Chapter 8

CONCLUSIONS

8.1 Summary

In this thesis, an attempt has been made to determine the reliability analysis of composite power system, Probability of Failure, Expected Energy Not supplied and system indices of a 6 bus RBTS composite power system using FACTS controllers like TCSC & UPFC. In Chapters 2 & 3, reliability analysis of TCSC, UPFC and series compensator is estimated with deterministic probability values with the available component data. Further, an attempt also has been made to estimate the availability of the combination of TCSC and series compensator, UPFC & Series Compensator using time dependant probabilities. These time dependant probabilities assume exponential distribution of the failure of the components where as the deterministic probability data is based on binominal distribution. Load indices are also calculated using load factor & system load. A comparison has been carried out between TCSC & UPFC when using series compensator between load indices like LOLE, LOEE.

In Chapter 4, the analysis of 6 bus RBTS is determined when using UPFC with different modules in all the bus. From the results obtained, depending upon the generation & transmission capacity it has been concluded that seven module UPFC is suitable for the system based on the reliability of different modules. Apart from the reliability; system indices, probability of failure & EENS had shown a major improvement in the system of different modules for all the buses.
In Chapter 5, the analysis of 6 bus RBTS is determined when using TCSC with different modules in all the buses. Based on the results obtained, it can be concluded that seven module TCSC is suitable for the system based on the availability of different modules depending upon the generation & transmission capacity. An attempt is also made to show the improvement in system indices, probability of failure & EENS when using different modules for all the buses apart from the availability in the system.

In Chapter 6, comparison has been made between TCSC & UPFC when using for 6 bus RBTS in different aspects like, availability, system indices, probability of failure, EENS etc. From the obtained results, major improvement has been observed in the system when using different modules of UPFC rather than TCSC at all the buses in the system. 20% of energy has been recovered by UPFC when compared with TCSC in the parameter of EENS.

In Chapter 7, the reliability analysis of 6 bus RBTS when using the combination of TCSC & UPFC is presented. Depending upon the generation & transmission line capacity, the combination of TCSC & UPFC is divided into 2 stages. Stage 1, consist 3 Modules each of TCSC & UPFC, where as Stage 2, consists 3 modules of TCSC & 4 Modules of UPFC. Reliability analysis of the two stages is determined by using state space and series parallel representation. System Indices, Probability of Failure & EENS are also calculated for both the stages. A comparison has been made between the two stages in all aspects and found that stage 2 is having less supply disturbance, Severity Index, probability of failure, EENS and interruption index when compared with stage 1. The availability of stage 1 is greater than stage 2 which is a negligible variation and can
be neglected. Finally, it has been concluded that stage 2 can be implemented in to the 6 bus RBTS depending upon the total power generated, power transfer capacity etc.

8.2 Future Scope

This research work can be extended by incorporating other new FACTS devices like IPFC (Interline Power Flow Controller) into the 6 bus RBTS. A comparison can be carried out between TCSC, UPFC & IPFC for different systems by having different combination of the above devices (viz. TCSC-UPFC, TCSC-IPFC, UPFC-IPFC). Contingency analysis including load flows can also be made by incorporating FACTS controllers, to improve the system performance indices with respect to the base case solutions. An attempt can also be made to implement Monte Carlo Simulation process apart from deterministic probability values & time dependent probabilities. Deregulation can also be performed for the above system.