CS/B.TECH/EE(N)/EEE(N)/ICE(N)/SEM-3/EC(EE)-302/2013-14

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 Questions)

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, $tpd = 50$ 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.

3105 (N)   [Turn over

3105 (N)   2

x) A ring counter consists of 5 flips 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 $(5\,EA)_{16}$ is

     a) 6543   b) 2752

     c) 5722   d) 3453.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. Given the logical expression $U = (A + BC)(B + \overline{C} A)$. 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 :

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

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.   3

7. a) What is lock out state ?

     b) Write a short note on Ring Counter ?

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

8. Write short notes on any *three* of the following :

     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 4 input priority encoder.

     c) Implement the following function using 8 : 1 MUX

$F (A, B, C, D) = \sum m (0, 1, 3, 4, 8, 9, 15) + d (5, 10, 13)$

     $3 + (2 + 3) +$

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

$f = \sum m (1, 3, 4, 5, 9, 10, 11) + \sum d (6, 8)$ using K-map

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

11. a) What are the types of PLD ?

     b) Design a code converter circuit for BCD to Excess using ROM ?

     c) Design a circuit which find the square of a three bit number using ROM.   2 +