LAB NO: 5

PERFORMING LOAD FLOW ANALYSIS USING ETAP SOFTWARE

Objective:

The main objective of this lab is to study the basic use of ETAP software and perform load flow analysis.

Theory:

ETAP:

ETAP stands for Electrical Transient Analyzer Program. It is one of the advanced software used for power system planning, designing and operation. It is very user friendly and requires very less simulation time. It provides data exchange interfaces including MS Word, MS Excel and PDF etc.

Important Features of ETAP:

Single line diagram can created very easily. Infinite number of buses can be added in single line diagram of the Grid structure. It has the capability to perform various types of analysis given below.

- • Load flow studies
- • Short circuit Analysis
- • Harmonic Analysis
- • Optimal power flow analysis
- • Reliability Assessment
- • Star analysis of protection devices
- • Transformer sizing and MVA capacity

Load Flow Analysis:

Load flow study is a numerical analysis of the flow of electric power in an interconnected system. For notation of load flow, single line diagrams are usually used with per unit system. It focuses on the various aspects of the AC parameters such as voltages, voltage angles, real power and reactive power. It analyzes the power system in normal steady-state operation. Power flow study is very important for future expansions of power system. Gauss-Seidel and Newton- Raphson are the various techniques used for load flow studies.

How to Start ETAP?

- •   First install ETAP in your system.

- •   Click on ETAP shortcut icon available on desktop after installation.

- •   After that, Open New Project.

- •   Enter Project File Name and Unit System.

- •   Enter Full Name and Description.
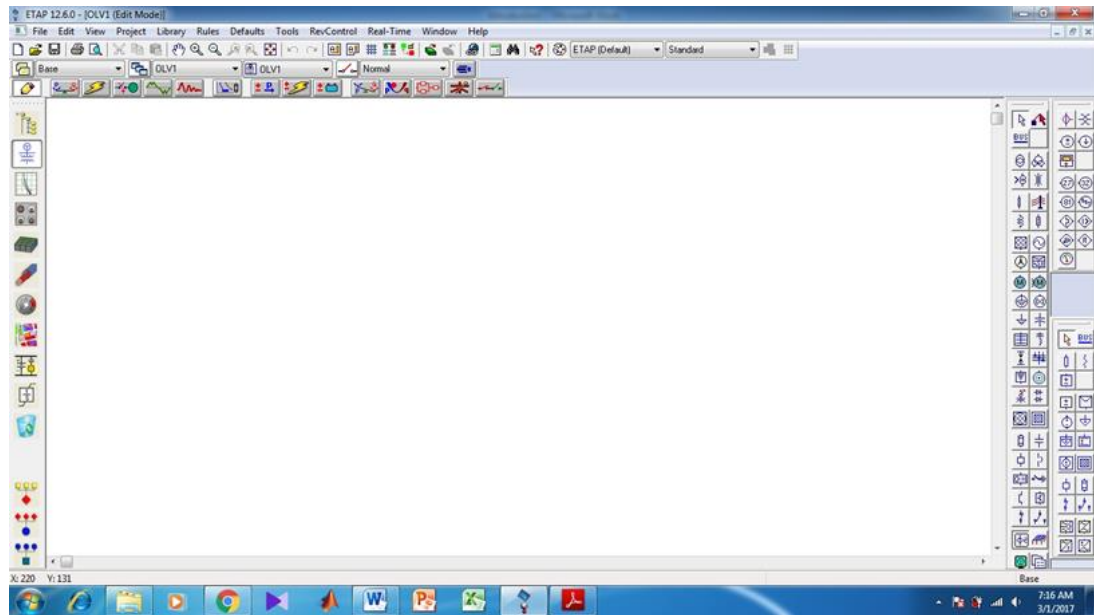
**Figure 5.1: ETAP Main Window**

Different Toolbars in ETAP:

On the main page we have different toolbars such as

- •   Project toolbar

- •   System toolbar

- •   Mode toolbar

- •   Presentation toolbar

- •   Real toolbar

Performing Load Flow Analysis:

- • Select Power Grid and bring it to Main Window.

- • Open power grid properties and provide information of power grid.

- • Then drop busbar into the main window.

- • Then open busbar properties and enter its required data.

- • Then connect the grid with the busbar.

- • Then drag the two winding transformer into the main window and enter its values.

- • Then connect transformer to the busbar.

- • Then drag a cable to the main window and enter its values and connect it to busbar.

- • Then drag a lumped load to the main window and connect it with the transformer.

- • To start load flow analysis, click on run load flow button.

The simulation of the single line diagram is shown in the figure below:
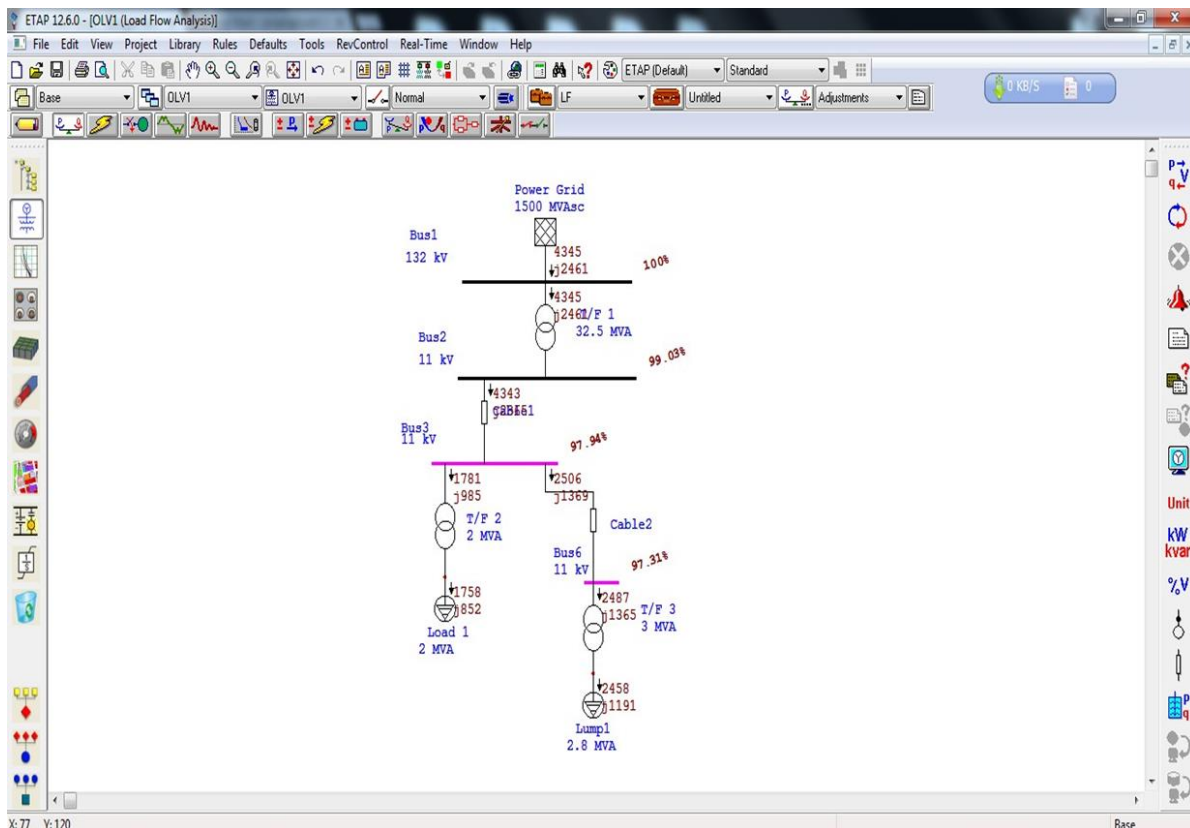
Figure 5.2: Simulation of Load Flow

POST LAB QUESTIONS:

Q1: Why is ETAP preferred over other simulation softwares?

Q2: What is meant by single line diagram?

Q3: Write down the names of different types of busbar arrangement used in substation.

Teacher Remarks:

Obtained Marks: / 10