Name of Candidate	**:**	**Shuaib Farooq**
Name of Supervisor	**:**	**Prof. (Dr.) Naimul Hasan**
Name of Co-Supervisor	**:**	**Prof. Ibraheem**
Name of Department	**:**	**Electrical Engineering**
Topic	**:**	**Real time simulation of advanced controllers for automatic generation Control of Interconnected power systems.**

ABSTRACT

This thesis presents the real time simulation of advanced controllers for automation generation control for interconnected power systems. The designs of controllers are based on intelligent techniques, modern and adaptive control theory. Finally the real time simulation of automatic generation controllers is performed on the PC based target machine to evaluate its performance in real time under the different disturbances and parameter variation conditions. The techniques proposed for design of advanced automatic generation controller are as below:

(i) PI-observer based optimal automatic generation controller.

(ii) Hybrid Taguchi Genetic Algorithm tuned automatic generation controller

(iii) Bat algorithm tuned automatic generation controller.

(iv) MPC-PID based automatic generation controller.

(v) Self-tuned automatic generation controller.

The PI-observer based optimal automatic generation controller is developed for two area power system model. The gains of the observer are selected by the LQR technique where as

the optimum gain of PI for observer is obtained by the integral square of error technique. The next proposed technique for automatic generation control is based on hybrid taguchi genetic algorithm, which is a combination of statistical method and evolutionary technique. Another soft computing technique known as BAT algorithm which is based on nature-inspired metaheuristic technique is also used here to tune the automatic generation controller for linear and non-linear multisource interconnected power system model. The modern control theory based generation controller which is a combination of Model predictive controller and PID structure is also developed, evaluated and proposed for the interconnected power system. The last technique based on adaptive control known as self-tuned automatic generation controller is also evaluated and proposed for multisource interconnected power system model. The self-tuning algorithm is based on the least square method of identification and the ultimate gains are calculated on the basis of pole placement technique. The gain of the controller is automatically tuned according to the operation and disturbances.

The prime objective of the thesis is the real time simulation of the developed advanced automatic generation controller for interconnected power system model. Real time simulation is performed on PC based target and by using MATLAB's software real time windows target. The models are configured for fixed time solvers then real time code is generated and downloaded on the target PC for real time execution. The advanced controllers such as HTGA tuned, online BAT, MPC-PID and Self-tuned automatic generation controllers are simulated in real time on the target PC. The real time performance of the automatic generation controller is carried out by changing operating condition and disturbances during the execution of simulation. The performance of the real time advanced automatic generation controller is compared with the real time conventional automatic generation controller for the multisource interconnected power system model.