EE6301E   POWER ELECTRONICS I

Assignment 1 dated 16th October 2023.

1. Consider the basic full wave diode bridge rectifier circuit with $I_d = 10$ A.

    (a) With $V_s = 230$ V at 50 Hz and $L_s = 0$, calculate average output voltage V_d and the average power P_o. Plot the relevant waveforms and derive the expressions used.

    (b) With $V_s = 230$ V at 50 Hz and $L_s = 5mH$, calculate μ, V_d and P_o
    (c) Repeat (a) if V_s has a 50-Hz square waveform with an amplitude of 200 V

    (d) Repeat part (c) if V_s has the pulse waveform shown in Fig. below.
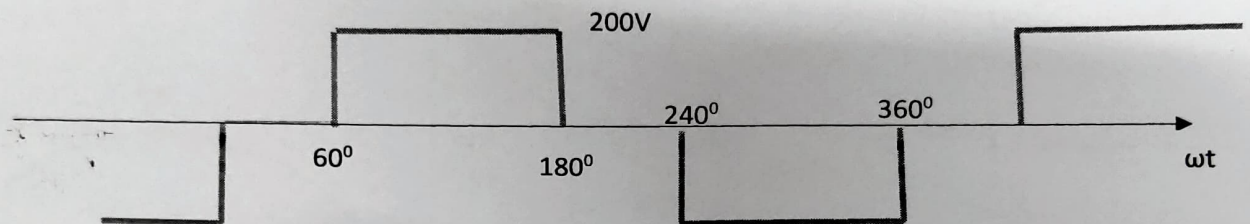
2. A single phase fully controlled bridge converter is fed from a 230V 50Hz supply and the load resistance is R = 10Ω. If the average output voltage is 25% of the maximum possible average output voltage, calculate (a) delay angle, (b) average and RMS output currents, (c) RMS and average current ratings of the switching devices and (d) input power factor

3.   Consider a 3 phase fully controlled bridge rectifier with ripple free load current of 10A from a 440V, 50Hz supply. Gating angle is 30^0 and $L_s = 5mH$

    Plot the following waveforms.

    (a) Load Voltage
    (b) Voltage across any one device.
    (c) Current through any one device.

Calculate average output voltage and peak current and voltage ratings of the devices.