Menoufia University
Faculty of Engineering
Dept. of Electrical Engineering.
Date: 31 /5/2017
Total Marks: 100

Final Term Exam
Academic Year: 2016-2017
Post graduate Students (Ph.D)
Allowed Time: 3 Hours

جودة القدرة فى نظم القوى الكهربية

Subject/Code: **Power Quality in Electrical Power Systems / ELE 715**
This exam measures ILO's no. (A1, A3, A5, B1, B2, B3, C3, C4)
Remarks: No. of pages: 1 No. of questions: 4
Allowed Tables and Charts: (None)

Answer All The Following Questions:

Question 1 [25 Mark]

a. What is the common definition of power quality? Describe the following terms: Crest Factor – Distortion factor – Flicker – Form Factor – Interruption – Isolation – Notch – Power Factor (displacement) – Power Factor (total) – Sag – Swell – Transient.
b. Explain the characteristics of voltage dip its sources and list three solutions to mitigate its effect.

Question 2 [25 Mark]

a. What is the main sources of voltage unbalance in electrical grid? List two methods for compensating voltage and current unbalance in electrical grids using power electronic devices.
b. Harmonics have always been present in power systems due to the widespread use of power electronic systems. List three sources of harmonics and explain their contributions on generating harmonics.

Question 3 [25 Mark]

a. Three phase rectifiers are one of the main sources of harmonics. Explain the current waveforms for various types of converters explain the difference between 6 pulses and 12 pulses converters in terms or harmonic order generation.
b. Active and Passive filters are commonly used to mitigate harmonic in industrial network. Explain the filter system used for mitigating harmonics produced by dc-drives. List the draw backs of using passive filters and explain the theory of Shunt active power filter and its purpose.

Question 4 [25 Mark]

a. Power converters are widely used in industrial networks, explain the impact their loads and how to reduce their effect on motors.
b. What is the impact of non-ideal grids on operation of power converters? Explain Ride-Through term and how converter design could play an important rule to rid-through during grid faults.

With best wishes
Prof. Elwy E. El-kholy