MODULE : TB11

GENERATOR, GENERATOR PROTECTION, EXCITATION SYSTEM, PARALLEL OPERATION & GRID ISLANDING

COURSE DESCRIPTION:

Generator, Generator Protection, Excitation System :

Discussion on : Generating system with Excitation scheme. Alternator Capability Curve, Reactances ; Summary – recommendation of protection practices for different ratings of Generators, Generator protection elements : Over load withstand : Over load protection, RTDs : Stator over current : Voltage controlled & Voltage restrained over current protection ;

Restricted Earth Fault Protection, Stator Earth Fault Protection (0 to 95% and □0%). Differential Protection : High impedance and low impedance schemes.

Motoring (Reverse power and Low forward power) and under frequency protection for steam, hydro, DG and gas units, Unbalanced armature current protection (Negative phase sequence protection).

Types of excitation systems : Static Excitation System with series compounding and Brushless excitation with PMG for short circuit maintenance. Nominal Response; Ceiling Voltage; AVR Limiters AVR adjustments for UFRO, Stability, Vtrim, dip and dwell settings; Field over heating; First and Second Rotor earth fault protection; Loss of excitation Protection with and without under voltage; Over voltage protection; over fluxing protection;

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Bearing vibration; Shaft current and insulated bearings; Fire protection; Class A, B, C trip logic. Step by step calculation for each protection scheme.

Grounding of Generators :

Methods of neutral grounding (solid, medium and high resistance) for L. V. and M.V. Generators.

Parallel operation of Generating Unit:

Basic power flow relation; (P-F) loop and (Q-V) loop; Real & Reactive power sharing; Governor control Modes; Isochronous (speed control), speed Droop (single & dual) and Constant KW control.

AVR Control Modes; Voltage control, voltage droop, constant P.F. and constant VAR control.

Islanding :

Grid failure history; Stability classification – voltage and angle stability; Power transfer relations and stability criteria; Critical Clearing Time ; Factors influencing stability; Short Circuit Ratio; Inertia Constant; Dynamic stability and PSS; Problems in interconnected operation with grid in india;

GIS(Grid Islanding Scheme) concepts; Symptoms before islanding; Schemes for islanding; Post islanding – load shedding schemes; Frequency based load shedding scheme; PLC based load shedding scheme and its advantages; Causes for GIS failure and remedial measures.