REAL TIME SYSTEM

A system is said to be Real Time if it is required to complete it's work & deliver it's services on time.

Example – Flight Control System

- All tasks in that system must execute on time.

Non Example – PC system

HARD AND SOFT REAL TIME SYSTEMS

Hard Real Time System

- Failure to meet deadlines is fatal
- example : Flight Control System

Soft Real Time System

- Late completion of jobs is undesirable but not fatal.
- System performance degrades as more & more jobs miss deadlines
- Online Databases

(Qualitative Definition)

ROLE OF AN OS IN REAL TIME SYSTEMS

Standalone Applications

- Often no OS involved
- Micro controller based Embedded Systems

Some Real Time Applications are huge & complex

- Multiple threads
- Complicated Synchronization Requirements
- Filesystem / Network / Windowing support
- OS primitives reduce the software design time

FEATURES OF RTOS'S

Scheduling.

Resource Allocation.

Interrupt Handling.

Other issues like kernel size.

SCHEDULING ALGORITHMS IN RTOS

Clock Driven Scheduling

Weighted Round Robin Scheduling

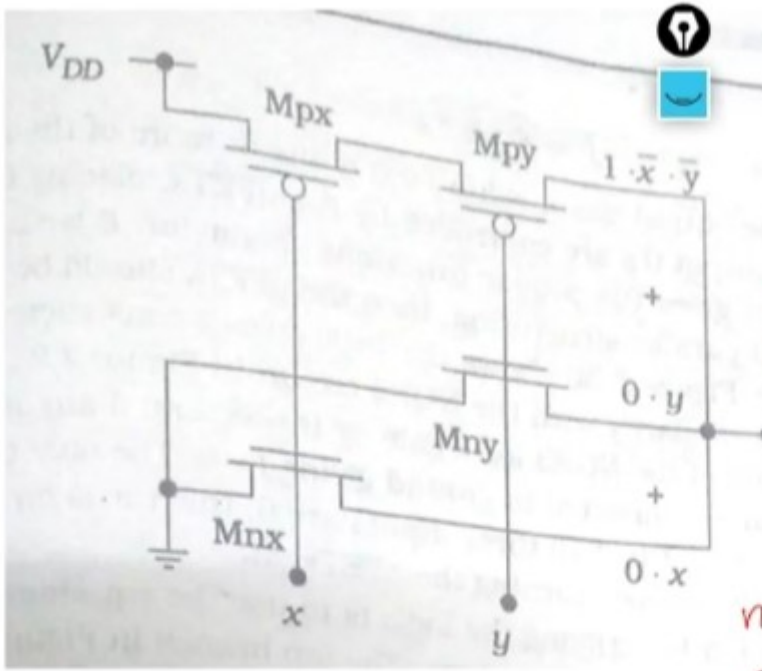
Priority Scheduling

(Greedy / List / Event Driven)

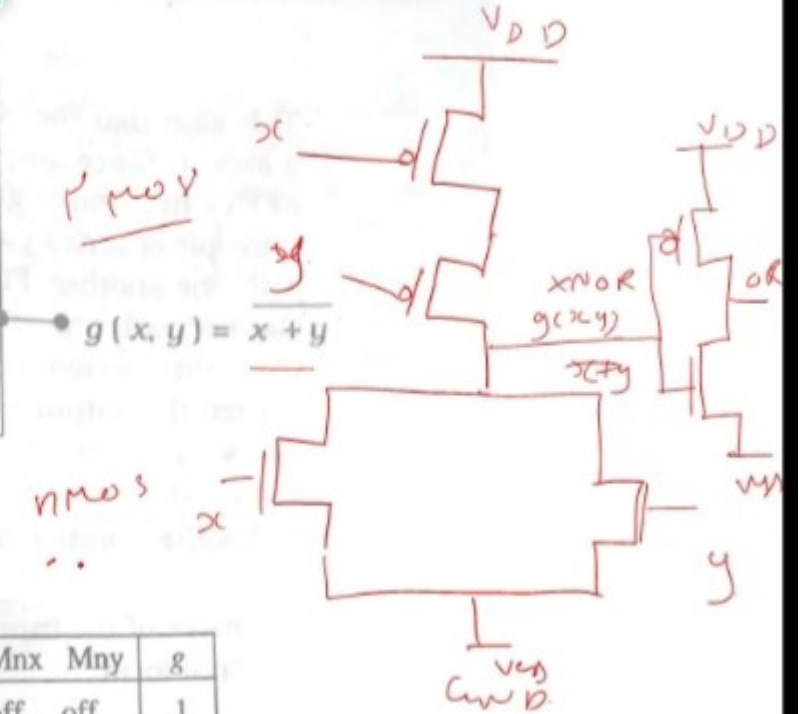
SCHEDULING ALGORITHMS IN RTOS (*CONTD*)

Clock Driven

- All parameters about jobs (release time/ execution time/deadline) known in advance.
- Schedule can be computed offline or at some regular time instances.
- Minimal runtime overhead.
- Not suitable for many applications.



$$g(x, y) = \overline{x + y}$$



x	y	Mpx	Mpy	Mnx	Mny	g
0	0	on	on	off	off	1
0	1	on	off	off	on	0
1	0	off	on	on	off	0
1	1	off	off	on	on	0

Complex Logic Gates in CMOS

$y = a.(b+c)$

P-MOS series

Parallel

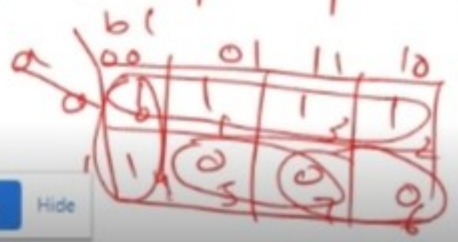
nMOS:

$b+c$ → parallel

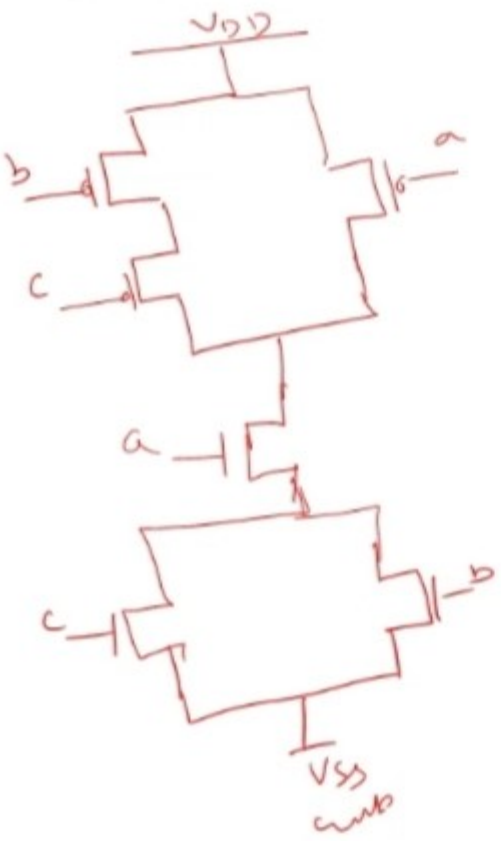
$a.b+c$ → series

$\bar{b}\bar{c}.1 + \bar{a}.1 + ac.0 + a.b.0$

a	b	c	b+c	a.(b+c)	$\bar{y}$
0	0	0	0	0	1
0	0	1	1	0	1
0	1	0	1	0	1
0	1	1	1	0	1
1	0	0	0	0	1
1	0	1	1	1	0
1	1	0	1	1	0
1	1	1	1	1	0



$\bar{b}c \cdot 1 + \bar{a} \cdot 1 + ac \cdot 0 + \bar{a} \cdot b \cdot 0$



$y = \underline{a \cdot (b + c)}$

PMOS

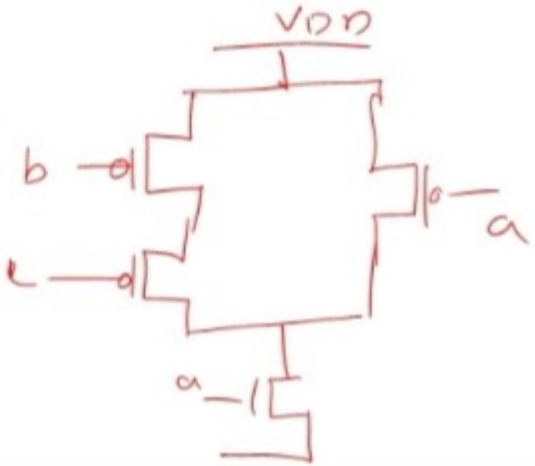
b+c - series conn.

a.(b+c) - parallel conn.

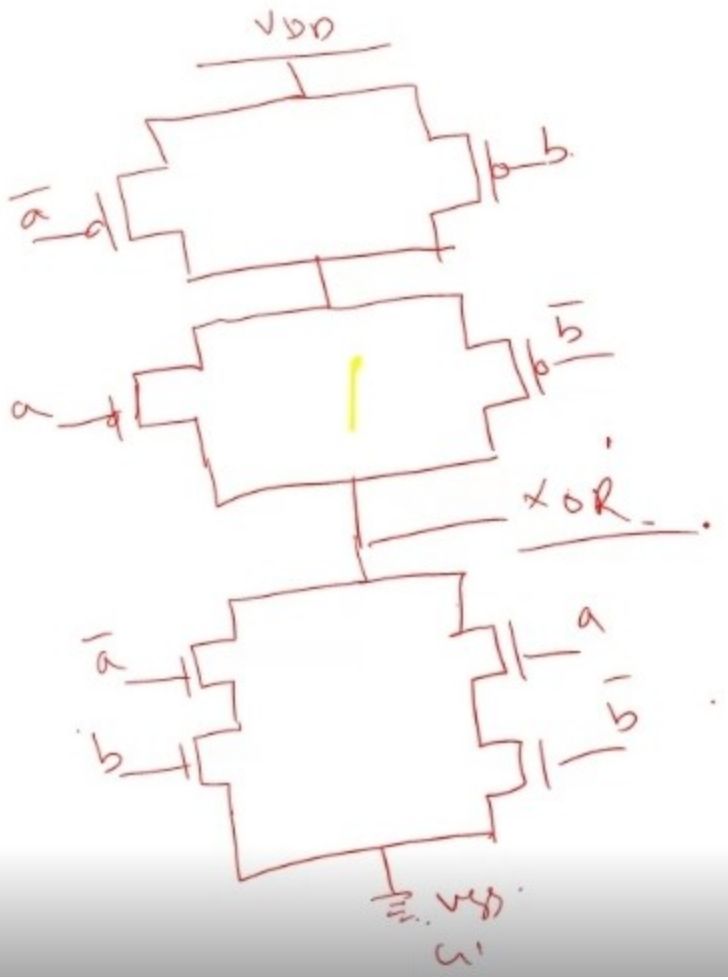
n-mos

b+c → parallel conn.

a.(b+c) - series.



$\bar{a}\bar{b}.1 + \bar{c}.\bar{d}.1 + a.0 + b.d.0 + b.c.0$



XOR = $\bar{a}b + a\bar{b}$

$\bar{a}.b$ → PMOS-Parl.

$a\bar{b}$ → PMOS-Parl.

$\bar{a}b + a\bar{b}$ → Series. NMOS

$\bar{a}b$ → Series

$a\bar{b}$ → Series.

$\bar{a}b + a\bar{b}$ - Parallel.