ME (ICE) 2nd Semester Examination, 2013

ICE 1005/7: CAD for VLSI

Answer any FIVE.

Time: 3 Hrs

FM: 100

1. How is test verification carried out? What is the objective of formal verification of a design? What is the role of technology mapping during logic synthesis? What is the purpose of using feedthrough in standard cell based design? What are primary advantages of FPGA based design over ASIC?

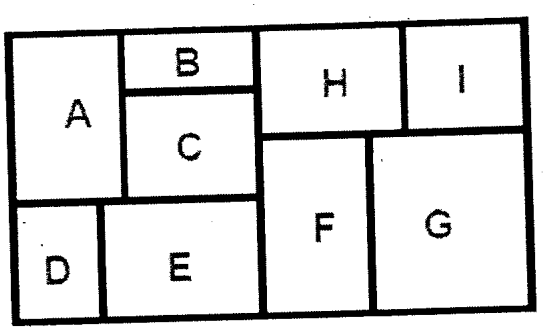
   4+2+3+2+3

2. A net is represented by the following graph. G=G(V,E), where, V={1,2,3,4,5,6,7,8} and E={(1,2), (1,5), (1,6), (2,5), (2,6), (3,6), (3,4), (3,7), (3,8), (4,7), (4,8), (5,6), (7,8)}. Apply the Kernighan-Lin heuristic to optimize the partition. Assume initial bisection as V1={1,2,3,4} and V2={5,6,7,8}. Clearly explain each step of operation. How KL algorithm may be extended for unequal sized blocks and unequal sized elements?

   9+5

3. What is Grid routing? What are the different algorithms used for grid routing? Explain different steps in Lee's algorithm for maze routing. What is the space complexity of this algorithm? Mention different improvements for this. Explain the grid graph model with a clear example.

   1+2+4+1+2+4



4. What is a slicing tree? Is the above floorplan sliceable? If yes, give its slicing tree representation. What are the inputs, requirements, and objectives of the placement problem? How the problem varies at different levels of design? What different modeling techniques are used for wire length estimation of multi-terminal nets during placement? Clearly explain with neat diagram.

   2+1+2+3+3+3

5. How can you realize a chip design problem from different domains viz. behavioral, structural, and physical. Explain. How do the phases in layout design find importance in clock synchronization problem today?

   3+3+3+5

6. Classify different types of placement algorithms. Describe quadrature placement and bisection placement procedure briefly. Name some simulation based algorithms. How simulated annealing may be applied to obtain a good placement? Describe briefly.

   3+3+2+6

7. What are the Generic CAD tools associated with each design steps? Mention the CAD sub-problem levels also for these steps. In MILP formulation of the floorplanning problem clearly mention
    a. Non-overlapping constraints for fixed blocks
    b. How can you define Integer variables
    c. A general problem formulation

4+4+6