V = I R

Q = C V

Q = I t

Q = charge

C = capacitance

V = Voltage

Q = CV

Q = IT

IT = CV

I = CV/T

I = CV/t

Mohammad41Batch

Threshold Voltage Vt

LED 0.7V

0.1V

0.5V

0.7v+…LED ON

Vs = Voltage of source

Vg = Voltage of gate

Vb = Voltage of body

Vd = Voltage of drain

µ = Mobility Constant

IS = Current of source

Vgs = Voltage difference between gate and source

Vds = Voltage difference between drain and source

tox = Thickness of Oxide

QCHANNEL = Cg (Vgc – Vt)

Average voltage gate to channel, Vgc = (Vgs + Vgd)/2 ……………………………….1

Vgs = Vgd + Vds -------🡪 Vgd = Vgs -Vds ……………….2

1+2………

Vgc = Vgs - Vds/2 …………………….3

QCHANNEL = Cg (Vgc – Vt)

Cg  = Cox W L………………………….4

3+4

QCHANNEL = Cox W L (Vgs - Vds/2 – Vt)

We know,

Velocity, v =

Electromagnetic force, E = Vds / L

So, Velocity, v = Vds / L

Time, t = L/v

So, t = L/ Vds / L)

T =

I = (Cox W L (Vgs - Vds/2 – Vt)) / L^2

So, I = Cox W/L (Vgs - Vds/2 – Vt) Vds

We merge Cox W/L into Beta, β

And Vgs – Vt into VGT

Hence, I = β (VGT – Vt) Vds