DISCRETE STRUCTURES
Essay

Abstract

This document describe the details of Discrete Structures course's Essay work. The work included 2 parts: Programming and Report Writing. The Essay will focus on calculation of base 2 numbers which are widely use in computers.

1 Programing: Implement the following functions

Important: Student mustn't change the any function's name or you won't get any point for that function. Student mustn't use any library or you won't get any point from programing section.

1. sum(A,B): return a string C which represent the sum of 2 numbers represented by strings A and B.
   For example: sum('1100','1101')='11001'

2. dif(A,B): return a string C which represent the different of 2 numbers represented by strings A and B.
   For example: dif('101','100')='1'; if A<B return C='error'

3. prod(A,B): return a string C which represent the product of 2 numbers represented by strings A and B.
   For example: prod('10','100')='1000'

4. bitwiseAnd(A,B): return a string C which represent the bit by bit "and"of 2 strings of bits A and B.
   For example: bitwiseAnd('101011','111101')='101001'
   bitwiseAnd('10','101')='0'

5. bitwiseOr(A,B): return a string C which represent the bit by bit "or"of 2 strings of bits A and B.
   For example: bitwiseOr('1100','10')='1110'

6. bitwiseXor(A,B): return a string C which represent the bit by bit "Xor"of 2 strings of bits A and B.
   For example: bitwiseXor('1000','1011')='11'

7. bitwiseNot(A): return a string C which represent the bit by bit "Not"of string of bits A.
   For example: bitwiseNot('1100')='11'
   bitwiseNot('111')='0'

8. bitwiseLeftShift(A): return a string C which represent the left shifted string of bits A.
   For example: bitwiseLeftShift('10010')='101';
   bitwiseLeftShift('11010')='10101'

9. bitwiseRightShift(A): return a string C which represent the right shifted string of bits A.
   For example: bitwiseRightShift('10011')='11001'

10. bin2Hex(A): return a string C which represent the Hexadecimal form of A.
    For example: Bin2Hex('10011')='13'; Bin2Hex('10011111')='9F';

Important: All calculations should be done using bit or binary algorithms. All inputs and outputs should be strings (ie:'101')
Student should return the results of functions not print the results.

2 Report Writing requirements

1. The report should be submitted in pdf file type and using faculty template format.

2. The report should include the following:

   (a) **Introduction:**
   Introduce your functions and application of Binary numbers.

   (b) **Algorithms described:** Describe step by step calculation by manual calculation examples using:
   A=Your student ID but any number will be mod for 2 or character different from convert into (character (ie:'H') if exist will be treated as number 1)
   B=A+A then take out the first number from the left
   for example: student with ID 17H00123
   A='11100101'; B='11001010'

   (c) **Result:**
   Screenshot the results of your functions for the above A and B.

3 Rubric

1. For each correct function: **0.5 points (Total 5 points)**
2. Report have correct format and structure: **0.5 points each (Total 1 point)**
3. Correct content for chapter (a) **0.5 points**, chapter (b) **1 point**, chapter (c) **0.5 points** (**Total 2 points**)
4. Submit file with right name (**StudentID.py** and **StudentID.pdf** contained in a folder named **'StudentID'** compressed into **StudentID.rar or StudentID.zip**): **2 points (if not -5 points)**