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10EC077

M.Tech. Degree Examination, June 2012

Synthesis and Optimization of Digital Circuits

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Explain the semi-custom design. **(06 Marks)**

b. Discuss 'tractable' and 'intractable' problems encountered in design of microelectronic circuits. **(04 Marks)**

c. What are pareto points? Explain the significance of pareto point, with an example. **(06 Marks)**

d. Explain the algorithm steps involved in DIJKSTRA algorithm. **(04 Marks)**

2 a. Explain the algorithm steps involved in bryantls reduction procedure **(10 Marks)**

b. Consider a function pair f = (a + b)c ; g = bcd. Compute ROBDD with variable order (d, a, b, c). Also represent unique table. **(06 Marks)**

c. Explain the following terms with respect to graph theory.
i) trail ii) multi – graph iii) planar graph iv) bipartite graph. **(04 Marks)**

3 a. Consider the following function :
$x_1 = (x + dx)$;
$u_1 = [u – (3 * x * u * dx) – (3 * y * dx)]$;
$y_1 = (y + u * dx)$;
$c = x_1 < a$;
Write a behavioral model, using silage. **(08 Marks)**

b. Write a UDL/I behavioral model for finite state machine that recognizes two or more consecutive 1's in an input data stream. **(06 Marks)**

c. Explain the optimization techniques. **(06 Marks)**

4 a. What are tautology? Give set of rules for simplifying the recursive procedure. **(06 Marks)**

b. Consider the function f = ab + ac + ab′ c′ + a′. Represent this function, using positional cube notation. Verify the above function for tautology. **(04 Marks)**

c. Give ESPRESSO minimizer algorithm. **(06 Marks)**

d. Consider the function :
$(\alpha)\ (\alpha + \beta)\ (\beta + \gamma)\ (\gamma + \delta)\ (\delta) = 1$
Represent prime implicant table. Solve the above function by applying Petrick's method. **(04 Marks)**

5 a. Explain the Algebraic division, with an example. Write the pseudo code for the method. **(06 Marks)**

b. Find the minimum cover for the following function, using exact logic minimization algorithm $f = \Sigma\ m_0, m_2, m_4, m_6, m_8, m_{10}\ m_5, m_7, m_9, m_{11}, m_{13}$
Represent the minimal cover on three dimensional cube. **(10 Marks)**

c. Give four major steps of expand procedure of logic minimization. **(04 Marks)**

6 a. Explain the different types of finite state machine decompositions. **(10 Marks)**

b. For the finite state machine Fig. Q6(b), obtain the minimum state diagram. **(10 Marks)**

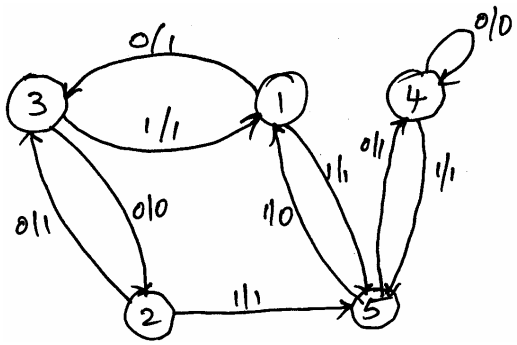

Fig. Q6(b)

7 a. Explain Hu's algorithm. **(06 Marks)**

b. For the given cell library in Fig. 7(b)(i) and Fig. Q7(b)(ii). Write pattern arrays and pattern strings. **(04 Marks)**

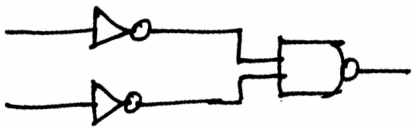

Fig. Q7(b)(i)

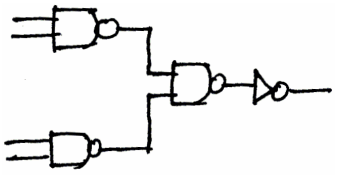

Fig. Q7(b)(ii)

c. Explain loop folding. **(06 Marks)**

d. Explain ALAP scheduling under latency constraints. **(04 Marks)**

8 Write short notes on :

a. Anti fuse based FPGA

b. TREE – BASED covering

c. LEFT – edge algorithm

d. Boolean relation minimization. **(20 Marks)**

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