# Conclusions

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6.1 Summary
In this thesis, the work is carried out on the position and capacity of DGs on RDS which has impact on loss reduction, improvement in voltage profile and Probability Indices. For position and capacity of DG units, GA and PSO approaches are employed. Further, the DG with PV and WECS are modeled in SIMULINK. The results obtained in the work are contributed and future scope of the work in this area is presented in this chapter.

In Chapter 2, an analysis of RDS with position and capacity of DG units in distribution system is considered and compared to an existing system. The advantage of the proposed method is that the position and capacity of DG units is done based on distribution load flow analysis. The DG performance is also tested by adding units of DG as 1DG, 2DG and 3DG at different positions on the radial feeder and improvement in voltage profile is presented. Further, probability indices are performed by increasing DG units at each position separately and with combination of all units. Finally, the availability of DG units on three individual positions is analyzed. The algorithm is applied on 15 bus RDS and results are presented.

In Chapter 3, the PV model with Incremental Conductance as MPPT is used as DG where an attempt is made in developing SIMULINK blocks for RDS. The capacity of the DG units is designed based on series and parallel cells in the system. An algorithmic procedure is proposed to develop the model in SIMULINK. The position and capacity of DG units are analyzed based on the voltage profile. To check the performance of the system it is interconnected with RDS. The effect of DG units on minimization of losses, improvement in voltage profile and Probability Indices are discussed and presented. The proposed algorithm is applied on 10 and 15 bus RDS and the results are presented.

In Chapter 4, grid-connected WECS is proposed with induction generator incorporating a MPPT technique for dynamic power control. The MPPT technique used to control the wind speed is incremental conductance algorithm with a suitable choice of Cuk-converter configuration. To check the performance of WECS it is integrated with RDS and total active power losses, voltage profile and probability indices with proper choice of position and capacity are analyzed and presented. The
effectiveness of the proposed approach is assessed on 15 bus RDS and results are presented.

In Chapter 5, GA and PSO approaches were applied for position and capacity of one DG unit and capacitor bank in RDS. The objective functions defined are PLI, RI and VSI. The BFSA is used for calculating voltage drops at each node and total power losses in the system. The GA and PSO methods are used to optimize with the objective functions of position and capacity of DG and Capacitor Bank with voltage profile, total active and reactive power losses, VSI and reliability parameters such as EIC and ENSI. The above said approach is applied and compared to 10 and 15 bus RDS to check the performance and the results are presented.

6.2 Scope for future work
The basic DG SIMULINK models with PV System and WECS has been employed. The Optimization Tool Box, Fuzzy Based Approach, Neural Network Approach can be introduced for performance of the radial networks. The FACTS devices such as UPFC, IPFC, DPFC etc., can be integrated with DG models to improve the performance of RDS for power loss minimization, improvement in voltage profile, reliability parameters and also by reducing harmonics and improving the voltage stability in the RDS.

In this thesis, optimization techniques with GA and PSO are used for position and capacity of DG units. The other optimization approaches such as Tabu Search and Artificial Intelligence can be used for further analysis. Reliability evaluation based on Monte Carlo Simulation can be employed.