

Graduation Design Project Proposal Form

Project # P5

Project Title: Design of Grounding Grid for a 132-KV Substation in High Resistivity Area
Professor(s) Name(s): 1. Dr. Yasin Khan 2. Prof. Abdulrehman Ali Al-Arainy
Number of Students: Two
Students Qualifications The students should have basic knowledge of electrical power and having good academic background in High voltage/power systems and grounding
Statement of Problem Grid grounding is an established technique used to ensure the safety of grid equipment and individuals. Over time, air insulated substations have been upgraded to GIS substations. The compact size of substations and the enhanced voltage levels due to increments in load consumption make the substations vulnerable to electric shocks. Grounding grids are necessary to achieve minimal impedance values and enable fault currents to flow easily toward the ground, thereby limiting potential surges to substation equipment and promptly clearing all types of transient surges. In general, ground grid impedance should be less than $1-5\Omega$. Moreover, grounding a grid allows the installed equipment and protective devices to perform properly and safely. For electrical equipment, such as power transformers, capacitor banks, reactors, and auxiliary station transformers, safety and reliability are top priorities. To achieve stability for such equipment, neutral point grounding is essential. The integrity of the grounding grid under both normal and faulty conditions enables the continuity of service and ensures personal safety in a facility by limiting the danger of electric shock. To achieve reliable and cost-effective grid grounding, several factors should be considered.
Brief Description of the Project In this project a complete grounding design procedure for a 132-kV substation in the Riyadh area will be conducted based on IEEE-80 specifications and local standard practices in the Kingdom of Saudi Arabia. To ensure a safety ground grid design, local Saudi Electricity Company (SEC) standard design constraints will be used. A suitable computer software will be used to design a suitable grounding grid. The calculated results will be compared to the standard values of ground potential rise, step voltage, touch voltage and soil resistance.
Objectives <ol style="list-style-type: none">(1) Understanding grounding of power system(2) Modelling of grounding grid using suitable software(3) Design and build a prototype grounding grid and study the impact of various parameters

(4) A comprehensive Report writing

Technical Approach and Expected Deliverables

The students should understand the main types of grounding grids for different types of faults in the MV/HV transmission system, factors affecting the efficiency of grounding grid and its performance, data acquisition and its analysis.