**MODILIM TOCHUKWU ADRIAN**

**17/ENG04/041**

**ELECTRICAL/ELECTRONICS ENGINEERING**

**ASSIGNMENT 2**

**DEADLINE FOR SUBMISSION – MONDAY 4TH MAY 2020 0N THE PORTAL**

**Question 1:** Discuss the effects of harmonics on synchronous machines (hint” identify the harmonics,

 state how they affect synchronous motors; state how they affect synchronous generators)

Answer:

Harmonics is the steady state of distorting the fundamental frequency. With the increasing concern of the effects of harmonic distortion and the lack of documentation of harmonic problems associated with synchronous machines, it is imperative that work to understand the effects of harmonics on synchronous machines be accelerated. This paper evaluates the voltage regulation of a synchronous generator with sinusoidal and distorted voltage waveform conditions. A motor-generator set is employed as an integral part of the power system simulator to supply power to various loads during the performance of the test. Harmonic distortion is introduced by connecting nonlinear loads to produce distorted voltage and current waveforms. To record the electrical and mechanical quantities, a data acquisition system is used. All data acquired is saved for future use in analysis and reporting. The test results show that the voltage regulation of a synchronous generator under various load conditions is related to the different level of harmonic distortion produced by the load. This research provides useful data to develop harmonic standards with better understanding of the impact of harmonics on equipment operation

**Question 2 :** Justify technically why the stator windings of large generators are star

 Connected

Answer:

The **stator winding** of an alternator is generally **connected** in **star** so as to obtain neutral which is properly earthed at the generating station. At the sub-stations, the neutral point of the **star**-**connected winding** of transformer is also earthed. Thus neutral completes its path through the earth.

Large machines are usually designed for a terminal voltage of several thousand volts. Each stator coil may therefore contain a number of insulated turns of conductor, and each stator winding usually consists of a number of similar coils placed in sequential slots in the stator surface and connected in series

**Question 3:** Why is it that the armature for large machines is stationary?

Answer:

It is quite simple to understand why is armature winding stationary.

As when you work with an electrical machine such as motor whether it will DC or AC , synchrones or induction you will always want 100℅ output and this output depends on some advantageous conditions or factors.

So, in the same sense “the armature winding is stationary because of some advantages” listed below:-

* It is easier to collect current through bruses from stationary armature in case of generators.
* When armature winding is stationary and field winding rotates we get more output as field winding is quite lighter than armature winding.
* There is less chances of sparking in stationary arm. Winding comparatively to stationary rotor.
* Commutation is a problem in rotatatory armature.
* As armature winding is stationary the natural cooling is more effective.
* As rotating winding is field winding which is comparatively light so chances of wear and tear is less.

 **Question 4:** Why do brushless generators undergo less maintenance

Answer:

This is because it has fewer wear parts so less maintenance is needed

The proposed **brushless** system have benefits of **reduced** regular **maintenance** due to elimination of brushes and **reduced** unscheduled **maintenance** due to redundancy; causing a redused cost-of-energy