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# PART – A

**(Write any THREE questions from this PART )**

## In preparing the electricity bill preparation, the following rule is followed:

**If customer category = Institution,**

**For first 1000 units, rate is Rs. 5.50 per unit**

**For the next 4000 units, Rs. 7.75 per unit**

**Above 5000 unit, Rs. 9.75 per unit**

**If customer category = Company,**

**For first 5000 units, rate is Rs. 6.50 per unit**

**For the next 5000 units, Rs. 11.75 per unit**

**Above 10000 unit, Rs. 13.25 per unit**

**If customer category = Domestic,**

**For first 100 units, Fixed amount 200**

**For the next 200 units, Rs. 3.50 per unit**

**For the next 300 units, Rs. 4.75 per unit**

**Above 600 unit, Rs. 6.00 per unit**

**Write a program to read Customer name , Customer number, previous reading and current reading and display the output in the following format (Sample):**

**ELECTRICITY BILL**

**Customer Name : Customer Number:**

**Customer category: Unit Consumed : 200**

**Amount details:**

**Between : 1 – 100 - 200**

**Between : 101 – 300 - 350**

**Between : 301 – 600 - 0**

**Above 600 : - 0**

**Total Amount - 550**

**Amount in words - Rupees Five Five Zero**

#include <stdio.h>

#include <string.h>

#include <stdlib.h>

const int LIMITS[] = {1, 0, 1000, 5000,

                2, 0, 5000, 10000,

                3, 0, 100, 300, 600,

                -1};

const double PRICEMAP[] = {1, 5.5, 7.75, 9.75,

                     2, 6.5, 11.75, 13.25,

                     3, 0, 3.5, 4.75, 6.0,

                     -1};

const char \*CATEGNAME[] = {"Institution", "Company", "Domestic"};

const char \*NUMWORD[] = {"Zero", "One", "Two", "Three", "Four", "Five", "Six", "Seven", "Eight", "Nine"};

int printBill(char\*, char\*, int, int);

char \*numtowords(int);

int main(int argc, char const \*argv[]) {

    char cname[80], cnumb[10];

    int preread, curread, ccateg;

    printf("Customer Name: ");scanf("%s", &cname);

    printf("Customer Number: ");scanf("%s", &cnumb);

    printf("Customer category:\n[1]Institution\n[2]Company\n[3]Domestic\n>> ");scanf("%d", &ccateg);

    printf("Previous reading: ");scanf("%d", &preread);

    printf("Current reading: ");scanf("%d", &curread);

    printBill(cname, cnumb, ccateg, curread);

    return 0;

}

int printBill(char \*custname, char \*custnumb, int custcateg, int reading) {

    int categlimpos;

    int readtemp = reading;

    double totalprice = 0;

    /\* Find the position of current category in the limits list \*/

    for (int i = 0; i < sizeof(LIMITS)/sizeof(LIMITS[0]); i++)

        if (LIMITS[i] == custcateg) {categlimpos = i;break;}

    printf("\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\n");

    printf("\t\t\tElectricity Bill\n");

    printf("\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\n");

    printf("Customer Name: %s\tCustomer Number: %s\nCustomer Category: %s\tUnits Consumed: %d",

            custname, custnumb, CATEGNAME[categlimpos-1], reading);

    printf("\n\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\nAmount Details:");

    for (int i = categlimpos + 1; LIMITS[i]%10 == 0; i++) {

        double cost;

        if (reading > LIMITS[i+1] && LIMITS[i+1] % 10 == 0) {

            readtemp -= (LIMITS[i+1] - LIMITS[i]);

            if (custcateg == 3 && LIMITS[i] == 0) cost = 200;   // Special condition for Domestic

            else cost = PRICEMAP[i] \* (LIMITS[i+1] - LIMITS[i]);

        } else { cost = PRICEMAP[i] \* readtemp; readtemp = 0;}

        totalprice += cost;

        printf("\n\tBetween: %d - %d\t- %.2f", LIMITS[i]+1, LIMITS[i+1]%10==0?LIMITS[i+1]:reading, cost);

    }

    printf("\nTotal Amount\t\t\t- %.2f", totalprice);

    printf("\nAmount in words: \t\t- %s", numtowords((int)totalprice));

    printf("\n\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_");

    return 0;

}

char \*numtowords(int num) {

    int wordindexlist[10], numlen = 0, wordslen = 0, numtemp = num;

    for (int i = 0; num > 0; i++) {

        wordindexlist[i] = num%10;

        numlen++;

        wordslen += strlen(NUMWORD[num%10]) + 1;

        num /= 10;

    }

    char \*str = NULL;

    str = malloc(wordslen);

    strcpy(str, "Rupees");   // Initialize with the first word

    for (int i = numlen-1; i >= 0; i--) { strcat(str, " ");strcat(str, NUMWORD[wordindexlist[i]]); }

    strcat(str, " Only");

    return str;

}

2. Tom has to send a secret code S to his boss. He designs a method to encrypt the code using two key values N and M**. The formula that he uses to develop the encrypted code is shown below:**

**(((S\*N%10)^M)%17)**

**Write an algorithm to help Bob to encrypt the code.**

**Input:**

**The input to the function consists of three arguments secret code, an integer representing the secret code (S) value N, an integer representing the key value N and value M, an integer representing the key value M.**

**Output:**

**Return an integer representing the code encrypted by TOM**

#include <stdio.h>

int encrypt(int, int, int);

int main(int argc, char const \*argv[])

{

    int scode, nkey, mkey;

    printf("Secret code: ");scanf("%d", &scode);

    printf("Key N: ");scanf("%d", &nkey);

    printf("Key M: ");scanf("%d", &mkey);

    printf("Encrypted code: %d", encrypt(scode, nkey, mkey));

    return 0;

}

int encrypt(int s, int n, int m) {

    return (((s\*n%10)^m)%17);

}

## 5. Write a C program to check if a six-digit number has three consecutive 5s.

**If yes, print YES, else print NO.**

**Example: Number: 135355 Result: NO**

**Number: 345559 Result: YES**

#include <stdio.h>

int validateconsecfives(int);

int main(int argc, char const \*argv[]) {

    int input;

    printf("Enter a 6 digit number: ");scanf("%d", &input);

    if (validateconsecfives(input) == 0) {

        printf("Yes");

    } else if (validateconsecfives(input) == 1) {

        printf("No");

    } else if (validateconsecfives(input) == 2) {

        printf("Enter a six digit number");

    }

    return 0;

}

int validateconsecfives(int input) {

    int temp = input;

    int fives = 0;

    if (input < 100000 || input > 999999) { return 2; }

    while (temp > 0) {

        if (temp % 10 == 5) {

            fives++;

        } else {

            fives = 0;

        }

        temp /= 10;

        if (fives >= 3) { return 0; }

    }

    return 1;

}

# PART – B

**(Write any five questions from this PART )**

## Assume that A is an array consisting of ‘n’ values. Write a program to count the number of prime numbers in that array

#include <stdio.h>

int main(int argc, char const \*argv[])

{

    int n, primecount = 0, primeflag;

    printf("Enter the size of the array: ");

    scanf("%d", &n);

    int arr[n];

    printf("Enter %d elements of the array: ", n);

    for (int i = 0; i < n; i++) {

        scanf("%d", &arr[i]);

    }

    for (int i = 0; i < n; i++) {

        primeflag = 0;

        for (int j = 2; j <= arr[i]/2; j++) {

            if (arr[i] % j == 0) {

                primeflag = 1;

                break;

            }

        }

        if (primeflag == 0) {

            primecount++;

        }

    }

    printf("There are %d prime numbers in the array.", primecount);

    return 0;

}

## Assume that A is an array consisting of ‘n’ values and has some duplicate values. Write a program to copy only the unique elements into another array

**Example: Given array is 5 6 7 1 5 1 2**

**The resultant array 5 6 7 1 2**

#include <stdio.h>

int \*initarray(int\*, int);

int main(int argc, char const \*argv[]) {

    int n, ctr = 0, existflag;

    printf("Enter the size of the array: ");scanf("%d", &n);

    int arr[n], uniqarr[n];

    initarray(uniqarr, n);

    printf("Enter the array: ");

    for (int i = 0; i < n; i++) {

        scanf("%d", &arr[i]);

    }

    for (int i = 0; i < n; i++) {

        existflag = 0;

        for (int j = 0; uniqarr[j] != 0; j++) {

            if (arr[i] == uniqarr[j]) {

                existflag = 1;

                break;

            }

        }

        if (existflag == 0) {

            uniqarr[ctr] = arr[i];

            ctr++;

        }

    }

    printf("Unique array: ");

    for (int i = 0; uniqarr[i] != 0; i++) {

        printf("%d ", uniqarr[i]);

    }

    return 0;

}

int \*initarray(int \*array, int size) {

    for (int i = 0; i < size; i++) {

        array[i] = 0;

    }

}

## Assume that A is an array consisting of ‘n’. Write a program to replace the prime number as 1 and all the remaining elements as 0

**Example: Given array is 5 6 8 1 5 4 2**

**The resultant array 1 0 0 1 1 0 1**

#include <stdio.h>

int main(int argc, char const \*argv[]) {

    int n, primeflag;

    printf("Enter the size of the array: ");

    scanf("%d", &n);

    int arr[n];

    printf("Enter %d elements of the array: ", n);

    for (int i = 0; i < n; i++) {

        scanf("%d", &arr[i]);

    }

    for (int i = 0; i < n; i++) {

        primeflag = 0;

        for (int j = 2; j <= arr[i]/2; j++) {

            if (arr[i] % j == 0) {

                primeflag = 1;

                break;

            }

        }

        if (primeflag == 0) {

            arr[i] = 1;

        } else {

            arr[i] = 0;

        }

    }

    printf("Replaced array:\n");

    for (int i = 0; i < n; i++) {

        printf("%d ", arr[i]);

    }

    return 0;

}

## Write a Program to add two numbers without using + operator

#include <stdio.h>

int sum(int, int);

int main(int argc, char const \*argv[]) {

    int num1, num2;

    printf("Enter 2 numbers(separated by space): ");

    scanf("%d%d", &num1, &num2);

    printf("Sum of %d and %d is %d.", num1, num2, sum(num1, num2));

    return 0;

}

int sum(int a, int b) {

    unsigned int temp;

    while (b != 0) {

        temp = a & b;

        a = a ^ b;

        b = temp << 1;

    }

    return a;

}

## Write a program to remove character C from a string S

#include <stdio.h>

int main(int argc, char const \*argv[]) {

    int size = 100;

    char str[size], remchar;

    printf("Enter a string: ");fgets(str, size, stdin);

    printf("Enter the character to remove: ");scanf("%c", &remchar);

    for (int i = 0; i < size; i++) {

        if (str[i] == remchar) {

            for (int j = i; j < --size; j++) {

                str[j] = str[j+1];

            }

        }

    }

    printf("%s", str);

    return 0;

}