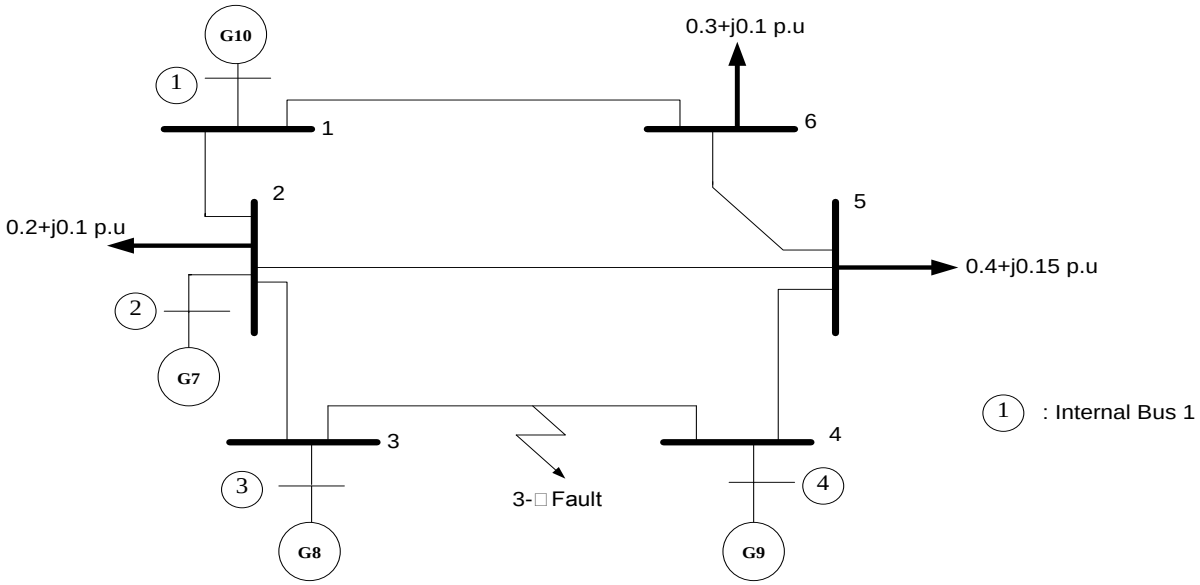
ECE 842 Final
Stability Study of Multi Generators

Problem : The multi-machine system to be studied has the following parameters :



Single-Line Diagram MVA_b=100

✓ The constants of the transmission lines are:

MVA_b = 100			
Line		**P.U. Impedances**	
From Bus	**To Bus**	**R**	**X**
1	**2**	**0.05**	**0.20**
2	**3**	**0.10**	**0.50**
3	**4**	**0.20**	**0.80**
4	**5**	**0.10**	**0.30**
5	**6**	**0.20**	**0.40**
6	**1**	**0.10**	**0.15**
2	**5**	**0.20**	**0.50**

✓ The data of the generators are :

Generator #	*At Bus*	MVA Capacity	M p.u	X'd p.u	D p.u
10	**1**	**100**	**7535**	**0.004**	**1.0**
7	**2**	**15**	**1130**	**1.000**	**12.0**
8	**3**	**40**	**2260**	**0.500**	**2.5**
9	**4**	**30**	**1508**	**0.400**	**6.0**

✓ The load flow results for pretransient (pre-fault) conditions (excluding the reactance of the machine) are:

Bus No.	*E*	*[degree]*	P_G [MW]	Q_G [Mvar]	P_L [MW]	Q_L [Mvar]
1	**1.00**	**0.0**	**33.20**	**9.1**	**0.0**	**0.0**
2	**1.002**	**-0.12**	**10.0**	**5.0**	**20.0**	**10.0**
3	**1.084**	**4.62**	**30.0**	**20.0**	**0.0**	**0.0**
4	**1.025**	**1.41**	**20.0**	**10.0**	**0.0**	**0.0**
5	**0.956**	**-2.8**	**0.0**	**0.0**	**40.0**	**15.0**
6	**0.953**	**-2.30**	**0.0**	**0.0**	**30.0**	**10.0**
P_{loss} = 3.2 MW			**Q_{Loss} = 9.0 Mvar**			

Write a matlab simulation testbed to perform the following:

1- Determine the dynamic equations of the faulted system (i.e , X=F(X,t)) .
2- Determine the dynamic equation of the system after the fault has been cleared
3- Simulate the response of the system for 1.85 seconds using the matrix exponential method. Assume the fault is cleared at 0.42 sec and Δt=0.01 sec.
4- Same as 3, but use trapezoidal method.
5- Same as 3, but assume the fault is cleared at 0.8 sec.
6- Same as 4, but assume the fault is cleared at 0.8 sec.
7- Same as 4, but assume the fault is cleared at 0.44 sec.