JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

B.Tech-III Semester (CS/IT/ECE/**ECM**/Civil/BT)

COURSE CODE (CREDITS): 20B11EM312 (3) MAX. MARKS: 25

COURSE NAME: DIGITAL ELECTRONICS

COURSE INSTRUCTORS: Dr. Harsh Sohal MAX. TIME: 1 Hour and 30 Minutes

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Note: *All questions are compulsory. Marks are indicated against each question in square brackets.*

Q1. [CO-1] [7]

(a) Express the following function as (i) standard SOP (ii) as standard POS form [1+1]

F(A,B,C,D) = AB` + BC + ACD`

(b) Find all the prime implicants for the following Boolean function, and determine which are essential. [2]

F(A,B,C,D)= ∑(0,2,3,5,7,8,10,11,14,15)

(c) Simplify the expression below and implement by two level NOR only gate circuit. [2]

F(W,X,Y,Z) =WX`+Y`Z`+WYZ`

(d) Perform the subtraction on the given unsigned numbers using 10's complement of the subtrahend. [1]

i) 2390-945 ii) 224 - 712

Q2. [CO-3, CO-2] [6]

(a) Implement the following four Boolean expressions using three half adders (you may use some additional logic gates if necessary):[3]

D=A xor B xor C

E=A`BC+AB`C

F=ABC`+ (A`+B`)C

G=ABC

(b) Describe the logic circuit of a 2:1 Mux (also Boolean equation, logic gate circuit). Construct a 16:1 Multiplexer with two 8:1 and one 2:1 multiplexer (using block diagrams only). [3]

Q3. [CO-2, CO-3] [6]

(a) Design a BCD to Excess 3 code converter circuit using unused combinations of the code as don't care conditions. [3]

(b) What are the drawbacks and advantages of Ripple Carry Adder (RCA) when compared to Carry Look Ahead Adder (CLA)? Discuss in brief. [1]

(c) Design the circuit of a CLA for adding two 2 bit numbers while explaining the propagate and generate terms. [3]

Q4. [CO-2, CO-3] [6]

(a) Can we make use of an adder circuit to carry out subtraction? Design a 4 bit combined adder-subtractor circuit with a mode bit input M (0 for addition; 1 for subtraction) for addition/subtraction of two 4 bit numbers. [3]

(b)Explain binary multiplication of two 2 bit numbers with an example. Compare it witch decimal number multiplication for differences and similarities. Also draw a circuit of 2 bit by 2 bit multiplier.[3]