JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-2 EXAMINATION- APRIL-2023

B.Tech-VIII Semester (ECE)

COURSE CODE (CREDITS): 19B1WEC832 (3) MAX. MARKS: 25

COURSE NAME: CAD Algorithms for Synthesis of Digital Systems

COURSE INSTRUCTOR: Dr. Pardeep Garg MAX. TIME: 1hour 30 minutes

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Note: All questions are compulsory. Marks are indicated against each question in square brackets. CO indicates Course Outcomes.

Q1. Compute the minimum vertex covering set and covering number for the graph shown in Figure 1. [CO-1, **2 marks**]

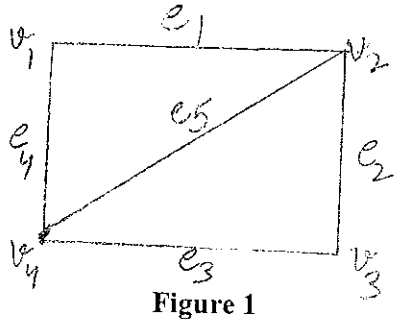

Figure 1

Q2(i). Is the function **g** shown in the following equation Boolean satisfiable or not? Justify your answer with test case values of x1 and x2.

$$g(x_1, x_2) = \left(x_1 \vee x_2\right) \wedge \left(x_1 \vee \bar{x_1}\right) \wedge \bar{x_2}$$ [CO-1, **1 mark**]

Q2(ii). Using path problem concept, check the 2-SAT of the function f:

$$f(a,b) = \left(\bar{a} \vee \bar{b}\right) \wedge \left(\bar{a} \vee b\right) \wedge \left(a \vee \bar{b}\right) \wedge \left(a \vee b\right)$$ [CO-1, **2 marks**]

Q3(i). Obtain the set of prime implicants using Tabular method for the following expression:

$$f = \pi M(0,1,4,5,9,11,13,15,16,17,25,27,28,29,31) \cdot d(20,21,22,30)$$ [CO-2, **5 marks**]

Q3(ii). Compute the minimal expression corresponding to essential prime implicants for the prime implicants obtained in part 3(i). [CO-2, **3 marks**]

Q4. Obtain the best possible minimized/optimized solution for the following function using the ESPRESSO minimizer; discuss the 3 steps involved in the execution of this minimizer in detail by showing the cubes and covers obtained after each step. [CO-2, **5 marks**]

$$f\,(x,y,z) = x'yz' + yz + xy'z' + d(xy'z)$$

Q5. Employing branch and bound method, compute the best possible solution (minimum cost) for the graph shown in Figure 2. S is the starting node and G is the goal node. [CO-2, **4 marks**]

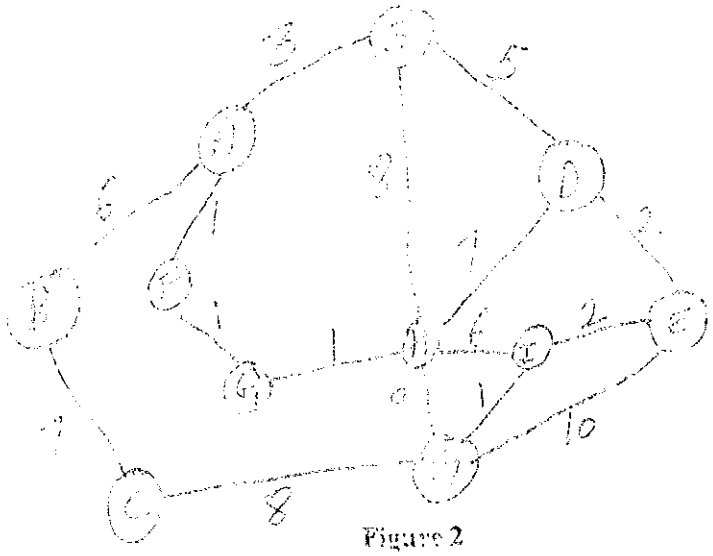

Figure 2

Q6. Discuss the significance of Kernels and Co-Kernels in the context of Boolean equations expressed in algebraic model for multi-level logic synthesis. [CO-2, 3 marks]