KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

ELECTRICAL ENGINEERING DEPARTMENT

EE-463 Project

Semester (071)

The line-data and bus-data of a 9-bus system are given below.

Line-Data

From-To	Impedance (per unit)	Total Line Charging (per unit)	Tap Position (per unit)	MVA Rating
1-4	j0.0576		1.02	150
2-7	j0.00625			200
3-9	j0.0586		1.01	150
4-5	0.01+j0.085	j0.088*2		100
4-6	0.017+j0.092	j0.079*2		50
5-7	0.032+j0.161	j0.153*2		150
7-8	0.0085+j0.072	j0.1045*2		100
8-9	0.0119+j0.1008	j0.1045*2		75
6-9	0.039+j0.17	j0.179		100

The impedances are on 100 MVA base.

Bus-Data

Bus Code	Bus Voltage (per unit)	P_G (MW)	Q_G (MVAR)	P_L (MW)	Q_L (MVAR)	Q_{min} (MVAR)	Q_{max} (MVAR)
1	1.04+j0.0	-	-				
2	1.025	163	-				60
3	1.025	85	0				20
5	-			125	50		
6	-			90	30		
8				100	35		

Use the Power World Simulation Package (the latest version can be downloaded from www.powerworld.com) to simulate the above system indicating the following:

- The single line diagram of the system including the circuit breaker at both ends of every line.
- The voltage (p.u.), generation (MW and MVAR), and load (MW and MVAR) for each bus, where applicable.
- The line-flows (MW and MVAR) at both ends of every line.
- The line-flow pie chart at both ends of every line.

Perform the following tasks:

- Run your **own case**[**] for a simulation time of 2 hours (7200 seconds) and simulation speedup of 60 seconds.

- Use the load variation graph to simulate a varying load from 100% (using the base case) to 200%.

- Show the animated flows on the single-line diagram.

- Enforce the line overloads to check the line limits.

- Detect and record any system's abnormality during the simulation time (e.g., bus voltages outside 5% range of the nominal values, overloaded lines, …etc.).

Introduce at least two different remedies for the problems detected earlier to ensure a normal operation of the system during the simulation time.

Write a formal typed-report showing the following items:

- The single-line diagram of the original case.

- The single-line diagram of the modified cases (the two solutions).

- Statement on the problems faced during the simulation time.

- Statements on the suggested solutions with clear explanation and justification.

- Comparison and discussion of the best solution.

Due dates:

November 21, 2007   The single-line diagram of the original case.   (10%)

November 28, 2007   The single-line diagram of the modified cases.   (20%)

December 8, 2007   Final Report including the above items.   (60%)

December 29-31, 2007   Oral Exam.   (10%)

** Your own case is as follows:

	Line-resistance	Line-reactance	MVA Rating	$P_L + j\,Q_L$
odd	x 1.4	x 1.2	x 1.(ser# + 9)	same
even	x 1.5	x 1.1	same	x 1.(ser# + 9)