CHAPTER 11

CONCLUSION

11.1 SUMMARY OF THE RESEARCH

In the present research, an attempt has been made for the analysis and diagnosis of single stuck-at, double stuck-at, AND-bridging and OR-bridging faults in ESOP RMC circuits.

A new universal test set, independent of the circuit function, dependent only on the number of function variables, as also five new network structures, with good fault detection capabilities have been proposed.

For stuck-at faults, a line has been assumed to be either stuck-at-0 or stuck-at-1 at a time. For double stuck-at faults, only two lines have been assumed to be involved at a time. However, the two lines can be any pair of lines involved. The bridging faults have been assumed to be of single (involving only one pair of lines at a time) and of non-feedback type. Tree type EXOR function block has been assumed for the reduction of propagation delay. The gates of auxiliary outputs are assumed to be fault-free.

All the primary input lines, primary output line and all the inputs and outputs of the various gates of the circuit have been considered for the simulation of the four types of faults considered.

The analysis and diagnosis of the various types of faults have been performed through the use of two quantification indices. Ten random ESOP
RMC functions from three to twelve variables have been simulated in MATLAB and compared for fault detection capability. A result compaction technique has been used for the ease of tabulation and comparison of the results.

The same network structures and associated test vectors have been applied for all the four types of faults considered, viz. single stuck-at, double suck-at, AND-bridging and OR-bridging faults and the results are analyzed. It was found that all the five proposed structures have very good fault detection capabilities with very limited test sets.

The proposed methods produce identical results for almost all the functions considered. The identifiability factor, is almost 100% for all the functions considered randomly and distinguishability factor has improved from structure to structure and the fifth one has been found to be the best among the various structures considered.

The tabulated distinguishability factor is an overall value. Though the overall factor may be poor in some cases, its value for an individual output set is much higher. Further, the detection capability is not affected by this factor. It is also easy to identify the actual faulty line from the set of outputs measured.

The highlights of the proposed schemes are listed below,

- Function independent test test
- Easy testability analysis of a given ESOP RMC circuit , with clear identification and location of various faults
- Easy implementation
- Single network structure to detect the four types of faults
• Enhancement in the performance of the diagnosis system

• Faster processing because of tree structure.

11.2 **SCOPE FOR FUTURE WORK**

Research in this field is on-going for the past forty years. The network structures and test sets proposed in the present thesis can be tested for other types like the feedback bridging faults and open circuit faults in digital circuits and the required modifications can be suggested since the possibility of occurrence may be large for some designs.

Soft computing techniques can be applied for optimising the test sets for the proposed structures to improve the fault detection.

New circuits and/or test vectors can be explored for further improvement of the diagnosis of the different types of faults.