# CHAPTER 9

# CONCLUSIONS AND SCOPE FOR FURTHER STUDY

## 9.1 Conclusions

The research work is focused on detailed analysis of different control techniques that are used for the sensor less BLDC motor drive fed from PV source. A hysteresis controller is used to generate the reference voltage to control the angle of output voltage, to produce smooth electro-magnetic torque and to acquire an accurate speed control. Further the proposed non-inverting four switch buck-boost converter with different MPPT techniques produce a high step up voltage and reduce the harmonics in stator current. Hence Dc link voltage control is given least preference in the control technique considering the merits of proposed converter. Estimation of speed, flux and stator current of BLDC drive is done using current infusion technique. This method predicts the stator current of any phase of BLDC motor even under varying load conditions. The multi stage power conversion system is reduced by introducing a switched inductor quasi z-source inverter which produces same step up voltage as a NFSBB converter.

The Power flow control to a BLDC motor is obtained by implementing a simple maximum boost PWM technique whose modulation index is altered with incremental conductance MPPT algorithm. It allows the DC link voltage to boost to a certain level in accordance with motor rating. By using simple maximum boost PWM technique, the THD in stator current is further decreased. The Torque ripple is minimized by using a single band hysteresis current controller with a simplified IFOC technique. The IFOC technique has eliminated the higher order harmonics in stator current and decrease the THD content to the least in comparison over previously employed control techniques. Speed estimation using back-EMF observer method is more suitable for the motors with different ratings and tracks the speed of the motor with zero error and with a very little settling time. The proposed IFOC based SL QZS inverter fed sensor less BLDC motor drive are simulated in MATLAB/Simulink

platform to verify the performance of the scheme, and the simulation results are validated with a real time hardware implementation using DSPIC platform.

## 9.2 Scope for Further Study

In future, a controller scheme that employs only with current sensor and without use of voltage sensor can be studied by the flux linkage and induction measurement to identify the rotor position and to bring out an effective solution to the current scheme. The passive elements used in SLQZS inverter may be reduced for generating high power compared to existing topology.