EE6508

**Nanyang Technological University**

**Semester 2 Quiz 2019-2020**

**EE6508 – Power quality**

**Student Name:**

**Student ID:**

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**Submission Location: S2-B2C-109**

**Instructions**

1. This Quiz contains 2 questions
2. Answer all the questions.
3. All questions carry equal marks.
4. Unless explicitly stated, all symbols have their usual meanings.
5. (a) Explain the concept of power quality, and provide an example to demonstrate your

understanding of power quality.

(2 Marks)

(b) Figure 1 shows a three-phase, 50-Hz distribution with a shunt capacitor bank of about

40 MVAr. During sudden switching of the capacitor bank, which was empty before

switching, the maximum transient voltage across the capacitor bank reaches to 100kV

with a frequency of 400 Hz.

1. Calculate the unknown voltage (x) in kV.
2. Calculate the unknown (y) short circuit capacity in MVA at Bus A.
3. Calculate the surge impedance.

(3 Marks)



**Figure 1**

1. An industrial 415 power supply is used to power the three-phase, 100-kW induction

motor. The motor is rated with a full-load efficiency of 92% and the power factor of 0.88

lagging. The starting current of this motor is about five times of the full load value. When

the motor starts, the voltage dip at the motor terminals is 40%. A second power source

is used to enhance the security of supply to the motor, with the source impedance 6

times the source impedance of the original power supply.

1. Calculate the short circuit capacity (SCC) at the motor terminals before and after the supply reinforcement.
2. After the supply reinforcement, find the amount of voltage variations at the motor terminals, when the motor is being switched ON and switched OFF