

King Fahd University of Petroleum & Minerals

Electrical Engineering Department

Study and Design Project for EE-520 (141)

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Objectives

1. The goal of this project is to conduct a five year plan for the 26-bus system of problem 6.14 of the text book in order to
 - ❖ maintain a voltage profile for all load buses within plus/minus 5% of the normal operating voltage level.
 - ❖ observe and maintain the lines MVA thermal limit.
 - ❖ keep the total system losses at the minimum possible.
2. To design and plan for the short circuit capacity for the given system.

Project Steps

A. Enter the system data for the given power system given according to the given format. Obtain the power flow solution of the **BASE CASE** by the following methods:

1. Gauss-Seidel power flow (for student #1 in the Group).
2. Newton-Raphson power flow (for student #2 in the Group).
3. Fast-Decoupled power flow (for student #3 in the Group).

Compare between the three solutions techniques. Plot and comment on the voltage profile (for all students in the Group). (20%)

Consider the load increase of **5% + two digits of your group number** annually for the next five years with the corresponding generation increase. At the beginning of the second year, generator at bus # 2 must be relocated at a different appropriate location. It is required to meet all the conditions of objective 1 (for every student in the Group). (5%)

Repeat the above change for generator at bus # 3 at the beginning of the third year, for generator at bus # 4 at the beginning of the fourth year, for generator at bus # 5 at the beginning of the fifth year (for every student in the Group). (15%)

B. Define the worst transient fault location in the network for the **BASE CASE** and for the **5th YEAR CASE** using

1. **symfault** for the given system (for student #1 in the Group).
2. **lgfault** for the given system (for student #2 in the Group).
3. **dlgfault** for the given system (for student #3 in the Group).

Summarize the overall results in a table-form (for all students in the Group). (20%)

Use the generator data in the table below.

Gen No.	X_d' + 0.two digits of your group number
1	0.05
2	0.25
3	0.4
4	0.2
5	0.1
26	0.25

Final Report Format: A written and bounded report along with all used program in disk is required (one report for the Group). (20%)

Oral Presentation: (every student in the Group should participate) (10%)

Personnel Exam: (10%)

Notice:

- **For MVA Thermal Limits:** Take the MVA flow of the base case (of NR method) and multiply it by 1.3, and use it as the thermal limit for each line in the system.
- **For possible resolution** to meet the conditions of 1st objective, consider the following options:
 - 1) Adding another circuit to an existing line will take two years.
 - 2) Adding a new line will take three years.

Group Formations and Regulations:

- A group must be 2 or 3 students.
- Names for each group must be provided by a selected “group leader” by Nov. 5th.
- Group numbers will be provided after receiving all group names on Nov 5th.
- The report must be FORMAL and well written in MS word.
- The program must be well documented with proper comments explaining the steps to be conducted as per the project requirements.
- Presentation will be done by each group in front of the class (12-15 minutes).
- Individual Exam will be done in the office (3-5 minutes).

Due Date: Dec. 10th 2015

Presentations and Personnel Exams: Starts Dec. 15th until end of term.