COMPUTER PROGRAMMING

ASSIGNMENTS – 07 (JANUARY 11, 2023)   CODE: assign07
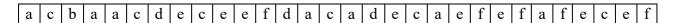
NOTES: You must use gcc compiler under Ubuntu OS

i) Please carefully read all assignment problems and answer in a single c file. You must invoke all functions from main program and write additional functions as necessary. You must have only one main function in the file and you can call other recursive functions from the main function appropriately.

ii) You can write more than one recursive function for each task as well.

iii) Create a .c file by strictly following the file naming convention: If the last 3 digits of your roll number is 127 & code is assign07, then the file name should be 127-assign07.c

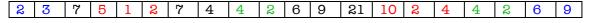iv) If you do not follow the above instruction, your file will not be evaluated

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PROBLEMS   **[Total Marks: 30]**

1) **[Marks: 3]** Write a **recursive function** to compute the sum of all prime digits of a given number (assume a large integer (having at least 8 digits) as the input).

2) **[Marks: 4]** Write a **recursive function** that prints all numbers less than N which consists of k digits and each of k digits can be 1 or 3 or multiples of 3 only (if N = 20, then output must be 19, 16, 13, 11, 9, 6, 3, 1). Choose N $\in$ [20, 100] and the recursive function must have at least one argument N.

3) **[Marks: 5]** Consider the following string namely str of length 30 characters.

a	c	b	a	a	c	d	e	c	e	e	f	d	a	c	a	d	e	c	a	e	f	e	f	a	f	e	c	e	f

Now write a **recursive function** to identify the maximum repeating substring of length k where k $\in$ [2, 4] (Note: Simply move only from left to right direction)

4) **[Marks: 8]** Take an array of 20 integers as given below:

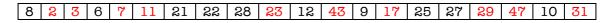| 2	3	7	5	1	2	7	4	4	2	6	9	21	10	2	4	4	2	6	9

Now write a **recursive function** to identify the following task:

A subarray can repeat in the same array with a constant multiplied with each element of the subarray. For example, consider the following subarray: 2 3 7. Multiplying each element with a constant 3 gives 6 9 21 which is also present in the array.

Find all such subarrays of length 2 and 3.

5) **[Marks: 10]** Assume the following integer array of size 20 elements:

8	2	3	6	7	11	21	22	28	23	12	43	9	17	25	27	29	47	10	31

Write a **recursive function** to convert this into a 2-dimensional matrix in which
(a) The first row will only have non-prime numbers and
(b) The second row will have prime numbers.