


د/ هادي عبد السلام

الالكترونيات القوية (1)
لغة عربية

Kafrelsheikh University Faculty of Engineering Electrical Engineering Department FINAL EXAM			
Course	Power Electronics (1)	Academic Year	2017-2018
Code	EPM3108	Time	3 hours
Students	3 rd Year Electrical Power Engineering	Mark	90

Answer the following FOUR questions. Assume any missed data

Question 1 (25 Marks): A filter is used to reduce the ripple content of the output voltage for a single-phase full-wave uncontrolled rectifier. The load resistance is $R=40$ Ohm, load inductance is $L=10$ mH, and source frequency is 60 Hz. Design the LC filter so that the ripple factor of output voltage is 10 %.

Question 2 (20 Marks): A single-phase full-wave controlled rectifier is used to charge a battery through an inductive load. The load resistance is 15 Ohm. Draw the waveforms of output voltage and source current, and calculate the average value of output voltage in each case of the following:

- $E = 0, L = 0, \alpha = 90^\circ$
- $E = 0, L = \infty, \alpha = 45^\circ$
- $E = 50$ Volt, $L = \infty, \alpha = 45^\circ$

Question 3 (25 Marks): Explain the sinusoidal PWM control. Show (using Fourier analysis) that the sinusoidal PWM control can eliminate the low order harmonics of source current for a full-wave controlled rectifier with highly inductive load. Assume values for the firing angle and width of each pulse. Assume four pulses per half cycle. Draw the spectrum diagram until the 7th harmonic.

Question 4 (20 Marks): Explain the principle of operation of three-phase full-wave controlled rectification. Your answer must include: circuit diagram, output voltage waveform, phase voltages equations, line voltages equations and average output voltage.