

Practice Questions

Computer System Architecture

INFO 119

Ques 1: Convert the following binary numbers to Decimal, Hexadecimal and Octal form:

- a. $(1\ 0\ 1\ 1\ 0\ 1.\ 1\ 1\ 0\ 1)_2$
- b. $(1\ 1\ 1\ 1\ 1\ 0\ 1\ 1.\ 1\ 0\ 0\ 1\ 0\ 1)_2$
- c. $(1\ 0\ 1\ 1\ 0\ 1.\ 1\ 1\ 0\ 1)_2$

Ques 2: Perform the following operations?

- a. $(42)_{10} - (68)_{10}$
- b. $(DDCC)_{16} - (BBAA)_{16}$
- c. $(723)_8 - (237)_8$
- d. $(756)_8 - (637)_8 + (725)_{16}$
- e. $(193)_x = (623)_8$

Ques 3: Perform the subtraction using 1's complement method and 2's complement method.

- a. $(1\ 1\ 0\ 1\ 0)_2 - (1\ 0\ 0\ 0\ 0)_2$
- b. $(1\ 0\ 0\ 0\ 1\ 0\ 0)_2 - (1\ 0\ 1\ 0\ 1\ 0\ 0)_2$

Ques 4: Convert the following numbers to binary

- a. $(12.0625)_{10}$
- b. $(41.375)_{10}$

Ques 5:

- a. Perform following subtraction using 11's complement method
 $(0\ 0\ 1\ 1.\ 1\ 0\ 0\ 1) - (0\ 0\ 0\ 1.\ 1\ 1\ 1\ 0)$
- b. Find the reduced POS form of the following equation

$F(A,B,C, D) = \sum m(1,3,7,11,15) + \sum d (0,2,5)$. Implement using NAND logic.

Ques 6: Simply the following Boolean expressions using algebraic simplification:

- a. $AB + \overline{A}\overline{C} + A\overline{B}C(AB+C)$
- b. $\overline{A}BC\overline{D} + BC\overline{D} + B\overline{C}\overline{D} + B\overline{C}D$

Ques 7: A 2 bit digital computer accepts two words $A = a_2 a_1$ and $B = b_2 b_1$ and gives three outputs G,E and L

- i) The output G is HIGH when $A > B$
- ii) The output E is HIGH when $A = B$
- iii) The output L is HIGH when $A < B$
- a) Write the truth table for this comparator
- b) Draw Karnaugh maps for G, L and E outputs and write SOP expressions for each.
- c) Draw the logic diagram for this comparator.

Ques 8: Design a combinational logic circuit that will generate the square of all the combinations of a three bit binary number represented by $A_2 A_1 A_0$

Ques 9:

- a. Use 7s complement method of subtraction to compute $516_8 - 413_8$
- b. Use 8s complement method of subtraction to compute $316_8 - 451_8$
- c. Convert $(615)_8$ to hexadecimal equivalent.
- d. Convert $25B_H$ to its Octal equivalent.
- e. Add $3F B_H$, $7 5 D_H$, $A 1 2_H$ and $C 3 9_H$

Ques 10:

- a. Use 16's complement method to subtract $3B 7_H - 8 5 4_H$
- b. Use 15s complement method of subtraction to compute $B 0 2_H - 9 8 F_H$
- c. Multiply 1110_2 1010_2 using binary multiplication method.
- d. Divide $1 1 0 1 0 1 1 0_2$ by $1 0 1_2$
- e. Express the following numbers in sign magnitude 1's and 2's complement:

- -56
- 107