GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

BN190012024

Registration No: | | | | | | | | | | |

Total Number of Pages : 2 AR-17 B.TECH

3rd Semester (BACK PAPER) Examination-2019

BECES3050 DIGITAL LOGIC DESIGN

Common to CSE/IT

Time : 3 Hours Maximum : 100 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) 10 x 2=20 Mark

Q.1. Answer *All* Questions

a How many input combinations would a truth table has for a six-input AND gate?
a) 32 b)48 c) 64 d) 80

b The expression W(X + YZ) can be converted to SOP form by applying which law?
a) associative law b) commutative law c) distributive law d) none of the above

c The 2's complement of 11100111 is _____.
a) 11100110 b) 00011001 c) 00011000 d) 00011010

d What logic function is the sum output of a half-adder?
a) OR b) NOR c) exclusive-OR d) exclusive-NOR

e A full-adder has a $C_{in} = 0$. What are the sum (Σ) and the carry (C_{out}) when A = 1 and B = 1?
a) $\Sigma = 0$, $C_{out} = 0$ b) $\Sigma = 0$, $C_{out} = 1$ c) $\Sigma = 1$, $C_{out} = 0$ d) $\Sigma = 1$, $C_{out} = 1$

f Which gate is best used as a basic comparator?
a) OR b) NOR c) Exclusive-OR d) Exclusive-NOR

g A BCD counter is a _____.
a) binary counter b) full-modulus counter c) decade counter d)divide-by-100 counter

h How many flip-flops are required to construct a decade counter?
a) 10 b) 8 c) 6 d) 4

i Dynamic memory cells store a data bit in a _____.
a) Capacitor b) Diode c) Flip-Flop d)Resistor

j How many 8K × 1 RAMs are required to achieve a memory with a word capacity of 8K and a word length of eight bits?
a) Eight b) Four c)Two d)One

PART – B: (Short Answer Questions) 10X2=20 Marks

Q.2. Answer *ALL* questions

a What is gray code? Convert $(100110101)_2$ into gray code.

b What is the decimal equivalent of the binary number (1000 1011 0111) represented in Excess-3 code?

c State De Morgan‘s law?

d Consider the function f (x_1, x_2, x_3) = Σ m (2, 3, 4, 6, 7). Derive the canonical sum-of-product for the function using minterm.

e What do you mean by “Prime Implicants” in a Karnaugh map? Under what condition a min-term in a square is said to be essential?

f Implement the following Boolean expression with X-OR and AND gates.
F = AB’CD' + A'BCD' + AB'C'D + A’BC’D

g How many clock pulses are required shift eight bits of data into and out of an eight bit serial-in serial-out shift register?

h What is a shift register? Explain the principle of 4-bit parallel-in parallel-out shift register.

i List the various types of DACs and ADCs.

j Which is the simplest type ADC? What is its other name?

PART – C: (Long Answer Questions) 4X15=60 Marks

Answer *ALL* questions

Q.3

a Convert the decimal number 4.532×10^7 to a single-precision floating-point binary number. 7

b Establish the following identities of Boolean algebra 8

(i) A + AB = A

(ii) (A+ B)(A+ C) = A+ BC

OR

c In a tabular form, write the "2421" code and "Excess-3" code of decimal digit "0 to 9". What are the special properties of these codes? 7

d Simplify the following Boolean expression using Boolean algebra: 8

(i) *x*'*y*'*z* + *x*'*yz* + *xy*'

(ii) *xyz* + *x*'*z* + *yz*

Q.4

a The four variable logic function can be expressed as

F (A, B, C, D) = Σ m (1, 2, 5, 7, 9, 11, 14).

Realize the above function using 10

(i) NAND gates only

(ii) NOR gates only.

b Implement the following Boolean function using NAND-AND two level combinational form 5

F (A, B, C, D) = Σ m (0, 1, 2, 3, 4, 8, 9, 12)

OR

c Implement the following Boolean function using 4 x1 MUX : 7

F = A'B'C'+ ABC + ABC + ABC

d The four variable logic function can be expressed as 8

F (A, B, C, D) = Σ m (1, 2, 5, 7, 9, 11, 14).

Realize the above function using 8 x 1 MUX.

Q.5

a What is a shift register? Explain the principle of a 4-bit Serial-in Parallel-out shift register. 5

b An 8-bit shift register has the binary equivalent of the decimal number 86 stored in it. What are the base-10 equivalent contents of the register after the following operations have been performed? For each case, assume the same initial state given. 10

(i) Shift Right 1 (ii)Shift Left 1 (iii) Shift Right 2 (iv)Rotate Right 2 (v) Rotate Left 2

OR

c A sequential circuit with two D Flip-flops A and B. two inputs in: and y and one output z is specified by the following state equations.

A (t+1) = x'y + xA B (t+1) = x'B + xA Z = B

(i) Draw the-logic diagram of the sequential circuit. 10

(ii) Derive state table.

(iii) Draw the state diagram.

(iv) Derive the flip-flop input functions.

d Design a sequential circuit with two D flip-flops A and B and one input X. When X = 0, the state of the circuit remains same. When X = 1, the circuit goes through the state transition from 00 to 01 to 11 to 10 d back to 00 and repeats. 5

Q.6

a What is Hamming code? Explain, how error is detected and corrected at the receiving end using hamming code? 7

b Explain briefly basic configuration of programmable logic devices (PLD). 8

OR

c How many 32K x 8 RAM chips are needed to provide a memory capacity of 256 K bytes? How many lines of the address must be used to access 256K bytes? How many of these lines are connected to the address inputs of all chips? 7

d Draw the diagram of the 4 x 4 RAM. 8

==0==