ASSUMPTIONS IN SHORT CIRCUIT ANALYSIS

Basic assumptions in fault analysis of power systems.

(i). Representing each machine by a constant voltage source behind proper reactance which may be X", X', or X

(ii). Pre-fault load current is neglected

(iii). Transformer taps are assumed to be nominal

(iv). Shunt elements in the transformers model that account for magnetizing current and core loss are neglected

(v). A symmetric three phase power system is conducted

(vi). Shunt capacitance and series resistance in transmission are neglected

(vii). The negative sequence impedances of alternators are assumed to be the same as their positive sequence impedance Z+ = Z-

Need for short circuit studies or fault analysis

Short circuit studies are essential in order to design or develop the protective schemes for various parts of the system. To estimate the magnitude of fault current for the proper choice of circuit breaker and protective relays.

Bolted fault or solid fault

A Fault represents a structural network change equivalent with that caused by the addition of impedance at the place of a fault. If the fault impedance is zero, the fault is referred as bolted fault or solid fault.

Reason for transients during short circuits

The faults or short circuits are associated with sudden change in currents. Most of the components of the power system have inductive property which opposes any sudden change in currents, so the faults are associated with transients.

Doubling effect

If a symmetrical fault occurs when the voltage wave is going through zero then the maximum momentary short circuit current will be double the value of maximum symmetrical short circuit current. This effect is called doubling effect.

DC off set current

The unidirectional transient component of short circuit current is called DC off set current.