KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF ELECTRICAL ENGINEERING

EE460-01 POWER ELECTRONICS

EXAM : II

DATE : January 2008

PLACE : BLDG. 59-1010

TIME : 5:30-7:00 PM

Student Name: _____

Student ID : _____

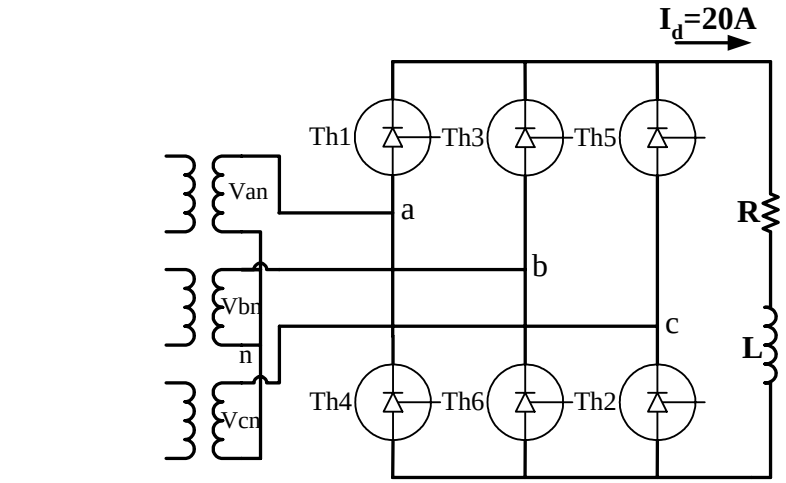
Instructors : Dr. Mahmoud Kassas

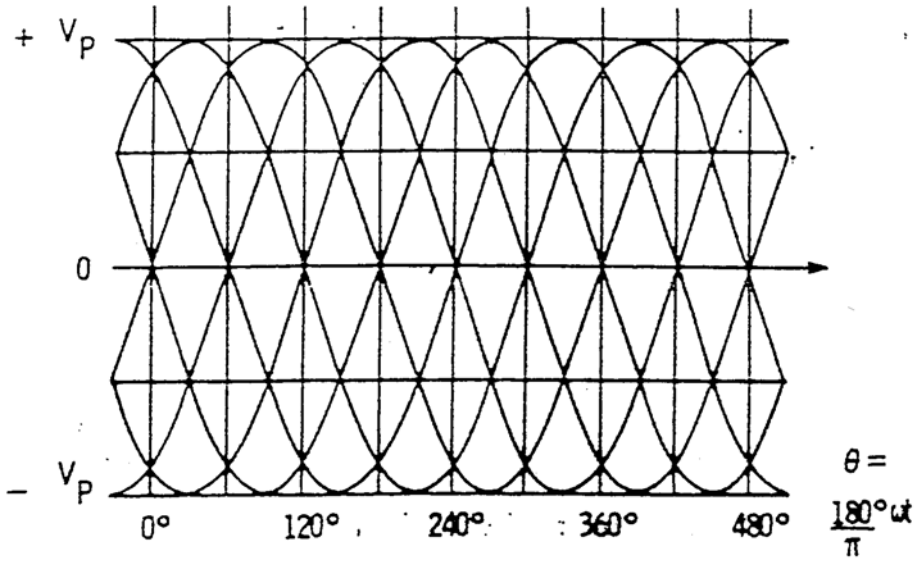
Problem 1	
Problem 2	
Problem 3	
Total	

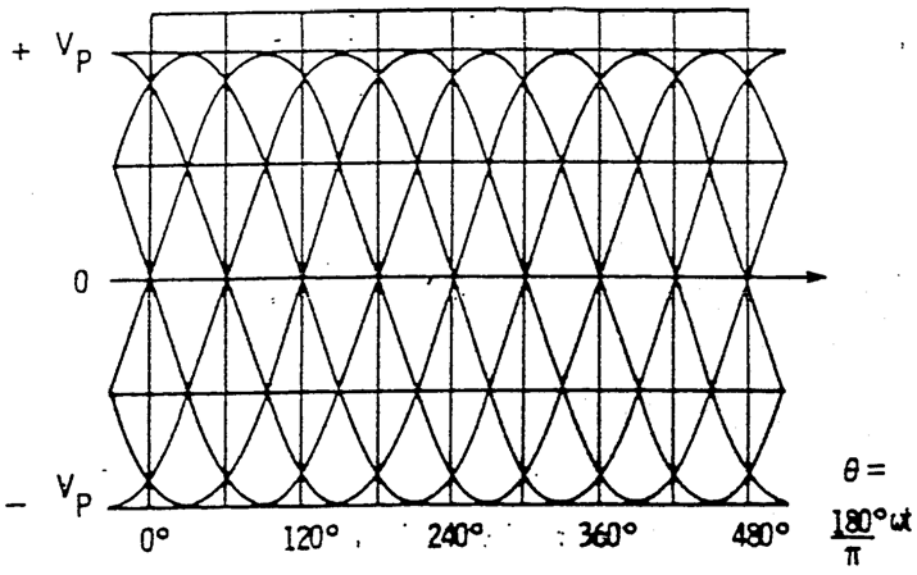
Problem 1 (10 points)

Three-phase bridge controlled rectifier has a highly inductive load. V_s= 220V is the rms phase voltage, f = 50Hz, If $V_{0(rms)}$ = 158.5V, Determine:

(a) The delay angle α. (2 points)
(b) The average output voltage. (2 points)
(c) Draw the secondary transformer input current i_b and find the rms current. (4 points)
(d) Draw the voltage across T_5 and the current through T_6. (2 points)



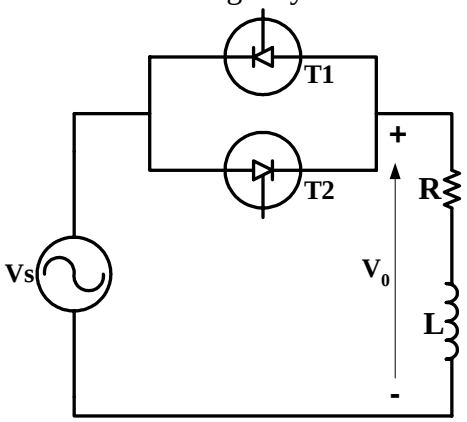




Problem 2: (10 Points)

The single-phase full-wave ac-controller in Fig. 2 supplies an RL-load. The input rms is voltage 220-V, 50 Hz. The load such that L = 31.83 mH & R = 10-Ω. If I_R = 8.25-A, calculate:

(a) The conduction angle γ. (3 points)
(b) Calculate the rms output voltage. (1 point)
(c) The input power factor. (2 points)
(d) Draw the voltage across the thyristor T2 and calculate the peak inverse voltage. (2 points)
(e) Draw the input current and calculate the average thyristor current. (2 points)



Problem 3: (10 Points)

The dc chopper in Fig. 1 has inductive load of R = 10Ω and L = 20mH. The input voltage value is V_s = 220V, f = 5 kHz, E=100V, and k = 0.50. Calculate:

(a) the average load current I_a. (3 points)
(b) the rms load current I_0. (3 points)
(c) the rms value of the chopper current I_R. (2 points)
(d) the effective input resistance R_i. (1 points)
(e) draw the voltage across the diode D_m. (1 points)