Questions for self assessment

Module 3--Lecture 1, 2,3

1. What is Boolean logic synthesis? What is the major goal of Boolean logic synthesis?

2. Why minimum two levels of logic are required to implement an arbitrary Boolean function?

3. What is the major issue with two level implementation of Boolean functions?

4. What are prime implicants? What are essential prime implicants?

5. Explain the tabular method of determining prime implicants.

6. What is the complexity of the tabular method? Suggest an alternative method to determine prime implicants, whose complexity is lower.

7. Explain the Quine-McCluskey procedure used to minimize an SOP formula.

8. Define formally the Unate covering problem.

9. What is row and column dominance in a constraint matrix (of the Unate covering problem)? How the use of row and column dominance help in reducing the complexity of solving the Unate covering problem?

10. Illustrate the branch and bound algorithm used to solve the Unate covering problem using an example. Do not use any heuristic to compute the lower bound of the constraint matrix.

11. Describe a heuristic to compute the lower bound of the constraint matrix. Illustrate using an example—"lower bound computing heuristic lowers the complexity but gives a sub-optimal solution"

Module 3--Lecture 3

1. How is distance measured between two solution points in local search based optimization?

2. What are feasible and in-feasible regions in the solution space of local search based optimization?

3. What are local and global minimum? Explain their implications in optimization.

4. What is any-time algorithm? Give an example of any-time algorithm (other than Boolean minimization).

5. What are the four steps of ESPRESSO? Explain using an example.

Module 3--Lecture 5

1. Draw the basic block diagram of Moore and Mealy Finite State Machines.

2. What are the steps for Finite State Machine synthesis?

3. Formally define equivalence of states.

4. What is the advantage of using hot 1 encoding in FSM synthesis. Also point out the issues of using such an encoding.

5. Discuss a heuristic for efficient state encoding.

Module 3--Lecture 6

1. What is the major problem of two level implementation of Boolean functions using CMOS gates?

2. What is an Algebraic expression? What is a Boolean expression?

3. When we say a factored form is maximally factored?

4. Define the division operation of an SOP formula.

5. What are the characteristics of a good divisor for the division operation of an SOP formula? Discuss a procedure to obtain such a divisor.