M. Tech (CSE-ISE) Number Theory and Cryptography (CS800)

Lab Assignment-2 (Week-4: 30.08.2018)

(**Topic:** Prime Numbers and Factorization)

A. Write a MATLAB program to:

(a) Find an integer n such that n/2 is a square,n/3 is a cube and n/5 is a fifth power. Apply proper theorem(s). Highlight the applied theorem(s) in the comments.

(b) If (a,b)=p, a prime,what are the possible values of (a^2,b)? Of (a^3,b)? Of (a^2,b^3)?Apply proper theorem(s). Highlight the applied theorem(s) in the comments.

(c) Do prime factorisation of any given number.Apply proper theorem(s). Highlight the applied theorem(s) in the comments.

(d) Find the largest prime factor of any given number.Apply proper theorem(s). Highlight the applied theorem(s) in the comments.

(e) Prove that there are infinitely many primes of the form 4n+3; of the form 6n+5.Apply proper theorem(s). Highlight the applied theorem(s) in the comments.

(f)Lia is fascinated by anything she considers to be a twin. She calls a pairs of positive integers, and , twins if: They are both prime & Their absolute difference is exactly equal to 2.

Given an inclusive interval of integers from to, can you help Lia find the number of pairs of twins there are in the interval ([n,m])?

Note that pairs (i,j) and (j,i) are considered to be the same pair.

Input Format: Two space-separated integers describing the respective values of n and m.

(g) Given two integers ‘L’ and ‘R’, write a program to find the total numbers that are having prime number of set bits in their binary representation in the range [L, R].

Input Format: Two space-separated integers describing the respective values of L and R

(h) Given a number N, task is to Check whether it is a permutable prime number or not.

Input Format: Take single integers describing the value of N.

(i) Given a String str, the task is to check if the sum of ASCII value of all characters is a prime number or not.

Input Format: In the first line take string as a input.

(j) A **k-rough** or **k-jagged** number is a number whose smallest prime factor is greater than or equal to the number 'k'. Given numbers 'n' and 'k' as input, we are required to find whether 'n; is a k-rough number or not.

Input Format Two space-separated integers describing the respective values of n and k.

(k)To print n prime number which comes after 3 non prime number.

for example:

Input n=10;

Output:=7,11,17,23,41,47,71,83,101,107.

Practice program: (Every tutor/AL should add one practice program and its MATLAB code should be demonstrated by tutor/AL during the beginning of a lab)

(k) Ajnas Muhammed (Phd) Q:

(l) Gautam Amiya (AL) Q: Write a function to find prime numbers ,say upto 5000.Apply proper theorem(s). Highlight the applied theorem(s) in the comments.

(m) Rajat Verma (M. Tech) Q: Write a program to check whether a number is prime or not ? (In less than $\sqrt{n}$ time)

(n) Kapil Patidar(M.Tech): Q:Given an even number (greater than 2), print two prime numbers whose sum will be equal to given number. There may be several combinations possible. Print only first such pair.

(O)Sagar jawanlal (M.Tech):Q:To find Twin prime number between the given range.

Twin prime number are the number whose difference is 2. for example (3,5),(5,7).

B. Note:

1. Write your MATLAB program as a function with its manual page.

2. Proper indentation with comments is mandatory.

3. Upload your source code (.m) with the name **<rollno>-<qno>.m** (<qno> is the assigned question no. and <rollno> is the roll no. of the respective student, eg. 182257) and a snapshot of the result as **<rollno>-<qno>.png** at brc.nitk.ac.in

C. Program to be executed:

Sl.No.	**Q**	**Sl. No.**	**Q**	**Sl. No.**	**Q**	**Sl. No.**	**Q**	**Sl. No.**	**Q**
1	a, f	6	b,g	11	c, h	16	d, j	21	e, f
2	f, b	7	c, h	12	h, a	17	d, f	22	j,c
3	j, e	8	a, i	13	e,g	18	g, b	23	g,a
4	c, f	9	d, j	14	b,j	19	f,c	24	h,d
5	d, h	10	e, i	15	a,f	20	a,h	25	b, h

***** Best of Luck *****