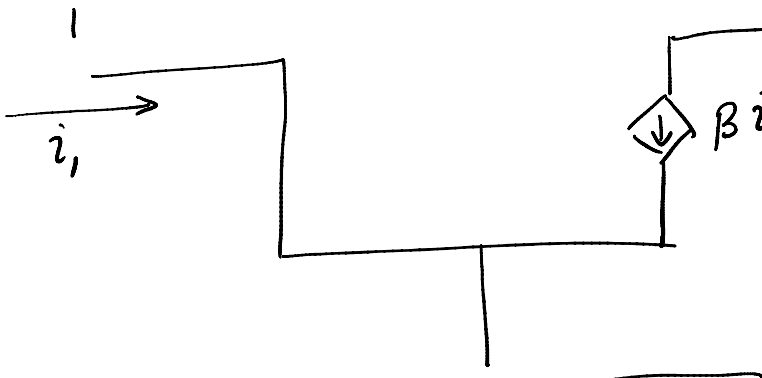
Monday, February 04, 2013
10:36 AM

PART B

TRANSISTORS

3 TERMINAL DEVICES → VOLTAGE OF CURRENT AT ONE TERMINAL CONTROLS THE ELECTRICAL BEHAVIOR AT OTHER TERMINAL

1) BJT → BIPOLAR JUNCTION TRANSISTOR



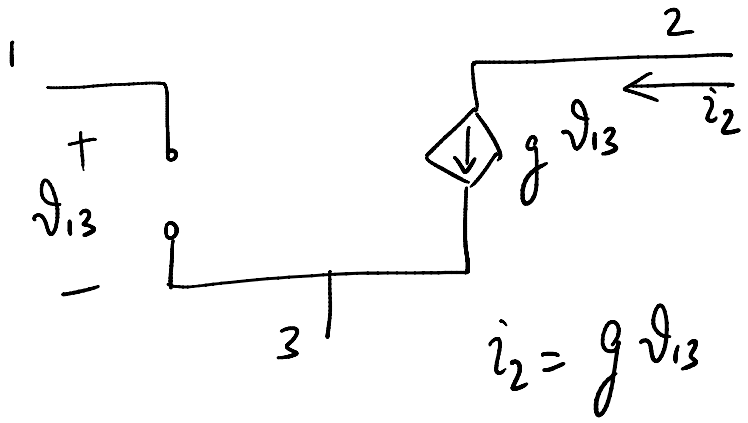
CCCS
CURRENT CONTROLLED CURRENT SOURCE

$i_2 = \beta i_1$

IF $\beta > 1$, AMPLIFICATION

Monday, February 04, 2013
10:42 AM

2) FET ⟶ FIELD EFFECT TRANSISTOR



$i_2 = g\,v_{13}$

VCCS
VOLTAGE CONTROLLED CURRENT SOURCE

SWITCH
" DIGITAL LOGIC"

" DC ANALYSIS AND DESIGN ONLY"

Monday, February 04, 2013
10:44 AM

"IV CHARACTERISTICS"

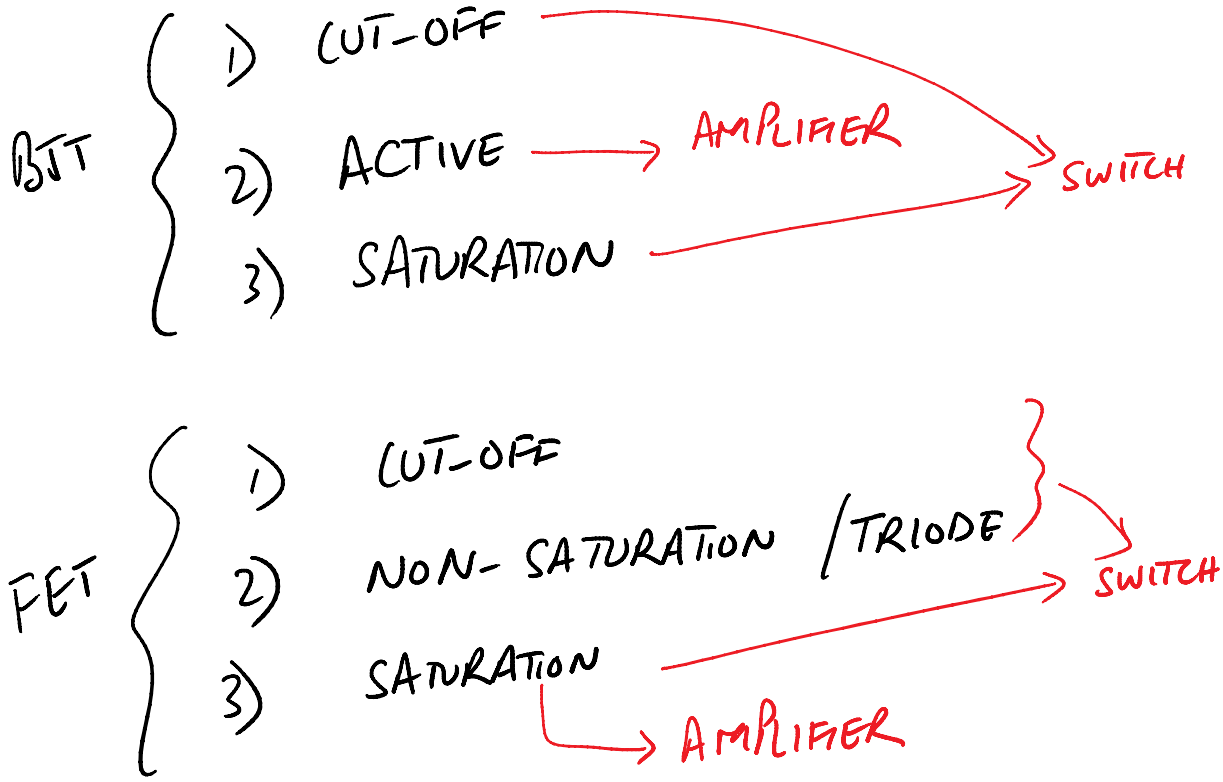
SET OF CURVES → EACH CURVE CORRESPONDS TO A DIFFERENT VALUE OF CONTROL SIGNAL (CURRENT OR VOLTAGE) LEADING TO DIFFERENT OPERATING REGIONS

∴ BIASING IS NEEDED TO OPERATE THE DEVICE IN SPECIFIC OPERATING REGION

Ex BJT → AMPLIFICATION REQUIRES BIASING, USING EXTERNAL CIRCUIT, IN ACTIVE REGION

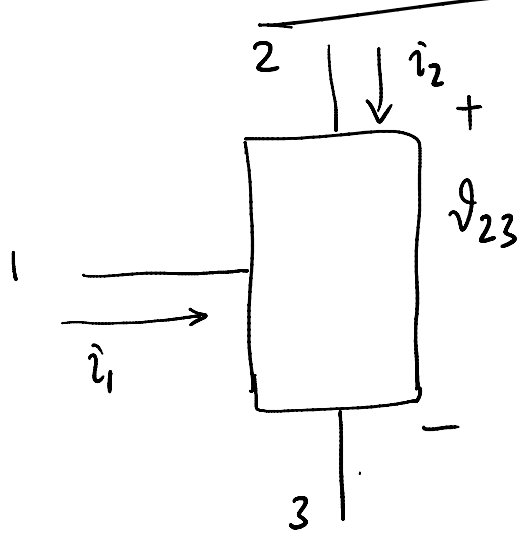
Monday, February 04, 2013
10:46 AM

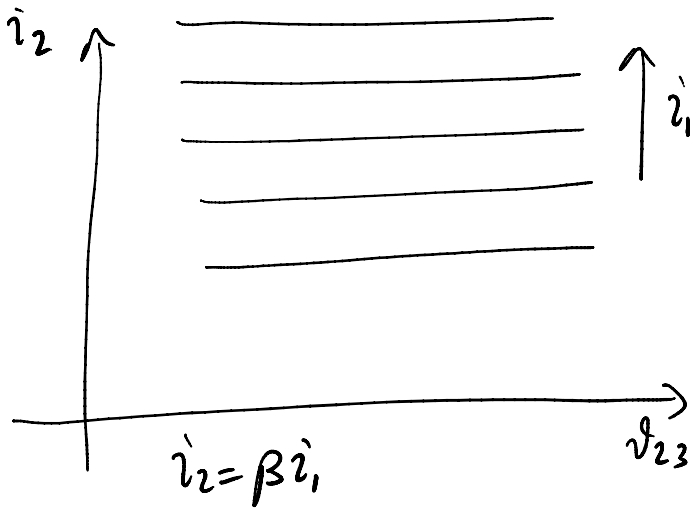
3 OPERATING REGIONS



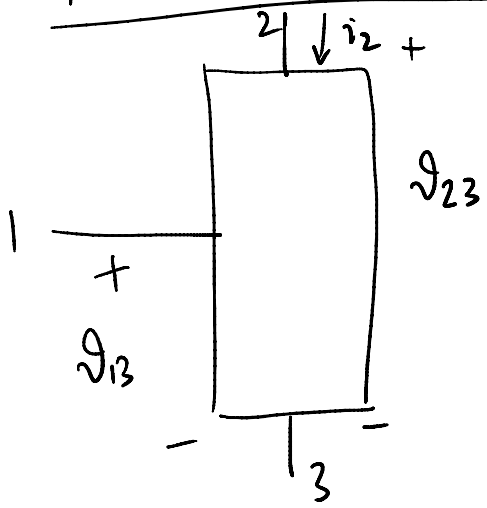
Monday, February 04, 2013
10:49 AM

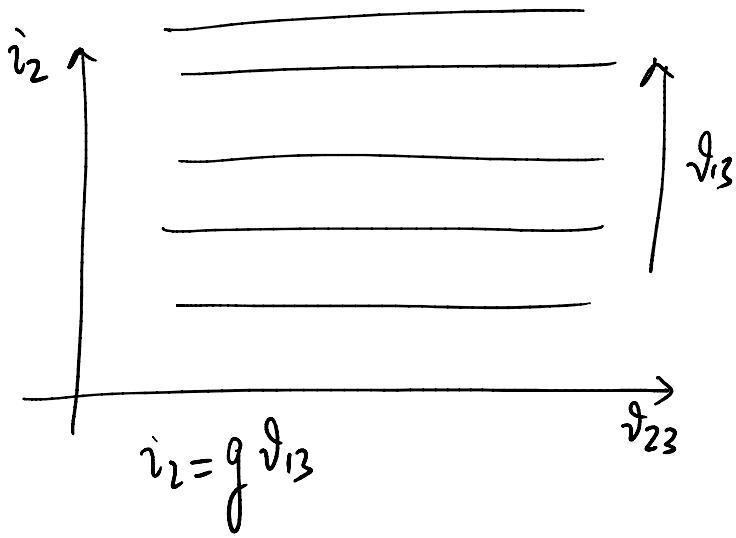
BJT SIMPLE SETUP





FET SIMPLE SETUP



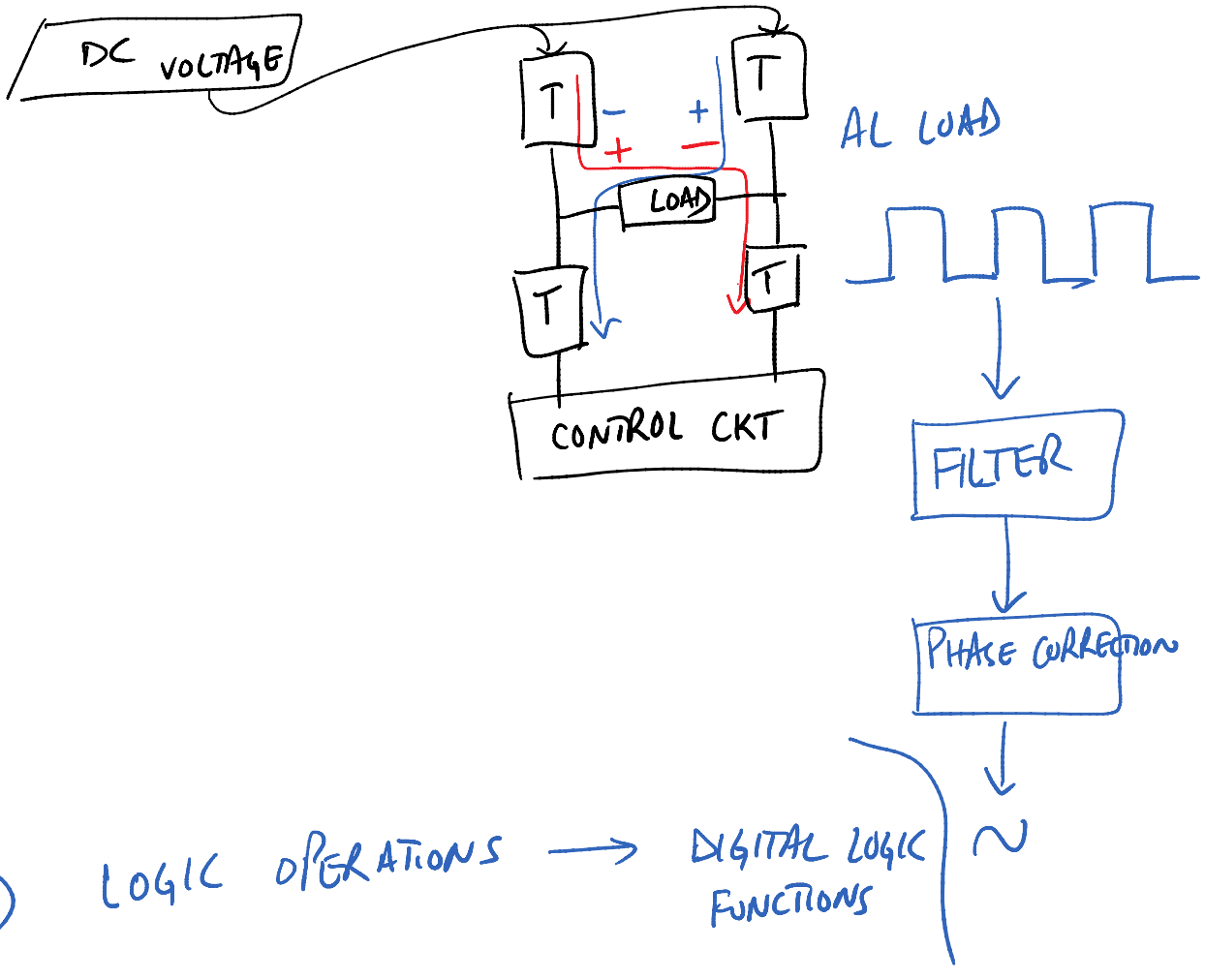


Monday, February 04, 2013
10:51 AM

APPLICATIONS

1) SIGNAL AMPLIFICATION → SMALL SIGNAL REPLICATED AND AMPLIFIED

2) SWITCHING → "POWER" INVERTERS
LOW POWER INPUT CONTROLS
HIGH POWER OUTPUT



3) LOGIC OPERATIONS → DIGITAL LOGIC FUNCTIONS

IMPLEMENTATION

1) DISCRETE →

2) IC →