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MATRIC NO.: 17/ENG04/070

DEPT.: ELECTRICAL ELECTRONICS ENGINEERING

COURSE CODE: EEE 326

COURSE TITLE: ELECTRICAL MACHINES II

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)

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

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?

- For large machines (designed to deliver many thousands of volts), the armature is stationary due to difficulties that would arise in insulating the rotor

Question 4: Why do brushless generators undergo less maintenance

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