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| --- | --- | --- |
| 1a) | Add following numbers and write answers in i) Hexadecimal, ii) octal, iii) BCD  (3F4)16 (6C8)16 | 8 |
| b) | Convert the following two decimal numbers in binary and perform addition.  (-10) and (-12) | 5 |
| 2a) | The following number is written Gray code format  1001  What is the number in decimal format? | 2 |
| b) | Design a BCD to Gray code converter. Show all steps. | 7 |
| c) | Show that the dual of the exclusive-OR is equal to its complement | 3 |
| 3a) | Express the following function as a sum of minterms and as a product of maxterms  F(A, B,C, D, E) = CDE + ABC’D + ABCDE | 3+3 |
| b) | For a given Boolean functionF(w, x, y, z)=∑(1, 4,5,6,12,14,15)which has the don’tcare conditionsd(w, x, y, z) = ∑(3,7,11)  a) Simplify the Boolean expression  b) Implement the circuit of a) with only NAND gates. | 4+3 |
| 4a) | Design a 3 bit comparator | 5 |
| b) | Given the Boolean expression F = x’y + xyz’  i. Derive an algebraic expression for the complement F’.  ii. Show that F·F’ = 0 | 5 |
| 5a) | Consider the following logical statement and implement it into a digital circuit.  *if (x<y)*  *Sum = x+y*  *else if (x>y)*  *Sum = x-y*  else  Sum = x  Here, X and Y are 1 bit data. Sum is 1 bit result. (You can ignore carry here.) | 7 |
| 5b) | Design a full subtractor circuit. | 5 |

**North South University**

Department of Computer Science and Engineering

**Midterm,**Spring 2017

Course No: **CSE231** Course Title: **Digital Logic Design**

Time:1 h 15 min Full Marks: 60