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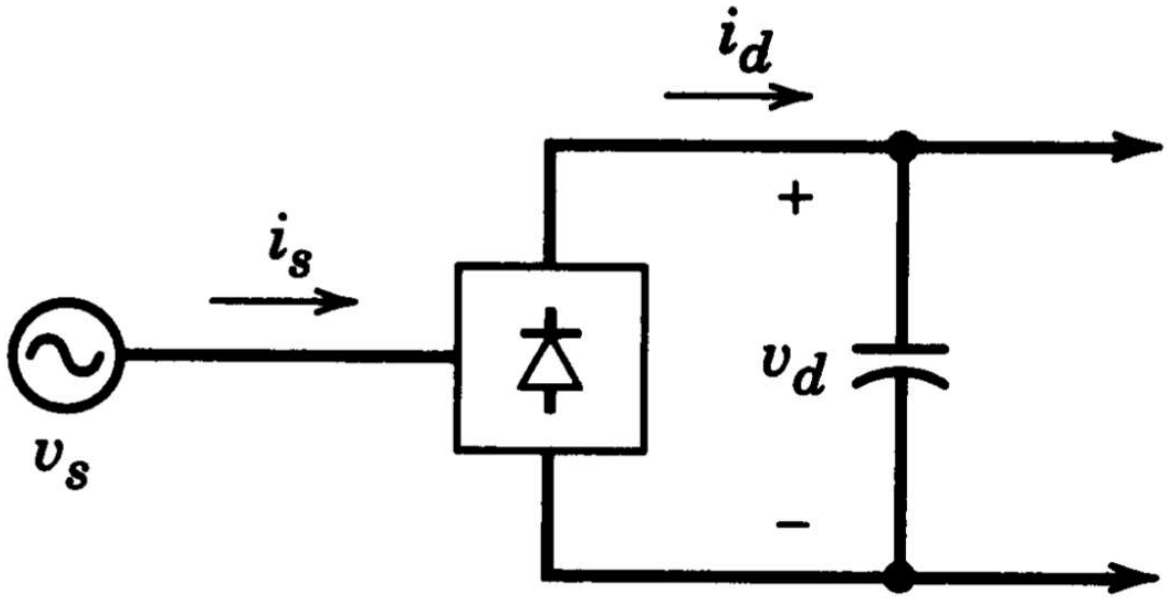
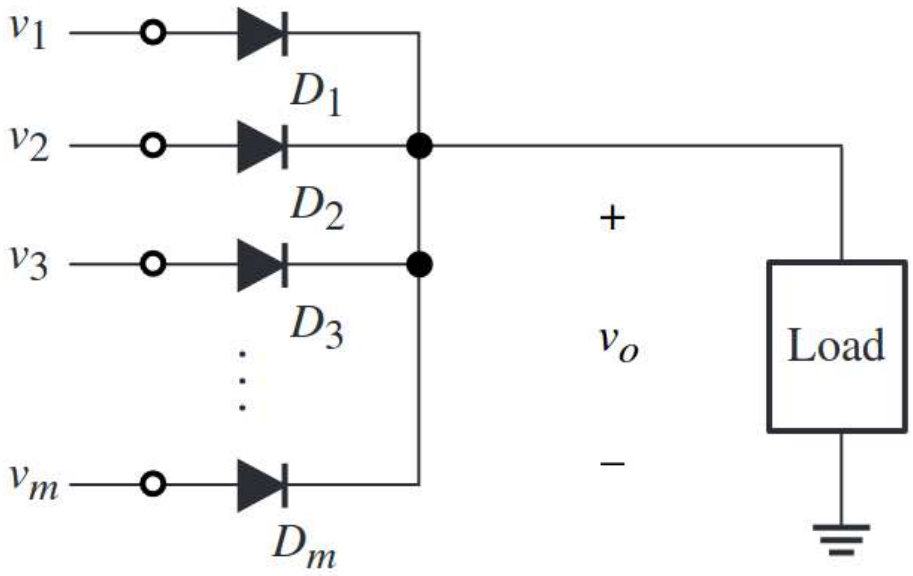
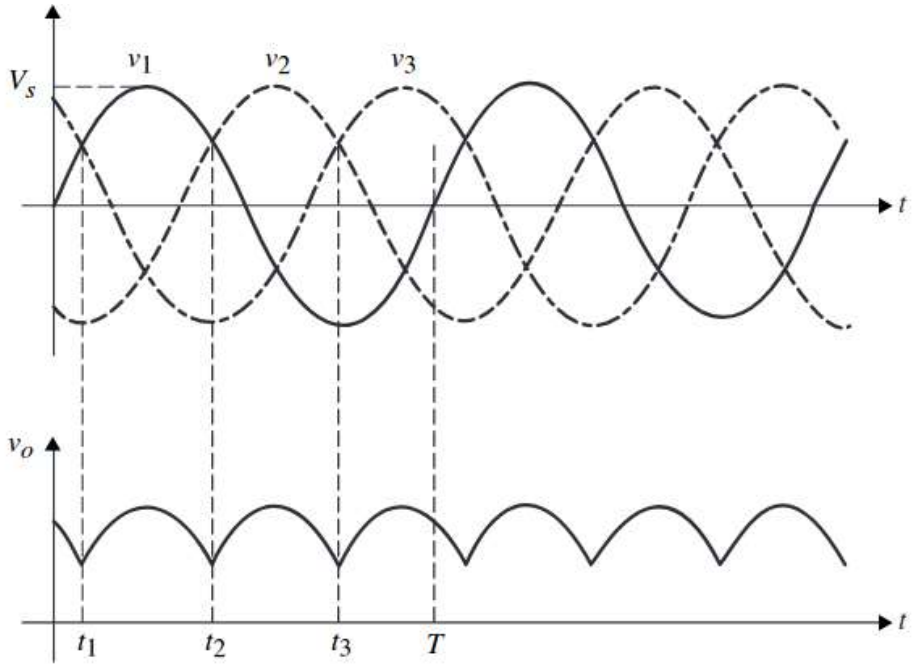
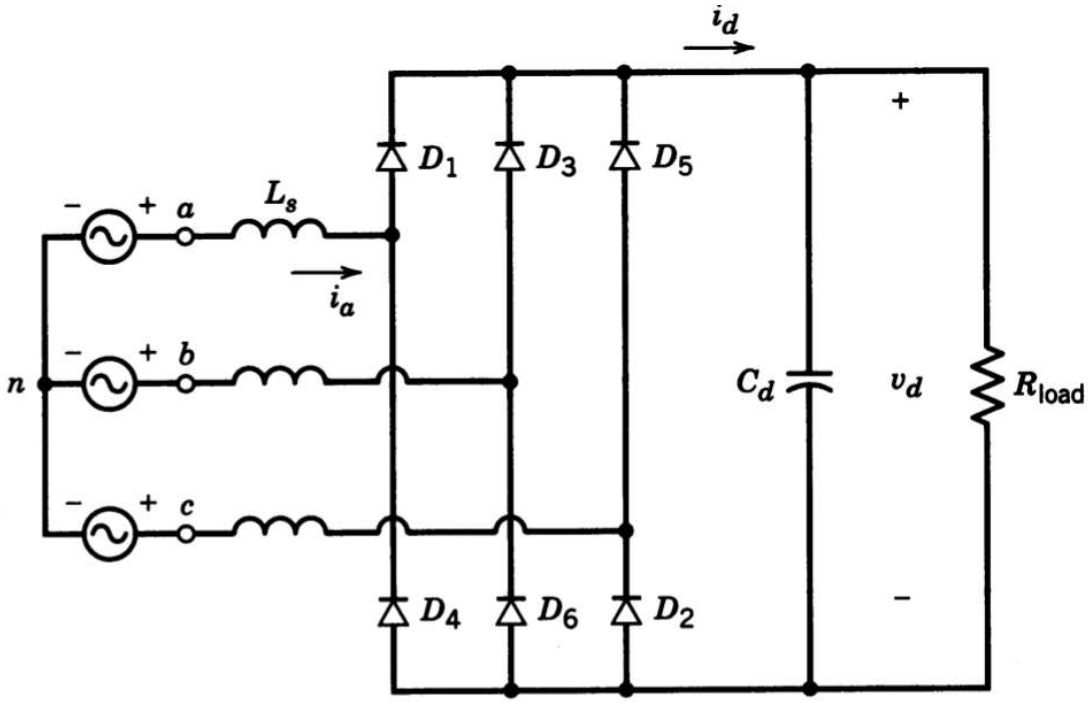
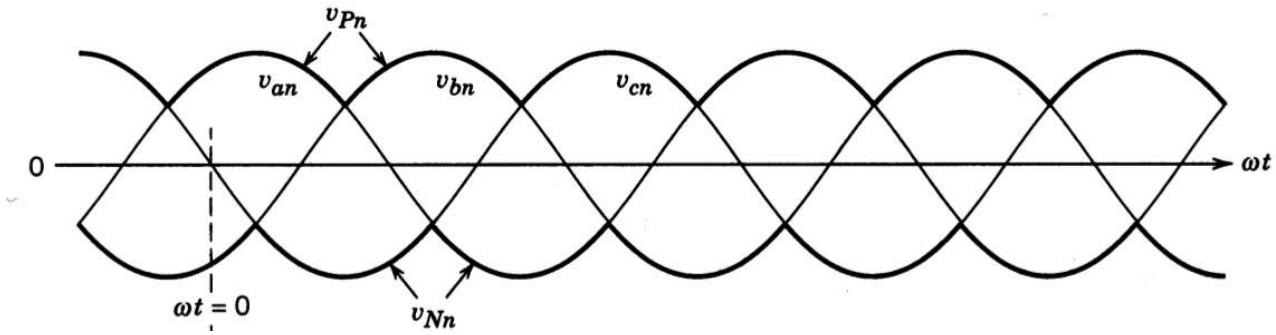

i_d
i_s
+
v_d
v_s
−

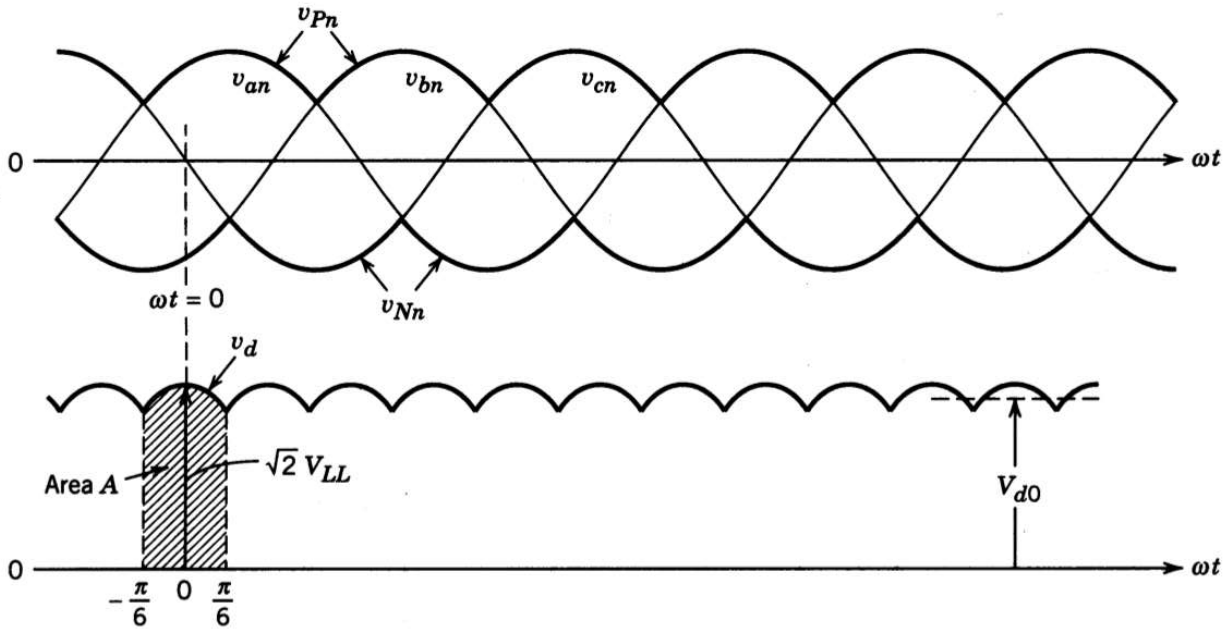

v_1
D_1
v_2
D_2
v_3
D_3
v_m
D_m
+
v_o
−
Load


v_1
v_2
v_3
V_s
t
v_o
t
t_1
t_2
t_3
T

$$V_{dc} = \frac{3\sqrt{6}}{2\pi} V_{rms}$$


i_d
D_1
D_3
D_5
L_s
a
b
c
n
i_a
C_d
v_d
R_{load}
+
−
D_4
D_6
D_2

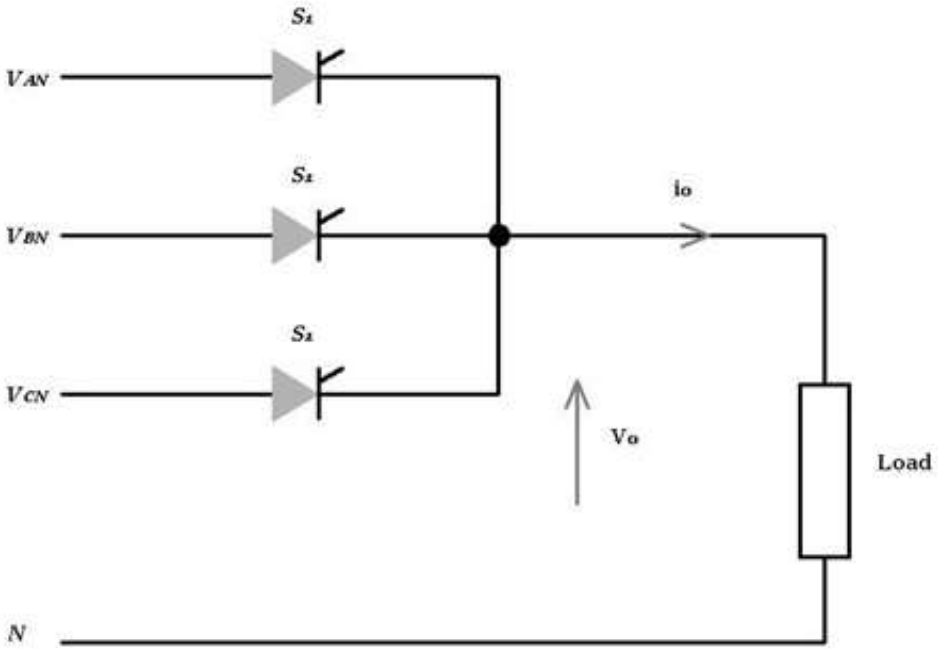

v_{Pn}
v_{an}
v_{bn}
v_{cn}
0
ωt
$\omega t = 0$
v_{Nn}


v_{Pn}
v_{an}
v_{bn}
v_{cn}
0
ωt
$\omega t = 0$
v_{Nn}
v_d
Area A
$\sqrt{2}\,V_{LL}$
V_{d0}
0
ωt
$-\frac{\pi}{6}$
0
$\frac{\pi}{6}$

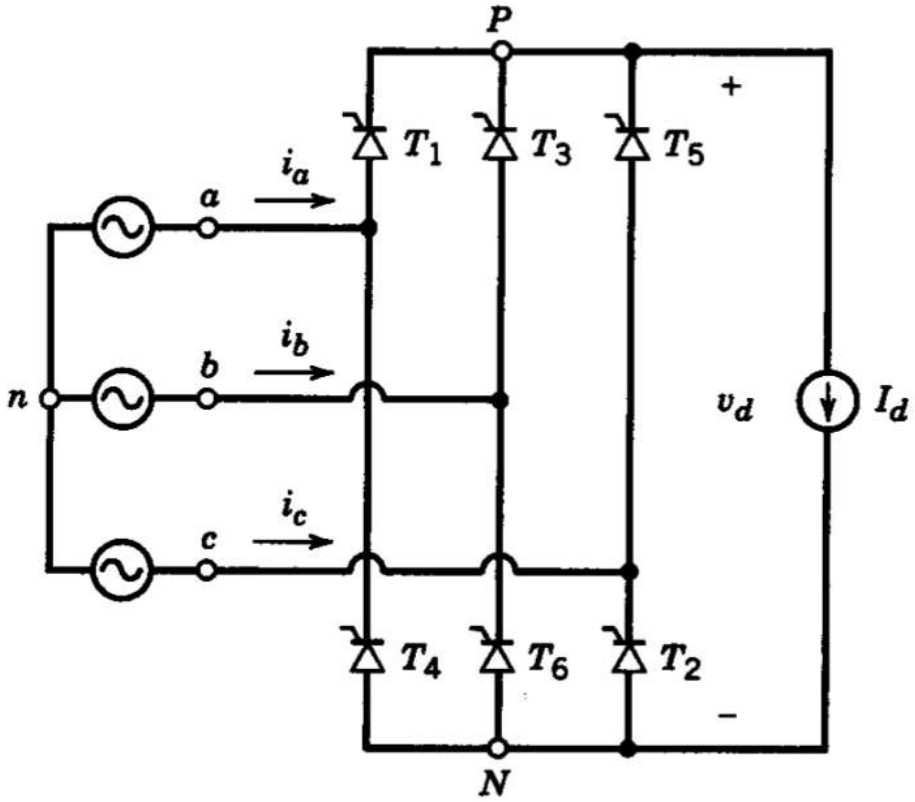
$$V_{dc} = \frac{3\sqrt{6}}{\pi} V_{ph}$$

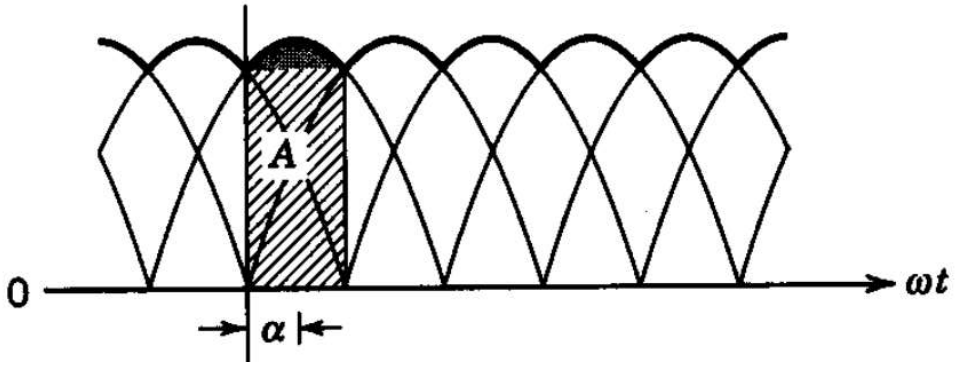
$$V_{dc} = \frac{3\sqrt{6}}{\pi} V_{ph}$$

$$V_{dc} = \frac{3\sqrt{2}}{\pi} V_{l-l} = 1.35 V_{l-l}$$

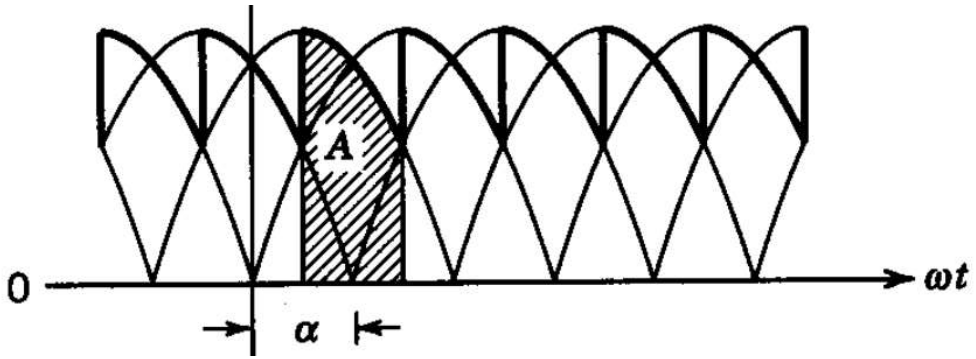

S1
VAN
S2
VBN
io
S3
VCN
Vo
Load
N

$$V_{dc(\alpha)} = \frac{3\sqrt{6}}{2\pi} V_{ph,rms} cos(\alpha)$$

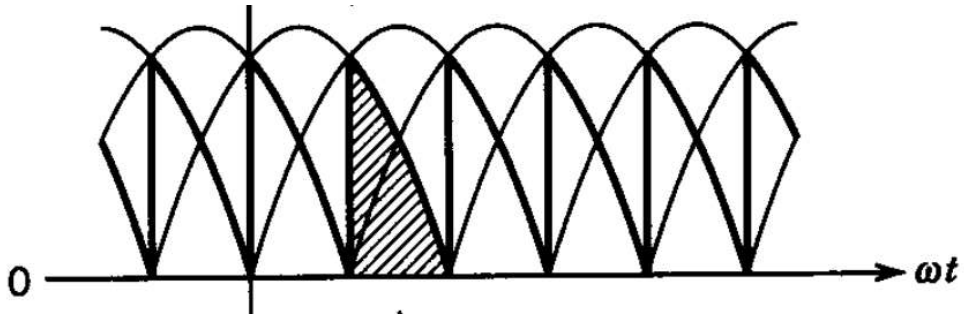

P
+
T_1
T_3
T_5
i_a
a
i_b
b
n
v_d
I_d
i_c
c
T_4
T_6
T_2
–
N



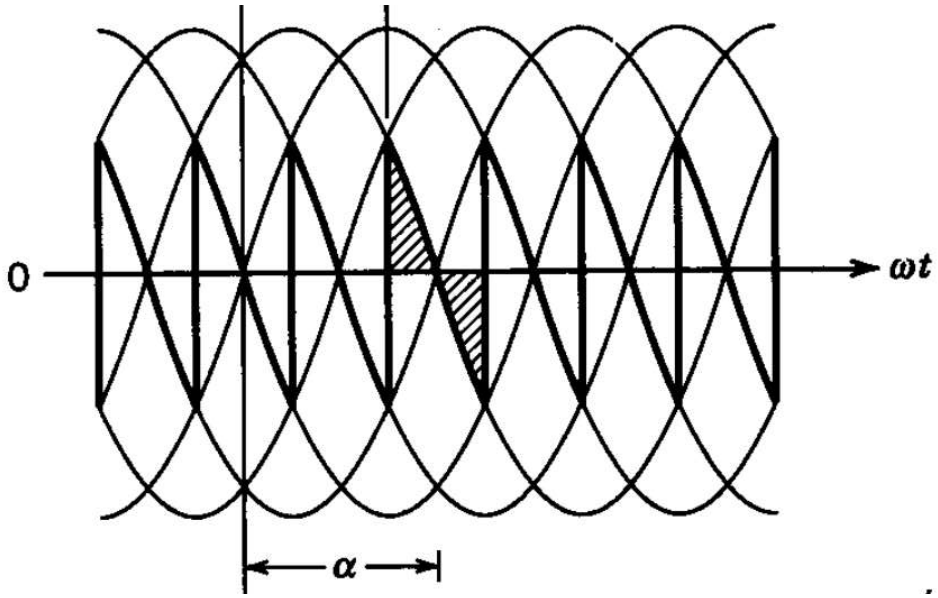
(a) $\alpha = 0$



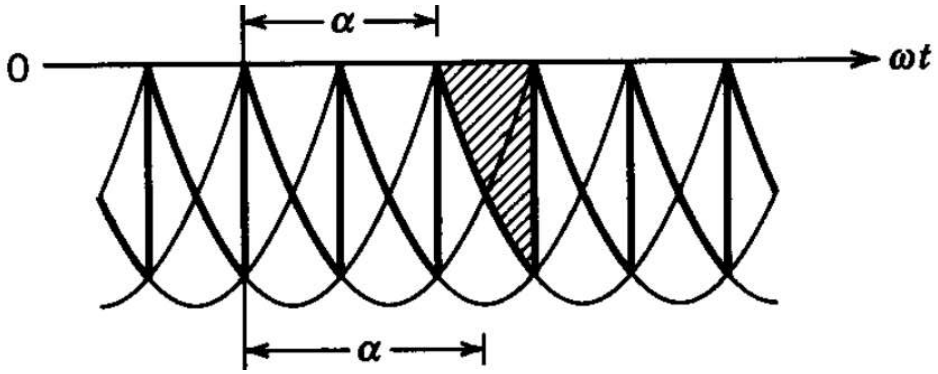
(b) $\alpha = 30°$



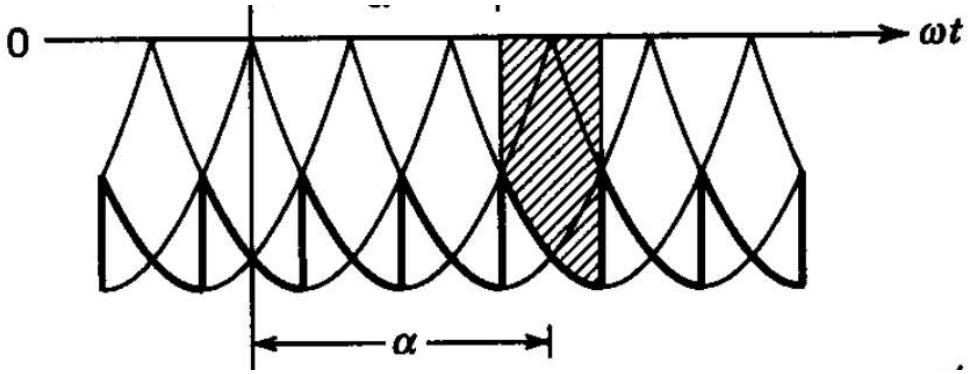
(c) $\alpha = 60°$



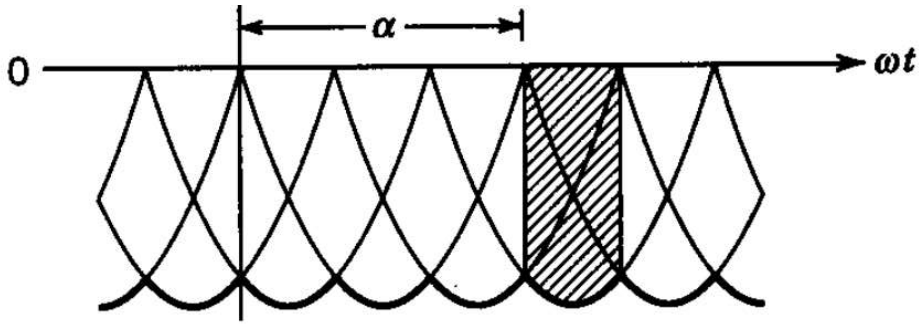
(d) $\alpha = 90°$



(e) $\alpha = 120°$



(f) $\alpha = 150°$



(g) $\alpha = 180°$

S

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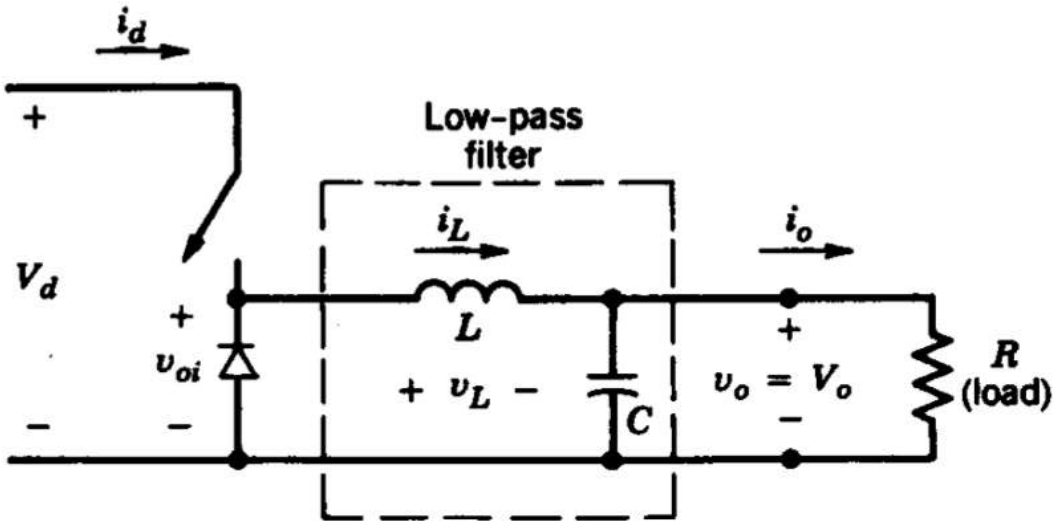
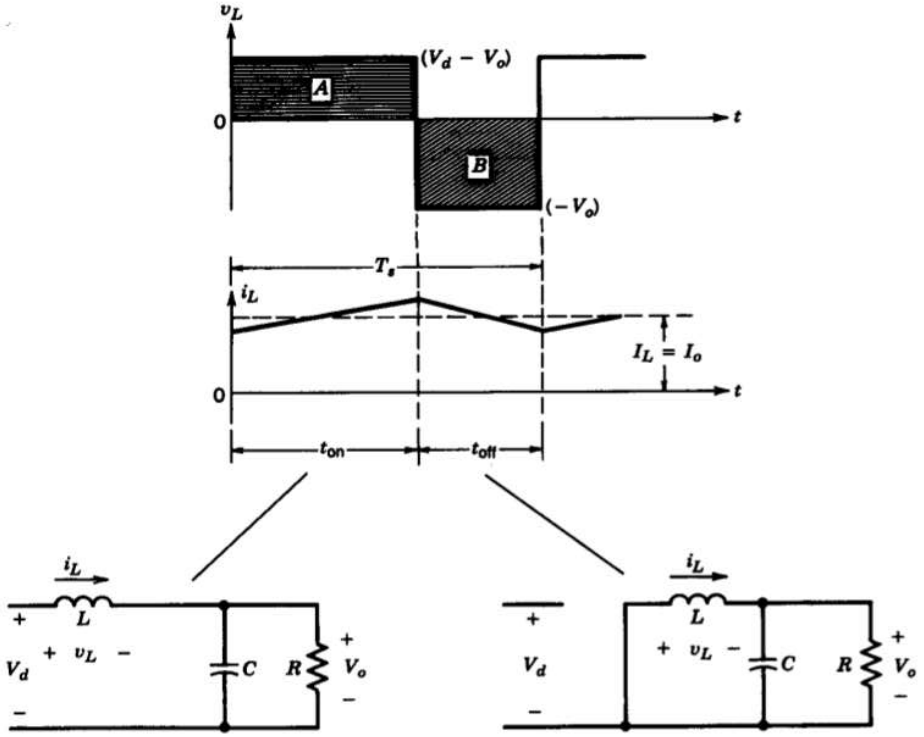

i_d
+
Low-pass
filter
i_L
i_o
V_d
+
v_{oi}
−
−
L
+ v_L −
C
+
$v_o = V_o$
−
R
(load)


v_L
$(V_d - V_o)$
A
0
t
B
$(-V_o)$
T_s
i_L
$I_L = I_o$
0
t
t_{on}
t_{off}
i_L
L
+
V_d
+ v_L −
C
R
+
V_o
−
i_L
L
+
V_d
−
+ v_L −
C
R
+
V_o
−

$$V_o = DV_d$$

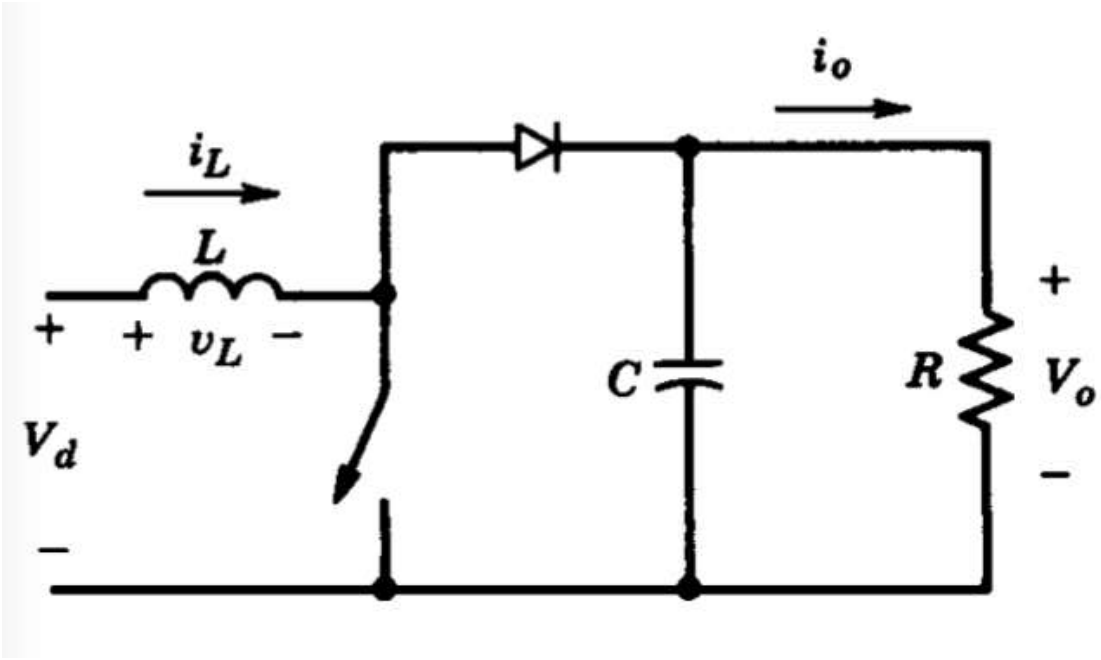
$$V_o = DV_d$$

$$I_o = I_d/D$$

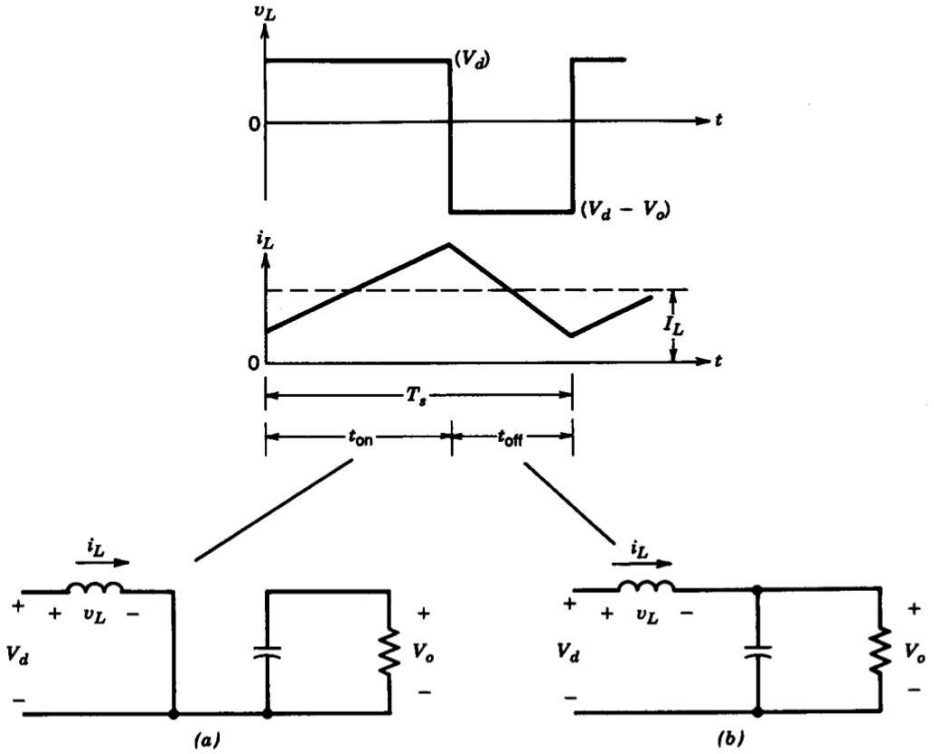
$$\frac{\Delta V_o}{V_0} = \frac{(1-D)T_s^2}{8LC}$$

$$\frac{\Delta V_o}{V_0} = \frac{(1-D)T_s^2}{8LC}$$

$$\frac{\Delta V_o}{V_0} = \frac{\pi^2(1-D)}{2}\left(\frac{f_c}{f_s}\right)^2$$



27 / 35


v_L
(V_d)
0
t
$(V_d - V_o)$
i_L
I_L
0
t
T_s
t_{on}
t_{off}
i_L
+ + v_L −
V_d
−
+
V_o
−
(a)
i_L
+ + v_L −
V_d
−
+
V_o
−
(b)

$$V_d t_{on} + (V_d - V_o) t_{off} = 0$$

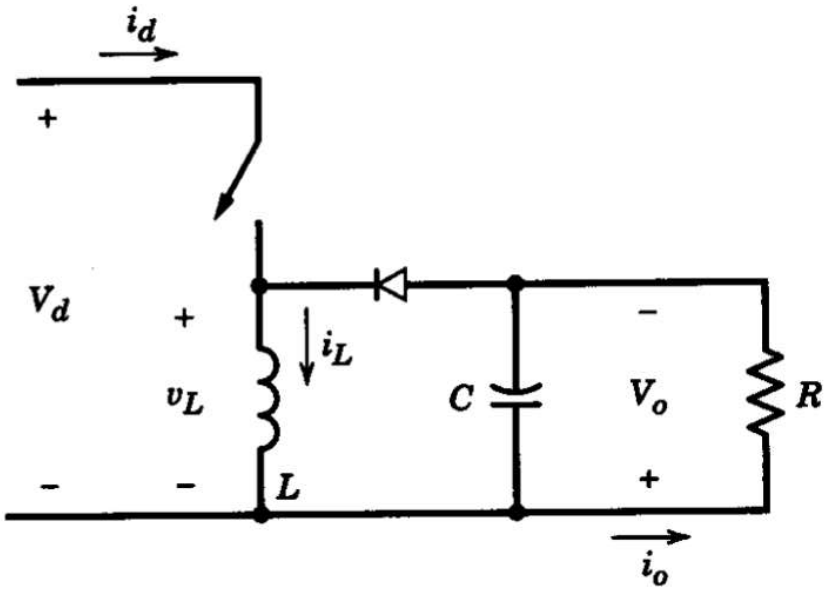
$$V_d t_{on} + (V_d - V_o) t_{off} = 0$$

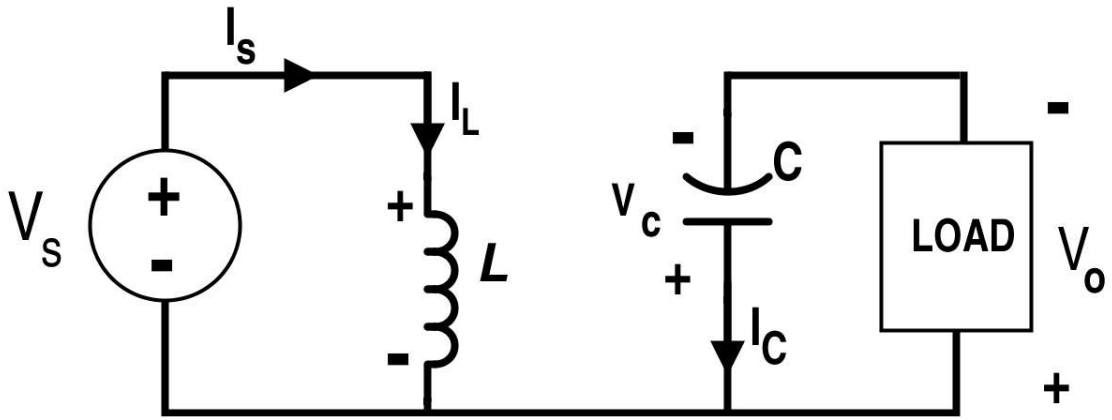
$$\frac{V_o}{V_d} = \frac{T_s}{t_{off}} = \frac{1}{1 - D}$$

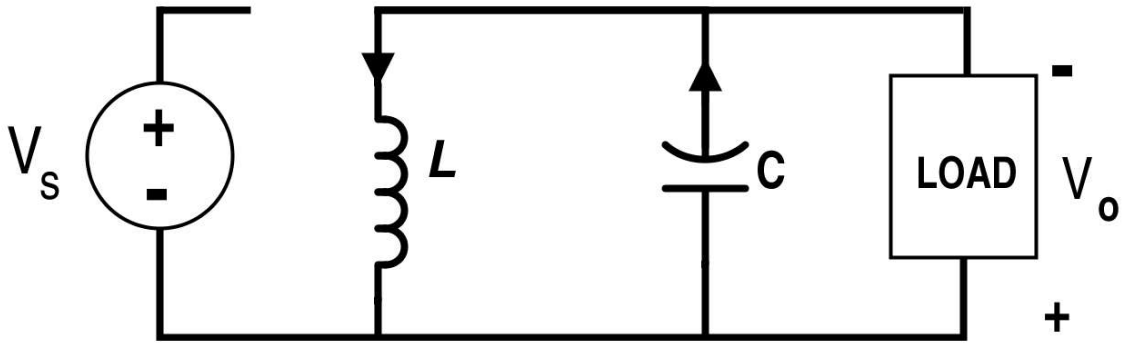
$$V_d t_{on} + (V_d - V_o) t_{off} = 0$$

$$\frac{V_o}{V_d} = \frac{T_s}{t_{off}} = \frac{1}{1 - D}$$

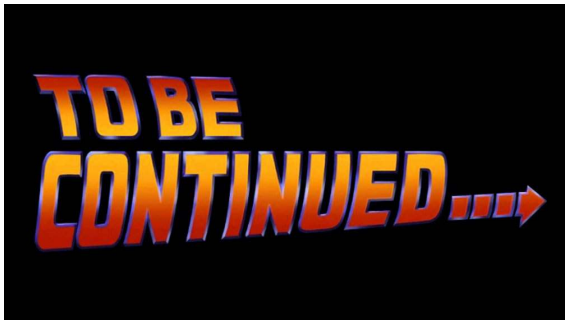
$$\frac{I_o}{I_d} = (1 - D)$$


i_d
+
V_d
+
v_L
−
i_L
L
C
V_o
−
+
R
i_o


I_S
I_L
V_S
+
-
+
L
-
-
C
V_C
+
I_C
LOAD
-
V_o
+


V
S
+
-
L
C
LOAD
V
o
-
+

$$V_o = \frac{D}{(1-D)} V_d$$


TO BE
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