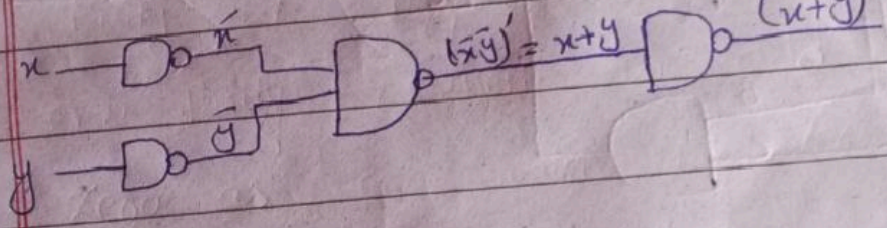
$A.B + A.C + 0 + B.C$

$A.B + A.C + BC$

State the De Morgan's law to verify that NOR gate is ~~used~~ equivalent to NAND gate.

$(x+y)' = \bar{x}\cdot\bar{y}$ || $(xy)' = \bar{x}+\bar{y}$




Prove that $A+\bar{A}\cdot B = A+B$

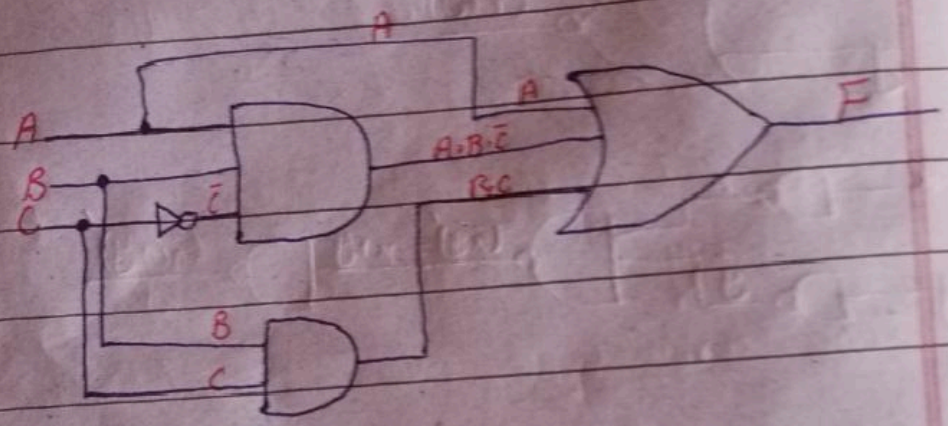
| A | B | $\bar{A}$ | $\bar{A}\cdot B$ | $A+\bar{A}\cdot B$ | $A+B$ |
|---|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 | 1 |

So Prove Both are equal

M T W T F S

Draw the gate Implementation of the function

$F = A + B \cdot C + A \cdot B\bar{C}$




Minimize the following SOP using K-Map

$F = A \cdot B \cdot C + \bar{A} \cdot B \cdot \bar{C} + \bar{A} \cdot \bar{B} \cdot \bar{C} + A \cdot \bar{B} \cdot C + A \cdot B\bar{C}$

| A \ BC | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 0 | 1 | | | 1 |
| 1 | | 1 | 1 | 1 |

$F = AC + \bar{A}\bar{C} + B\bar{C}$

$F = (A \odot C) + B\bar{C}$

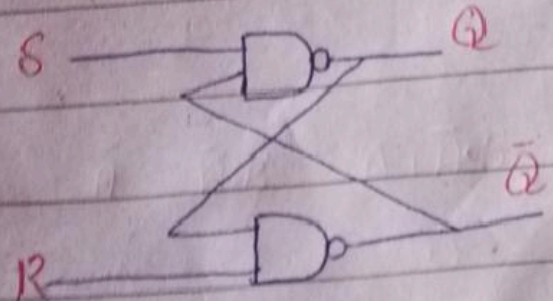
Determine the logic required to decode $(1011)_2$ by producing a High / HIGH on the output

$= 2^3 \times 1 + 2^2 \times 0 + 2^1 \times 1 + 2^0 \times 1$

$= 8 + 0 + 2 + 1$

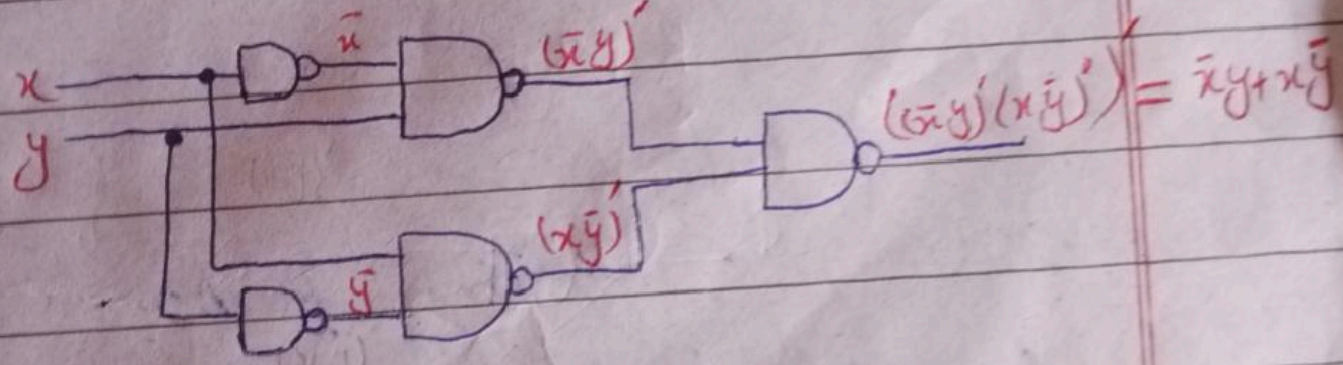
$= 11$

Draw the diagram of SR-Latch using NAND gate.



~~Difference b/w~~

Draw the logic diagram ~~As~~ of XOR gate using all NAND-gates.



2019

Use 10's Complement to Perform M-N when

M = 85320 N = 51360

9's compliment
N2 = 48639
10's Compliment

N2 = 48640

85320
51360
33960

M = 85320
N = 48640
(1)33960

M-N = 33960

Write the following function into Maxterms

F = Σ(2,4,5,6)

F = Π(0,1,3,7)

M T W T F S

Using Postulates & theorems of Boolean algebra Prove

$x + xy = x$

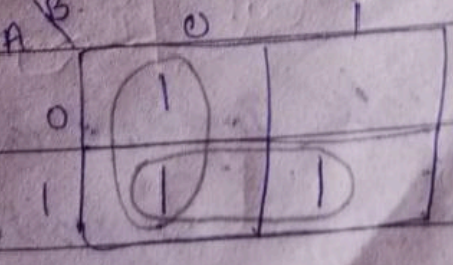
$x(1+y) = x$

$x(1) = x$

$x = x$

Simplify using K-Map

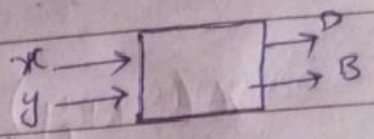
$F(A,B) = A'B' + AB' + AB$




$F = \bar{B} + A$

M T W T F S

Draw the truth table of half Subtractor and write the Boolean function for its Borrow and Difference?



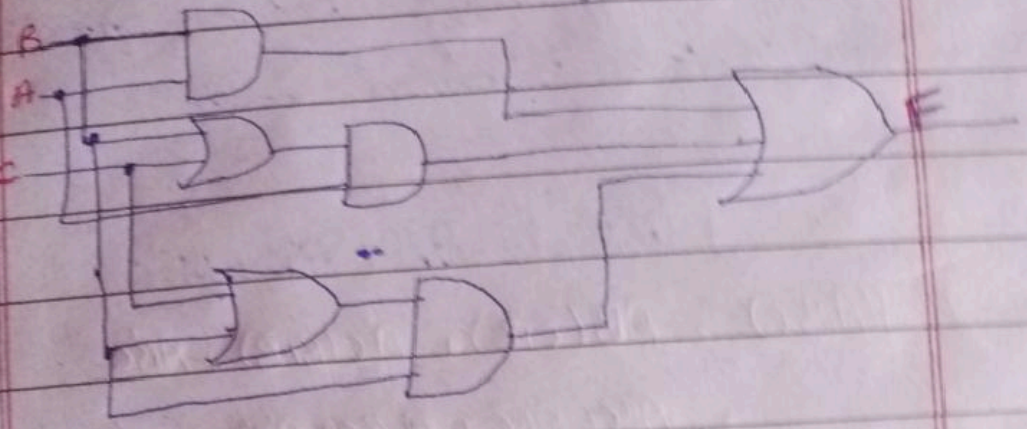

| x | y | D | B |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 0 |

What is Karnaugh?

K.Map
↓
Karnaugh

Draw the gate Implementation of the following expression

$F = AB + A(B+C) + B(B+C)$




Prove that exclusive-OR is the Compliment of exclusive-NOR:

$$(x \oplus y) = (\bar{x}y + x\bar{y})$$

Take Compliment on L.C

$$(x \oplus y)' = (\bar{x}y + x\bar{y})'$$

$$= (\bar{x}y)' \cdot (x\bar{y})'$$

$$= (x + \bar{y})(\bar{x} + y)$$

$$= x\bar{x} + xy + \bar{x}\bar{y} + y\bar{y}$$

$$= 0 + xy + \bar{x}\bar{y} + 0$$

$$= xy + \bar{x}\bar{y}$$

$$\boxed{(x \oplus y)' = x \odot y}$$

So Prove.

M T W T F S

Expand the following Boolean functions into their canonical form

$$f(A,B,C) = AB + A'C + AB'C$$

$$f(A,B,C) = AB(C+\bar{C}) + A'C(B+\bar{B}) + AB'C$$

$$= ABC + AB\bar{C} + A'BC + A'B'C + AB'C$$

What is 4-bit binary Parallel adder?

M T W T F S

## Minterms:

Minterms are the Product of all the variables in a Boolean function where each variable appears exactly once in true or complement form

## Maxterm:

Maxterm are sum of of all the variables in a Boolean function where each variable appears exactly once in true or complement form

## Don't care Condition:

The are some conditions where output cannot be specified so we use don't care conditions in that case. To make a group of cells we also ignore that cells. We mainly use "don't care" cell to make a large group of cells.

# How many types of number System are there?

Four

The four most common number system types are there.

Decimal No System ( Base 10 )
Binary no System ( Base 2 )
Octal No System ( Base 8 )
Hexadecimal No System ( Base 16 )

# Duality Principle:

This Principle states that

* Changing every OR into AND and vice versa
* Changing every 0 into 1 and vice versa.

# Parity bit:

Parity bit is an optional parameter, used in Serial Communication to determine if the data character being transmitted is correctly received by the remote device.

Parity bit may be place on left side or right side

Parity bit may be odd or even.

# K-Map:

K-Map is a visual method used to Simplify the algebraic expressions in Boolean functions without having to resort to Complex theorems or equation manipulations.

# END Carry:

The carry out of last digit is called end carry.

M T W T F S

**Carry:** To take something or someone to a particular point or in a particular direction.

## Multiplexer:

It is a combinational circuit which have many data inputs and single output depending on control or select inputs.

## Example:

In telephone network multiple audio signals are integrated on a single line for transmission with the help of multiplexers.

## Demultiplexer:

A demultiplexer sometimes abbreviated demux, is a circuit that has one input and more than one output. It is used when a circuit intends

(M) T W T F S

to send a signal to one of many devices

## De-Coder:-

A combinational logic circuit which has n input lines and maximum $2^n$ output lines is known as decoder. Decoder is an electronic device that converts signals from one form to another.

## Encoder:-

An encoder is a sensing device that provides feedback. Encoders convert motion to an electrical signal that can be read by some type of control device in a motion control system.

## Clock Pulse:-

The clock

M T W T F S

Pulses are at a frequency that is much higher than the sampling pluses, and while a voltage is being held at the input, the clock pluses pass through the gate and are counted.