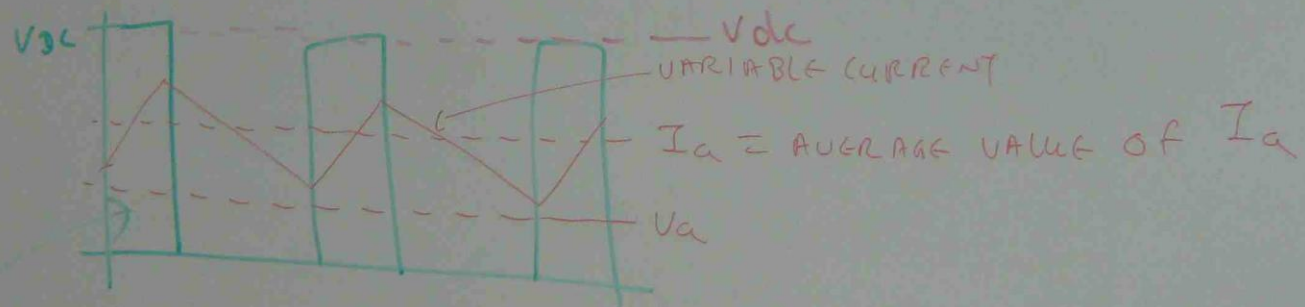
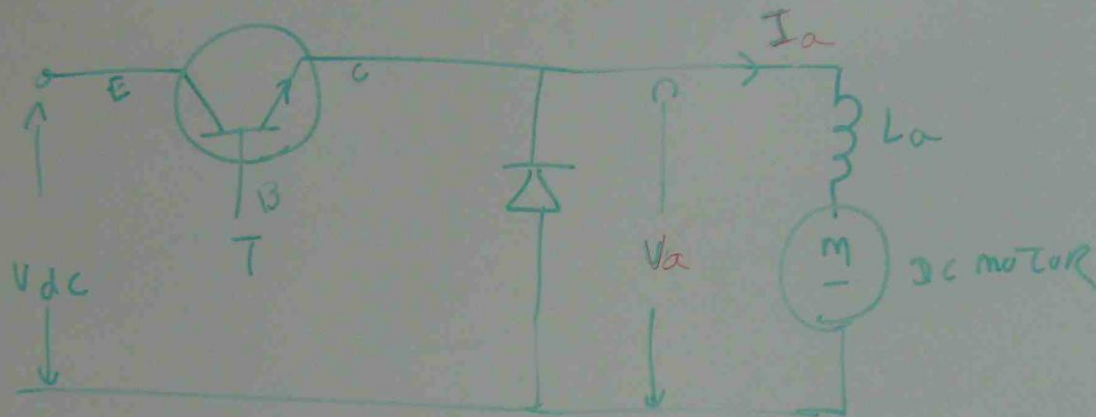


BASIC DC-DC CONVERTER (OR) CHOPPER CIRCUIT



V_{dc} IS CHOPPED BY
TRANSISTOR

THEN
INVT

V_{dc} = DC SUPPLY VOLTAGE

V_a = DC ARMATURE VOLTAGE

L_a = ARMATURE INDUCTANCE

I_s = INSTANTANEOUS ARMATURE
CURRENT

INPUT CONSTANT DC VOLTAGE IS
CONVERTED INTO PULSATING DC
BY TRANSISTOR CHOPPER.

THEN THIS PULSATING IS FILTERED &
INVERTED TO AC TO DRIVE AC MOTOR

CURRENT IN CHOPPER CIRCUIT & CURRENT DRAWN FROM SOURCE



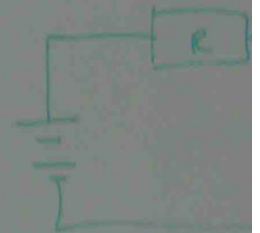
T_a = SWITCHING ON TIME
 T_b = SWITCHING OFF TIME
 of chopper

BECAUSE OF FREEWHEELING
 DIODE THE CURRENT
 WILL NOT GO BACK TO
 ZERO

IF FREEWHEELING DIODE IS OUT, THE CURRENT
 WILL CHANGE FROM ZERO TO MAXIMUM FREQUENTLY
 CAUSING VIBRATION AND DOWNGRADING THE INSULATION OF MOTORS

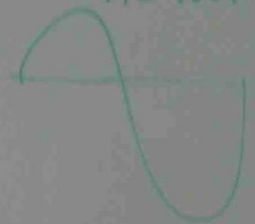
POWER TRANSFER

CONDUCTION



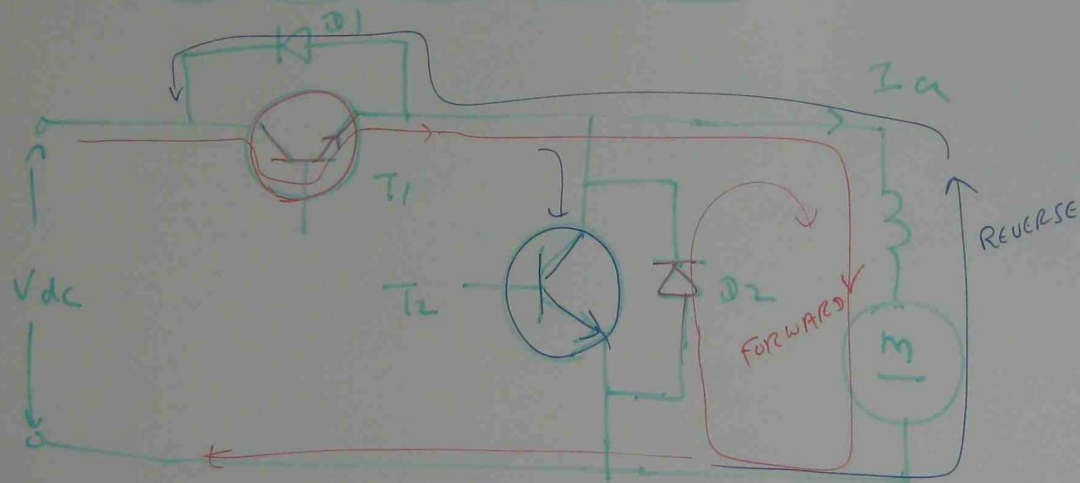
IN S

AC VOLTAGE



CHOPPER CIRCUIT FOR FORWARD DRIVING & BRAKING

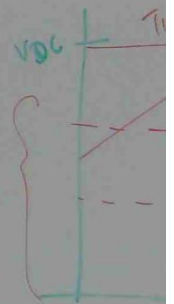
2 QUADRANTS OPERATION



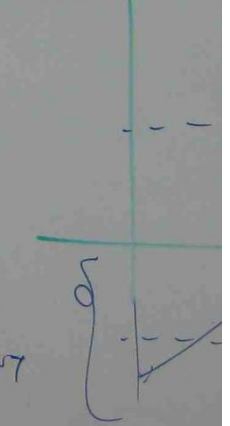
FORWARD DRIVING T_1 ON, D_2 ON

REVERSE BRAKING T_2 ON, D_1 ON

FORWARD



REVERSE



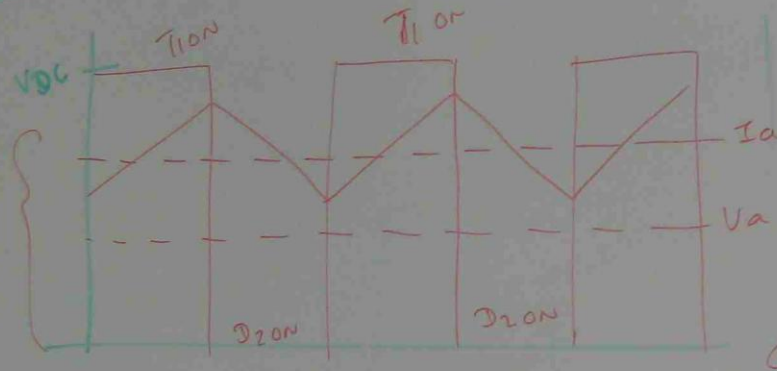
BRAKING

FORWARD DRIVING

2 QUADRANTS OPERATION

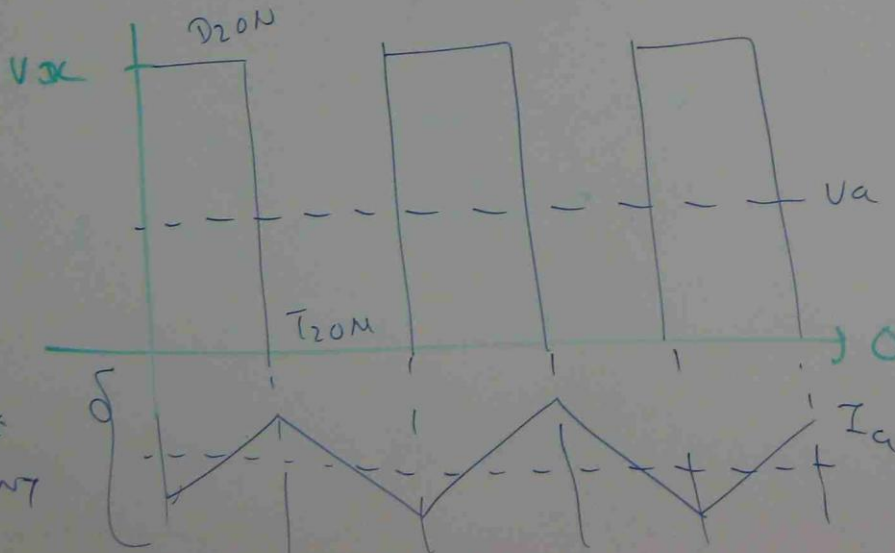
REVERSE

FORWARD
CURRENT



FORWARD
I

REVERSE
BRANKING
IV



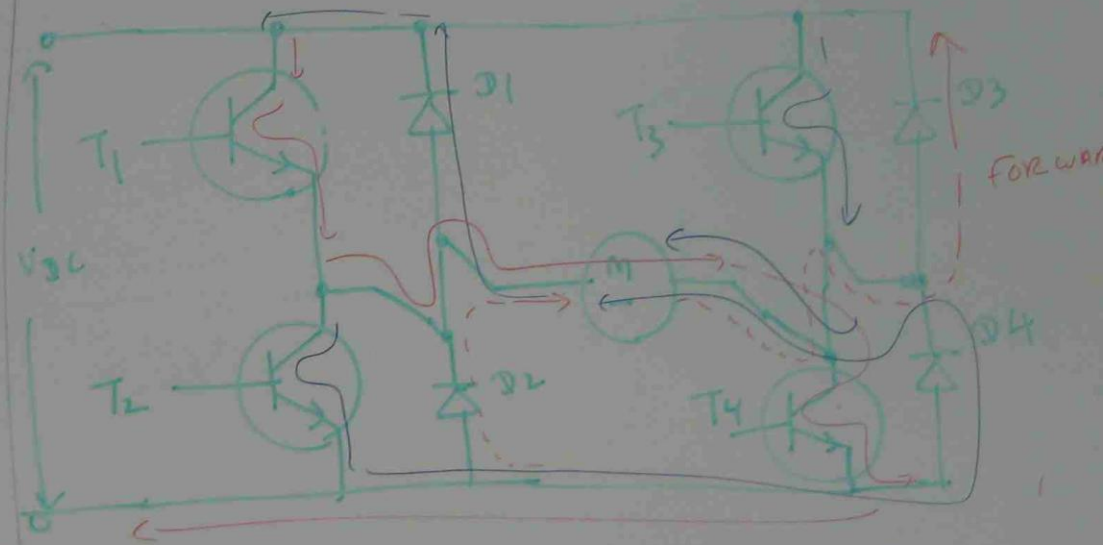
REVERSE
CURRENT

2 QUADRANTS OPERATION

FORWARD I

REVERSE
BRAKING \overline{I}

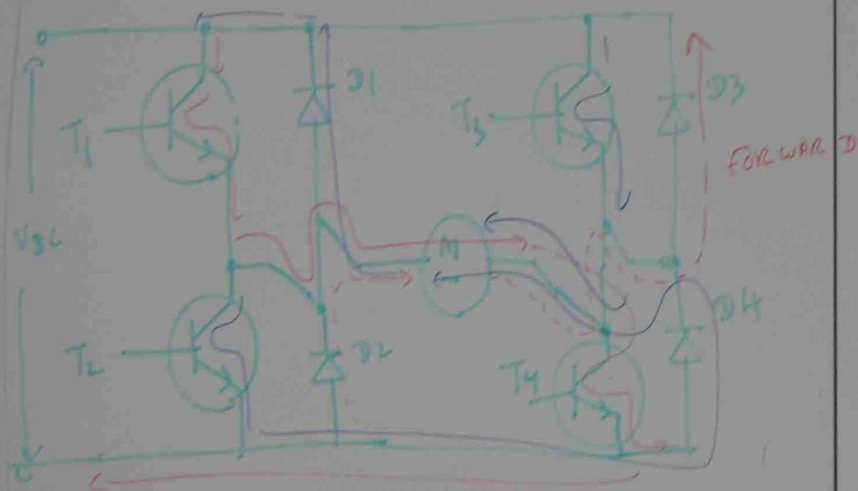
CHOPPER CIRCUIT FOR FORWARD AND
REVERSE, MOTORING & BRAKING



$T_1, D_2, T_4, D_3 = \text{FORWARD}$

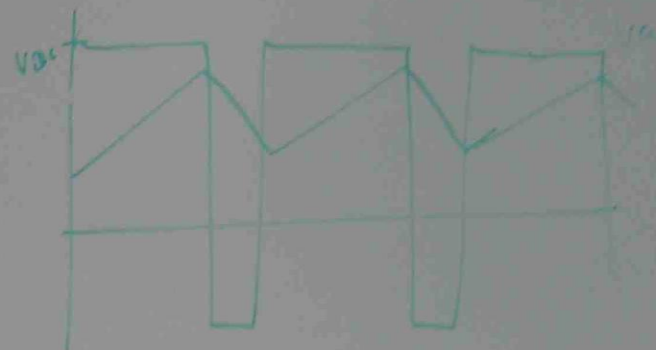
$T_2, D_1, T_3, D_4 = \text{REVERSE}$

CHOPPER CIRCUIT FOR FORWARD AND REVERSE, MOTORING & BRAKING

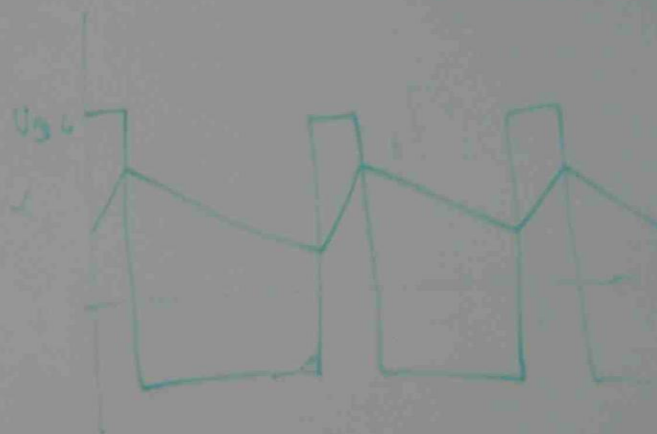


$T_1, D_2, T_4, D_3 = \text{FORWARD}$

$T_2, D_4, T_3, D_1 = \text{REVERSE}$



FORWARD
MOTORING



REVERSE
BRAKING

APPLICATION OF SCR (POWER & SWITCHING SPEED)

APPLICATION	POWER VA	SWITCHING SPEED
POWER LINE	100 MVA	10 Hz \rightarrow 100 Hz
ELECTRIC TRAIN	10 MVA	100 Hz \rightarrow 10 kHz
UPS / motor	1 MVA	500 Hz \rightarrow 50 kHz
motor	10 kVA	50 kHz \rightarrow 100 kHz
CAR	1 kVA	50 kHz \rightarrow 500 kHz
VCR	100 VA	500 kHz \rightarrow 1 MHz

RATING OF POWER SEMI CONDUCTORS

			FREQUENCY
DIODE	GENERAL PURPOSE	5000V / 5000A	1K
	HIGH SPEED	3000V / 1000A	10K
	SCHOTTKY	40V / 60A	20K
THYRISTORS	REVERSE BLOCKING	5000V / 500A	1K
	HIGH SPEED	1200V / 1500A	10K
	REVERSE CONDUCTING	2500V / 1000A	5K
	LIGHT TRIGGERED	6000V / 1500A	400Hz

