

# M R

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## مدرس خصوصي

حضورى

اونلاين

مخصص الطالب علي

مقاطع فيديو هات لشرح المقرر بشكل وافى

ملخص للمادة Pdf للمذكرة واطراجة

محاضرات مباشرة علي برنامج زووم

مناقشة الأجزاء الغير مفهومة

تواصل مستمر مع معلم المادة

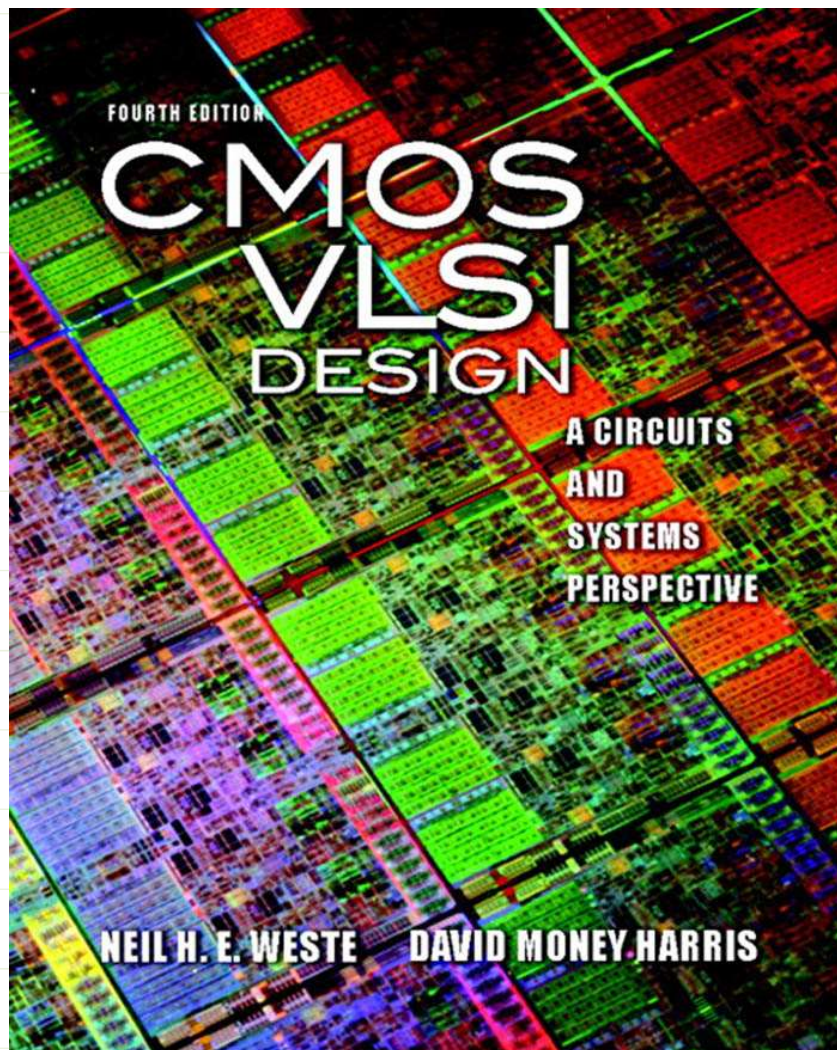
للنواصل

0567630097

0565657741

استاتيكا	فيزياء
الكترونيا	دوائر كهربية
هيدروليكا	ميكانيكا الانشآت



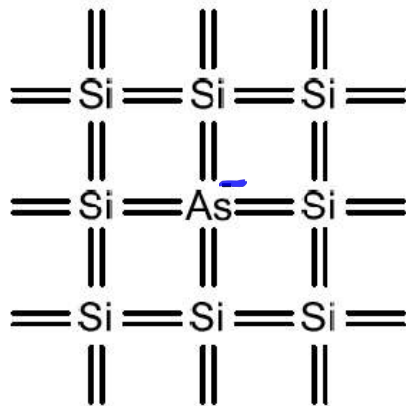
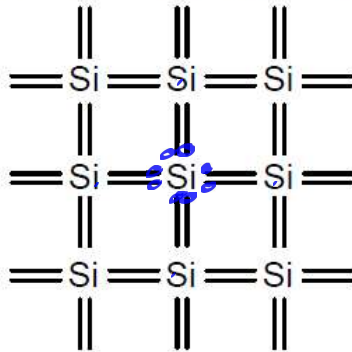
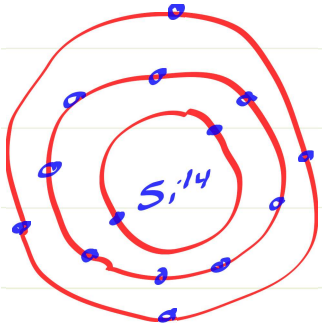


## Introduction

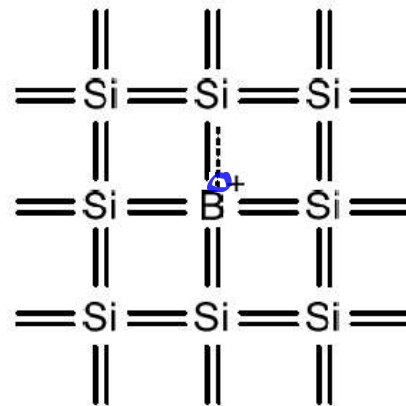
- ❑ Integrated circuits: many transistors on one chip.
- ❑ *Very Large Scale Integration (VLSI)*
- ❑ *Complementary Metal Oxide Semiconductor (CMOS)*
  - Fast, cheap, low power transistors
- ❑ Today: How to build your own simple CMOS chip
  - CMOS transistors
  - Building logic gates from transistors
  - Transistor layout and fabrication
- ❑ Rest of the course: How to build a good CMOS chip

# Silicon Lattice

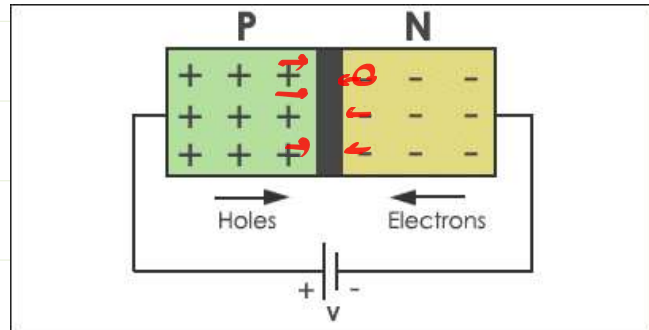
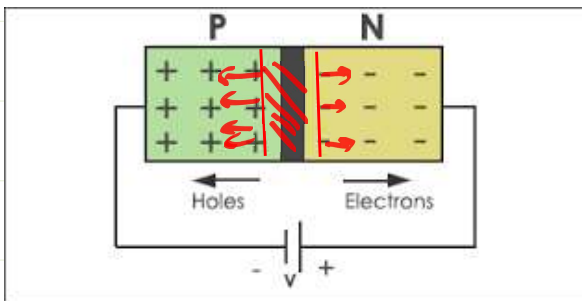
- ❑ Transistors are built on a silicon substrate
- ❑ Silicon is a Group IV material
- ❑ Forms crystal lattice with bonds to four neighbors



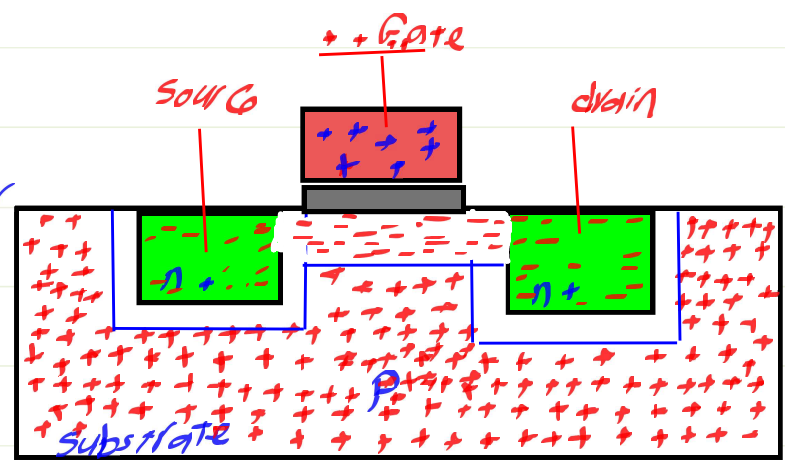
*n - type*



*p - type*

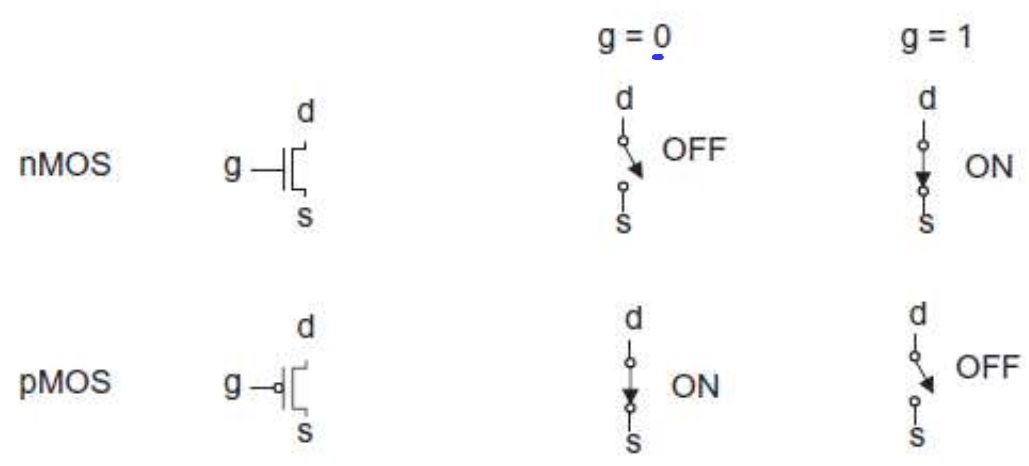
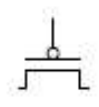
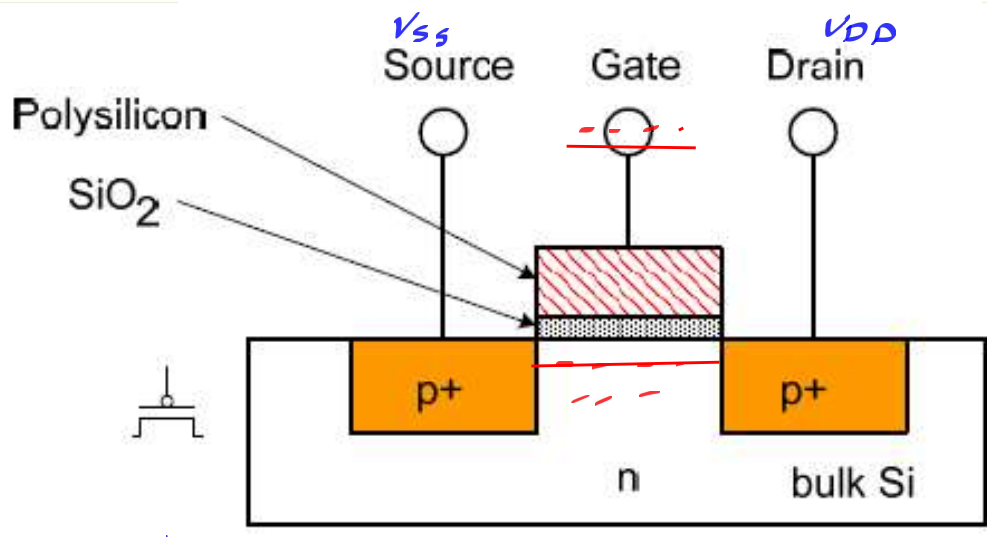


MOS Transistor  
 nMOSFET Transistor



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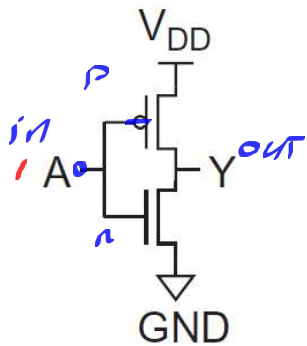
# pMOS Transistor



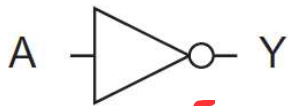
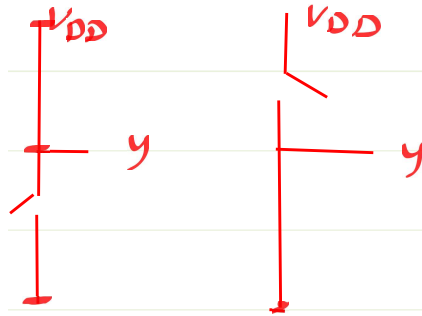
## 1.4 CMOS Logic

### 1.4.1 The Inverter

A	Y
0	1
1	0



(a)



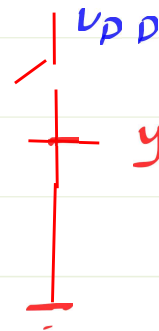
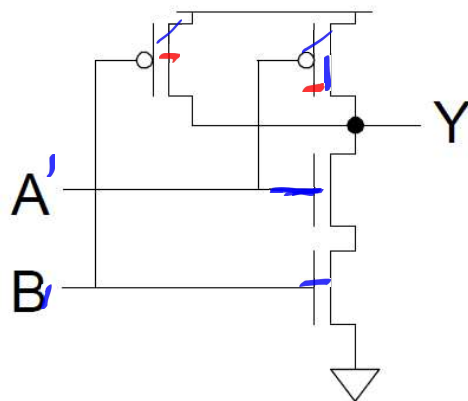
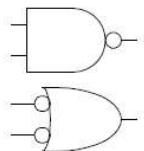
(b)

and

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

## CMOS NAND Gate

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0



P	Q	$P \vee Q$
T	T	T
T	F	T
F	T	T
F	F	F

## CMOS NOR Gate

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

