KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

ELECTRICAL ENGINEERING DEPARTMENT

EE-463 Project

Semester (161)

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The line-data and bus-data of a 9-bus system are given below on a 100 MVA base.

Line-Data

From-To	Impedance (per unit)	Total Line Charging (per unit)	Tap Position (per unit)	MVA Rating
1-4	j0.0576		1.02	160
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

(Transformer's taps limits are +/- 15%, with tap position of 1%)

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	40	15		20
5	-			125	50		
6	-			90	30		
8				100	35		

1. Use the Power World Simulation Package (Ver. 19) to simulate the above 9-bus power 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.
- The line-flows (MW and MVAR) at both ends of every line.
- The line-flow pie chart on every line at the mid-line of each line.

2. 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 increase from 100% (using the base case) to (150+**your two digit serial number**)% during the simulation time.
- 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.).

3. Solve the problems detected earlier to ensure a normal operation of the system during the simulation time.

4. Write a formal typed-report showing the following items:
- The single-line diagram of the original case.
- The single-line diagram of the modified case.
- Statement on the problems faced during the simulation time.
- Statements on the suggested solutions with clear explanation and justification.

Submission Format:
Submit a hard-copy as well as a softcopy. Label the softcopy with your student ID for all files in the following fromat
S200xxxxx0-o.pwd for the original file with extension pwd. (Nov 21st , softcopy)
S200xxxxx0-o.pwp for the original file with extension pwp. (Nov 21st , softcopy)
S200xxxxx0-m.pwd for the modified file with extension pwd. (Dec 19th , softcopy)
S200xxxxx0-m.pwp for the modified file with extension pwp. (Dec 19th , softcopy)
S200xxxxx0.doc for the report file with extension doc. (Dec 28th , hardcopy, and softcopy)

Due dates:

November 21st, 2016	The single-line diagram of the original case.	(30%)
December 19th, 2016	The single-line diagram of the modified case.	(40%)
December 28th, 2016	Final Report including the above items.	(20%)
January 2, 4, 9, 2017	Oral Exam.	(10%)

Control Options:
- ❖Increase the number of circuit of lines (takes1-year; 10MSR/10MVA).
- ❖Add a new line (takes 3-years; 30MSR/10MVA).
- ❖Add a new Generator to one of the existing busses (takes 4-years; 40MSR/10MVA).
- ❖Add a new bus with a new Generator and new line (takes 5-years; 50MSR/10MVA).
- ❖Add Capacitor banks (takes 6 months; 1MSR/10MVA).
- ❖Use Transformer taps

****** Your own case is as follows:

	Line-resistance	**Line-reactance**
o-ser	x 1. your-two-digit-ser#	same
e-ser	same	x 1. your-two-digit-ser#

o-ser : odd serial number.

e-ser : even serial number.

Good Luck in your project