

EE3123 Tutorial 4

Power System Stability

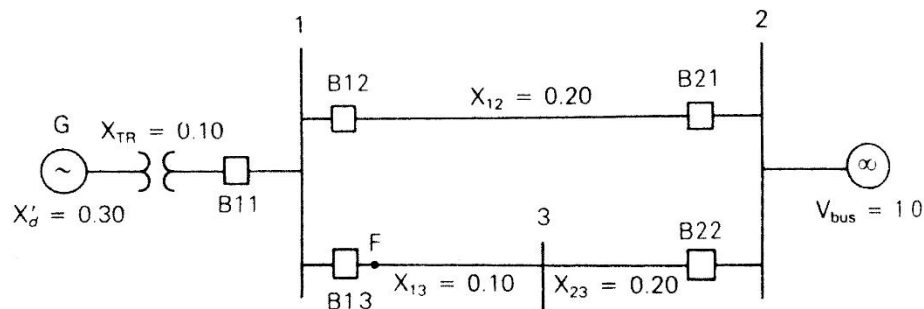
Name:

Student No.:

Q1

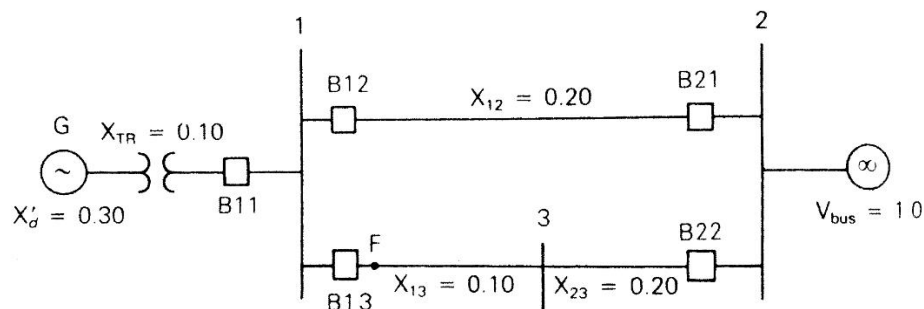
The synchronous generator below delivers 0.8 per-unit real power at 1.05 per-unit terminal voltage. Determine:

- the reactive power output of the generator;
- the generator internal voltage; and
- an equation for the electrical power delivered by the generator versus power angle δ .



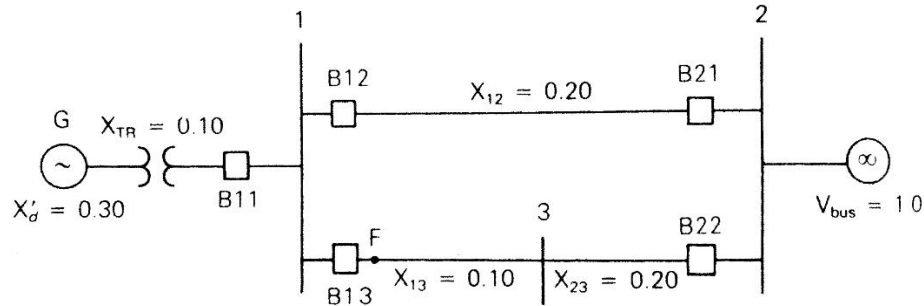
Q2

The generator in Q1 is initially operating in the steady-state condition given in Q1 when a three-phase-to-ground bolted short circuit occurs at bus 3. Determine an equation for the electrical power delivered by the generator versus power angle δ during the fault.



Q3

The 60-Hz synchronous generator shown below is initially operating in the steady-state condition: the infinite bus receives 1.0 per unit real power at 0.95 p.f. lagging. When circuit breaker B12 inadvertently opens, use the equal-area criterion to calculate the maximum value of the generator power angle δ . Assume $\omega_{p.u.}(t)=1.0$ in the swing equation.



Q4

The 60-Hz synchronous generator shown below is initially operating in the steady-state condition: the infinite bus receives 1.0 per unit real power at 0.95 p.f. lagging. There is a temporary three-phase-to-ground short circuit that occurs at point F. Three cycles later, circuit breakers B13 and B22 permanently open to clear the fault. Use the equal-area criterion to determine the maximum value of the power angle δ .

