2013

DIGITAL ELECTRONIC CIRCUITS

Time Allotted : 3 Hours   Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words

as far as practicable.

GROUP – A

(Multiple Choice Type Question)

1.   Choose the correct alternatives for any *ten* of the following:

$$10 \times 1 = 10$$

i)   Which code is used in K-map?

   a)   Gray   b)   BCD

   c)   Binary   d)   Hamming.

ii)   Gray code of a number is 10110. What is its decimal number?

   a)   10   b)   15

   c)   27   d)   None of these.

iii)   What is Excess-3 Code of 27?

   a)   0101 1001   b)   0010 0100

   c)   0101 1010   d)   None of these.

iv)   How many flip-flops are required to design Mod-10 Counter?

   a)   3   b)   4

   c)   5   d)   6.

v) $(15)_{10} - (10)_{10}$ is equal to (Using 1's complement)

a)   0101   b)   1010

c)   1110   d)   0010.

vi)   If you want to convert a J-K FF to a D-FF then which gate is to be connected between J & K terminals of the J-K FF?

a)   AND   b)   OR

c)   NOT   d)   EX-OR.

vii)   If an asynchronous counter have three flip-flops with identical, tdp = 50 ns, then what is the total propagation delay and the maximum frequency?

a)   150 ns & 6.67 MHz.   b)   160 ns & 5.67 MHz

c)   140 ns & 2.23 MHz   d)   None of these.

viii) BCD coding of 12 is

a)   00001010   b)   00001100

c)   00010010   d)   none of these

ix)   The result of the BCD addition of 00000111 & 00000011 is

a)   00001010   b)   00010000

c)   01000001   d)   none of these.

x)   A ring counter consists of 5 flip-flops will have

a)   5 states   b)   10 states

c)   32 states   d)   none of these.

xi)   The equation $\sqrt{213} = 13$ is valid for which one of the number systems with base?

a)   Base 8   b)   Base 6

c)   Base 5   d)   Base 4.

xii)   The octal equivalent of $(5EA)_{16}$ is

a)   6543   b)   2752

c)   5722   d)   3453.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.   3 x 5 = 15

2. Given the logical expression $U = (A + BC)(B + \bar{C}A)$, Design the circuit using NAND gates.

3. What is race around condition? How can we overcome the race around condition?

4. Find the characteristic equation of a JK flip-flop.

5. Draw and explain the circuit of 8×1 MUX using two 4×1 MUX and one 2×1 MUX.

6. Implement the following Boolean expression using decoder:

$$F(A, B, C, D) = \prod_m(1, 2, 5, 7, 8, 10, 12, 13)$$

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.   3 x 15 = 45

7. a) What is lock out state?

    b) Write a short note on Ring Counter.

    c) Design Mod-6 synchronous counter using JK flip-flops and other gates.   2+5+8

8. Write short notes on any three of the following: 3×5

    a) Johnson Counter

    b) Propagation Delay

    c) Parallel In Serial Out (PISO)

    d) Even Parity Generator & Checker

    e) Two-bit Comparator.

9. a) Design a Full Adder circuit using 3:8 Decoder.

    b) What is priority encoder? Write the truth table of 4-input priority encoder.

c) Implement the following function using 8×1 MUX:

$F(A, B, C, D, E) = \Sigma_m(0, 1,3,4,8,9,15) + \Sigma_d(5,10,13)$.

3+(2+3)+7

10. a) Find the minimal sum of product for the Boolean expression:

$f = \Sigma_m(1,3,4,5,9,10,11) + \Sigma_d(6, 8)$ using K-map.

b) Write a short note on Dual slope A/D converter.

8+7

11. a) What are the types of PLD?

b) Design a code converter circuit or BCD to Excess-3 using ROM.

c) Design a circuit which finds the square of a three-bit number using ROM.

2+6+7

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