**Instructions**

* **All Questions should be in style =Arial black size = 11**
* **All Programs(solutions) in style =Arial rounded size= 12**
* **The Assignment should have : Front Page, Contents(Topics) with line numbers. Each topic should have the Heading in different page.**
* **Each program should have the question followed by program listing and the sample input and output.**
* **Page numbers should match with the contents.**
* **Last date to submit the assignment : 5th Dec 2013**

**Object Oriented Programming**

**Question 1**

To calculate the distance between 2 point is given by the formula



Where x1,y1 and x2,y2 are the co-ordinates of 2 points.

Write a program to calculate the distance between 2 points

**Class name** : Distance

**Data member** : double x,y

**Distance()** : To initialize the object

**void Accept()** : To accept values for x and y

**double calDistance(Distance x):** To calculate the distance between current object and object x and return the distance.

**void Display(Distance x1):** To print the distance between the current object and the object X1

**Question 2**

**Class name**: AgeCompare

Data members : String n; double a;

AgeCompare():Default constructor

Void Accept():Method to accept name and age.

AgeCompare compare(AgeCompare x) :Method to compare the age in the current object with that of object x and return the object with the greater age.

Void Display():Method to display name and age.

**Question 3**

Example program on Call by Value and Call by reference

**Nested Loops**

a) \*

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b) \* \* \* \* \* \* \*

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**Single Dimension Arrays**

1. Union of 2 matrix (AUB)
2. Intersection of 2 matrix (A Intersection B)
3. Selection Sort
4. Bubble Sort
5. Insertion Sort
6. Linear Search
7. Binary Search
8. Menu driven to perform deletion and insertion of elements from the arrays
9. Implementation of Stack using arrays
10. Implementation of Queue using arrays
11. Implementation of Dqueue using arrays

**Double Dimension Arrays**

1. Print the transpose of Matrix
2. Matrix Addition
3. Matrix Multiplication

**Question 4 (2003)**

A wondrous square is an n by n grid which fulfils the following conditions:

* It contains integers from 1 to n2, where each integer appear only once
* The sum of integer in any row or column must add up to 0.5x n x (n2 + 1)

Write a program to read n (2 <= n <=10) and the values stored in these n by n cells and output if the grid represents a wondrous square or not

Also output all the prime numbers in the grid along with their row index and column index as shown in the output.

**Sample Input**

N = 4

16 15 1 2

6 4 10 14

9 8 12 5

3 7 11 13

**Output:**

YES IT REPRESENTS A WONDROUS SQUARE

PRIME ROW INDEX COLUMN INDEX

2 0 3

3 3 0

5 2 3

7 3 1

11 3 2

13 3 3

**Question 5**

Class name : DDA1

Data member : int a[][]=new int[5][5]

DDA1() : Constructor to initialize data members

void Accept() : To accept 5x5 numbers in the array

void Display1() : Display all the elements above the left diagonal

void Display2() : Display all the elements below the left diagonal

void Display3() : Display all the elements above the right diagonal

void Display4() : Display all the elements above the right diagonal

void Swap1() : Swaps the elements above the left diagonal with the elements below the left diagonal

void Swap2() : Swaps the elements above the right diagonal with the elements below the right diagonal

**Modulus**

**Question 1**

**Class name** : AmicableNumbers

**Data member** : int num

**void Input(int n1)** : Parameterized method to initialize num = n1

**int SumFactors(int n1):** To find the sum of all the factors of n1 other than n1 and return it

**boolean checkAmicable(AmicableNumbers x)** : Checks if the number in the current object and the number in object x are Amicable to each other then it returns true else it returns false

**void Display(AmicableNumbers x):** Displays if the number in the current object and the number in the object x are Amicable to each other or not.

**Question 2(2007)**

A unique-digit integer is a positive number (without leading zeros)with no duplicate digits. For eg. 7, 135, 214 are all unique-digit integers whereas 33, 3121, 300 are not

Given two positive integer m and n, where m<n. write a program to determine how many unique- digits are there in the range between m and n(both inclusive) and output them

The input contains two positive integers m and n. Assume n<30000 and n<30000. you are to output the number of unique-digit integers integers in the specified range along with their values in the format specified below:

Sample Data:

**INPUT**

m=100

n=120

**Output:**

THE UNIQUE\_DIGIT INTEGERS ARE:-

102, 103, 104, 105, 106,107, 108, 109, 120

Frequency of unique digits integer is : 9

**INPUT**

M=2500

N=2550

THE UNIQUE\_DIGIT INTEGERS ARE:-

2501, 2503, 2504, 2506, 2507, 2508, 2509, 2510, 2513, 2514,2516, 2517, 2518, 2519, 2530, 2531,2534, 2536, 2537, 2538, 2539, 2540, 2541, 2543, 2546, 2547, 2548, 2549

Frequency of unique digits integer is : 28

**Question 3 (Smith number)**

A smith number is a composite number, the sum of whose digits is the sum of the digits of its prime factors obtained as a result of prime factorization (excluding 1). The first few such numbers are 4, 22, 27, 58, 85, 94, 121,….

**Example:**

1. **666**

Prime factors are 2, 3, 3 and 37

Sum of the digits are (6+6+6) = 18

Sum of the digits of the factors (2+3+3+(3+7))=18

1. 4937775

Prime factors are 3,5,5, 65837

Sum of the digits are (4+9+3+7+7+7+5)=42

Sum of the digits of the factors (3+5+5+(6+5+8+3+7))=42

Write a program to input a number and display whether the number is a Smith number or not.

**Sample Data :**

Input 94 Output SMITH Number

Input 102 Output NOT SMITH Number

Input 666 Output SMITH Number

Input 999 Output NOT SMITH Number

**Question 4(2010)**

A positive whole number ‘n’ that has d number of digits is squared and split into two pieces, a right- had piece that has ‘d’ digits and left-hand piece that has remaining ‘d’ or ‘d-1’ digits. If the sum of two pieces is equal to the number, then ‘n’ is a Kaprekar number. The first few Kaprekar numbers are 9, 45, 297,…..

Example 1

9

92 = 81, right-hand piece of 81 = 1 and left hand piece if 81 = 8

Sum = 1 + 8 = 9 i.e equal to the number

Example 2

45

452= 2025

Sum = 20+25= 45, ie equal to the number

Example 3

297

2972=88209

Sum = 209 + 88 = 297, ie equal to the number, right-hand piece of 88209 = 209 and left hand piece if 88209 = 88.

Given 2 positive integers p and q, where p<q, write a program to determine how many Kaprekar numbers are there in the range between p and q(both inclusive) and output them.

The number contains 2 positive integers p and q. Assume p<5000 and q<5000. You are to output the number of Kaprekar numbers in the specified range along with their values in the format specified below:

**SAMPLE DATA:**

**INPUT**

p=1

q=1000

**OUTPUT**

THE KAPREKAR NUMBERS ARE:

1, 9, 45, 55, 99, 297, 703, 999

FREQUENCY OF KAPREKAR NUMBERS IS : 8

**STRING**

**Question 1**

Write a program which takes a sting (maximum 80 characters) terminate by a

full stop. The words in this string are assumed to be separated by one or more blanks.

Arrange the words of the input string in descending order of their lengths.

Same length words should be stored alphabetically. Each word must start with

an uppercase letter and the sentence should be terminated by a full stop.

Test your program for the following data and some random data.

SAMPLE DATA :

INPUT :

“ This is human resource department ”

OUTPUT :

Department Resource Human This is.

INPUT :

“To handle yourself use your head and to handle others use your heart.”

OUTPUT :

Yourself Handle Handle Others Heart Head Your Your And Use Use To To.

**Question 2**

The input in this problem will consists of a number of lines of English text

consisting of the letters of the English alphabet, the punctuation marks (‘)

apostrophe, (.) full stop, (,) comma, (;)semicolon, (:) colon and white space

characters (blank, newline). Your task is to print the word of the text in reverse

order without a punctuation marks other than blanks.

For example consider the following input text:

This is a sample piece of text to illustrate this problem. If you are smart you

will solve this right.

The corresponding output would read as:

right this solve will you smart are you If problem this illustrate to text of piece

sample a is This.

that is , the lines are printed in reverse order.

**Note: Individual words are not reversed.**

**Input format**

The first line of input contains a single integer *N ( < = 20 )*, indicating the

number of lines in the input. This is followed by N lines of input text. Each line

should accept a maximum of 80characters.

**Output format**

Output the text containing the input lines in reversed order without punctuation

except blanks illustrated above.

Test your program for the following data and some random data.

**SAMPLE DATA**

**INPUT:**

**2**

Emotions, controlled and directed to work, is character. By Swami Vivekananda.

**OUTPUT:**

Vivekananda Swami By character is work to directed and controlled Emotions.

**INPUT:**

1

Do not judge a book by its cover.

**OUTPUT**

cover its by book a judge not Do.

**Date**

1. class Name : MyDate

Data member : int dd,mm,yy

MyDate() : Constructor to initialize data member

void Accept() : To accept day, month and year

int julianDate() : To find the number of days between the beginning of the given year to the given date.

void Display() : To print the Julian date

1. class Name : MyDate2

Data member : int dd,mm,yy

MyDate2() : Constructor to initialize data member

void Accept() : To accept day, month and year

int diff(MyDate2 X) : Difference between current object and object X. Assuming the year in both the dates are **same.**

void Display(MyDate2 X) : To print the difference between 2 dates

1. Write a program to accept date in dd-mm-yyyy format and print the same in words

Input : 31-03-2012

Output1 : Thirty one – Three – Two Thousand and Twelve

Output2 : 31st-March-2012

**Assignment On Inheritance**

**Question 1(2012)**

A super class Detail has been defined to store the details of a customer. Define a sub class Bill to compute the monthly telephone charge of the customer as per the chart given below:

**Number of calls Rate**

* 1. Only rental charge
  2. 60 paise per call + rental charge
  3. 80 paise per call + rental charge

Above 300 1 rupee per call + rental charge

The details of both the classes are given below.

**Class name : Detail**

Data Members / Instance Variables

name : to store the name of the customer

address : to store the address of the customer

telno : to store the phone number of the customer

rent : to store the monthly rental charge

Member function

Detail(…) : parameterized constructor to assign

values to data members

void show() : to display the details of the customer

**Class name : Bill**

Data Members / Instance Variables:

n : to store the number of calls

amt : to store the amount to be paid by the customer

Member Functions:

Bill(…) : parameterized constructor to assign values

to data members of both classes and

initialize amt=0.0

void cal() : calculates the monthly telephone charge as

per the chart given above

void show() : displays the details of the customer and

amount to be paid

Specify the class Detail giving details of the constructor() and void show(). Using the concept of inheritance, specify the class Bill giving details of the constructor(), void cal, and void show.

THE MAIN() FUNCTION AND ALGORITHM NEED TO BE WRITTEN.

**Assignment - Recursion**

**Question 1**

A class HiFact has been defined to find the HCF of two numbers using recursive technique. This HCF is used to find the LCM of the two numbers. Some members of the class are given below:

Class Name: HiFact

Data Members: int a, b, hcf, lcm.

HiFact(): contructor to assign initial values

void getdata(): to input values of 'a' and 'b'

void change(): to swap a and b if a>b

int rechcf(int, int): to find hcf using recursive technique

int fn\_lcm(int, int, int,): to find lcm using 'a', 'b', and hcf

void results(): To invoke rechcf() and fn\_lcm() and to print lcm, hcf of the two numbers, 'a' and 'b'

**Question 2**

Class name: Convert

Data Members: int n (integer whose digits are to be expressed in words)

Convert(): constructor to assign 0 to n

void inpnum(): to accept value of n

void extdigit(int): to extract digits of n using recursive technique

void num\_to\_words(int): to display digits of an integer in words

**Assignment - Linked Lists**

1. Generic list with insertBegin, insertEnd, insertMiddle, deletes, etc.
2. Count all the nodes in a list
3. Sum of all elements in a list
4. Search for a value in the list
5. Split a list into two
6. Merge two lists into one
7. Reverse a list
8. Sort a list
9. Compare two lists and check is they are equal
10. Implement stack using linked lists
11. Implement queue using linked lists

Merge as many of these functions as possible into one menu-driven program. Seperate programs for things like merging, splitting, stacks, queues, comparing can be used.

**Assigment – Trees**

You will be required to create a menu-driven program for a binary tree which does the following:

1. Create and insert a node
2. Display inorder
3. Display preorder
4. Display postorder
5. Count the number of nodes and display
6. Search for a value in the tree