***ITP ASSIGNMENT***

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q1) Write a program to determine the smallest positive integer n with the following property.

* Let n=akak-1 …...a1a0 be the decimal representation of n with ak>0.
* Look at the integer:

n’=a0akak-1 …. a2a1 (the cyclic right shift of n).

The desired property of n is that n' must be a proper integral multiple of n.

***ABSTRACT:***

***In this we are discussing about the smallest number with non repeating digits which when the digits are cyclically right shifted forms a multiple of the original number.***

***INTRODUCTION***

The C language provides us with the facility to define functions and then use them in our program without writing the required code every time.

Functions are outside the main function and we provide the return data type and also the data type of parameters on which the function is called. When using in the main function we call the function as a process or as a return value depending on the return data type specified by us.

Basic idea: The basic idea is to use a loop to find the required number and also in the same loop check for the right shifted number.

***APPROACH***

**Step1:** The header file stdio.h is included to include all the required functions of the program.

**Step2:** Then the functions checkzero and checksame are defined. checkzero checks the digit of a number to be zero and checksame checks if the digits are repeated or not.

**Step3:** The recursive function binpow is defined to calculate the value of ab .

**Step4:** In the main function a for loop is created for a variable ‘i’ with lower limit as 10. Then the checkzero and checksame functions are called in an OR operation with either being equal to 1 for the loop to continue.

**Step 5:** Then the value of ‘i’ is initialised to a new variable ‘x’ and a variable counter is created to calculate the maximum 10’s power in the number. This is calculated using a while loop dividing x each time by 10 and incrementing the counter till x becomes 0.

**Step 6:** Two new variables are created num and mul. ‘mul’ is defined as binpow(10,counter-1) i.e., 10counter-1 .

**Step 7:** ‘num’ is the cyclic right shifted number. Using i%10 the one’s digit of ‘i’ becomes the head digit of ‘num’. Then num is redefined as num\*mul and the number is completed by adding the value of i/10 into the newly defined ‘num’. This will assign the right-shifted number value to the variable ‘num’.

**Step 8:** Then ‘num’ is checked for being the multiple of ‘i’. If it is the message “The number is [i]” is printed and the loop is stopped otherwise the loop continues.

***CONCLUSION***

Through this question one can understand the importance of user-defined function in C language. Declaration of functions, their calling, parameters and return types all are very important when using this powerful tool in C .

The concept of looping and different looping statements is also very important when learning C programming and specifically when solving such problems.

q8)Generate a random sequence of birthdays and store the birthdays in an array.

* As soon as a match is found, report that.
* Also report how many birthdays were generated to get the match.

***ABSTRACT:***

***In this report, we are discussing about an generating a random sequence of birthdays and storing it in a array and as soon as a match is found it is reported and number of birthdays generated before are reported***

***Keywords: seed, rand() function, srand function(), structure, arrays***

***INTRODUCTION***

The C language provides a capability that enables the user to design a set of similar data types called array. Array is a collective name given to a group of similar quantities.

The **struct** statement defines a new data type, with more than one member.

**The C library function void srand(unsigned int seed)** seeds the random number generator used by the function rand.

**Seed** − This is an integer value to be used as seed by the pseudo-random number generator algorithm.

Basic Idea**:** The idea is to store a random birthday sequence in an array using the srand() function and then using loops to print the match.

***APPROACH***

**Step1:** First all the header files are included like the stdio.h , stdlib.h and time.h .Then a structure birthday is created with integer contents like day, month and year.

**Step2:** srand() function is seeded using the time parameter.Then we initialise an array of size 10000 to store a random birthday sequence in 2001.

**Step3:** Using a loop array is populated. rand() function can generate a number of any magnitude, so month number is adjusted taking modulo with 12 and adding 1 to it(as rand()%12 lies between 0 to 11)

**Step4:** Birthday day is populated with if else statements. Month number 1 to 12 denotes month january to december . Months are filtered using the month number and then month date is adjusted using the number of days in the corresponding month with the help of modulo function(taking modulo with number of days in the month and adding 1 to it).

**Step5:** Now as the birthday array has been populated, then to find a match a loop is written. This loop runs i times and the number of birthdays generated for a match are printed by i+1.

**Step6:** Finally if a match is found the program is terminated by exit(0), else the loop is executed again.

***CONCLUSION***

**T**his problem is the famous birthday paradox problem which states that there is a 99% chance of two people having the same birthdays in a group of 25 people. So if we make it 2\*25 i.e 50 people we are almost certain that we will get a match if the year is same.I ran the code 20 times and never got an answer greater than 50

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