DATA STRUCTURES

BATCH – A
[TUESDAY JANUARY 17, 2017: 2:00 PM – 5:00 PM]

ASSIGNMENTS – 2 CODE: assign02

INSTRUCTIONS:

i) Please carefully read all assignments and there is no choice.
ii) Each problem in this assignment has to be answered in the same c file.
iii) Create a .c file following the file name convention:
If your roll number is abc and assignment code is: assign02
Then use the following file name convention as follows: abc-assign02.c
For example, if the roll number is 67 and assignment code is assign02
then the file name should be 067-assign02.c
iv) Strictly follow the file name convention.
v) Do not use scanf() or do not use unnecessary print statement.
Just print only those you are asked to do in each assignment.

PROBLEMS [Total Marks: 25]:

Consider the following 6 x 9 matrix:

$$\begin{bmatrix} 5 & 3 & 2 & 7 & 3 & 1 & 9 & 1 & 5 \\ 8 & 7 & 4 & 5 & 1 & 9 & 2 & 3 & 6 \\ 7 & 5 & 6 & 1 & 6 & 1 & 2 & 1 & 3 \\ 2 & 2 & 1 & 3 & 2 & 5 & 1 & 5 & 0 \\ 3 & 1 & 4 & 3 & 8 & 3 & 6 & 1 & 9 \\ 1 & 3 & 4 & 8 & 6 & 9 & 4 & 1 & 1 \end{bmatrix}$$

1) **[Marks: 2 marks]**
Read the matrix and print the same (preserving the rank of the matrix!!)

2) **[Marks: 6 marks]**
Identify the only one **row** of integers with which you could create a magic square of size 3. Print the following:
a) Print the magic square of size 3
b) Find the transpose of that row and sum of that row.

3) **[Marks: 5]**
Write a program to count the number of paths in the 2-d matrix between the origin (0, 0) and point (m-1, n-1), where m and n are nonnegative integers, such that each path is made up of a series of steps, where each step is a move one unit to the right or a move one unit downward. (No moves to the left or upward are allowed.)

4) **[Marks: 4]**
Identify the PASCAL TRIANGLE in the given matrix and print the following: element and its coordinate (x, y)

For example, the element in the 2^{nd} row 4^{th} column from left can be printed as:

5 (1, 3)

5) **[Marks: 5]**
Find two columns in such a way that the sum of first column would be reflexive to the sum of the second column.

Print these two columns
Print the transpose of these two columns with their sum at the end of each column.

6) **[Marks: 3]**
Construct a square matrix of prime numbers from the above matrix in such a way that the given matrix is reduced by removing non-prime numbers in each row and then by adding zero to the tail of each smallest row of prime numbers so as to make it as a square matrix.

DATA STRUCTURES

BATCH – B [THURSDAY JANUARY 19, 2017: 2:00 PM – 5:00 PM]

ASSIGNMENTS – 2 CODE: assign02

NOTES:

1) Please carefully read all assignments and there is no choice.
2) Each problem in this assignment has to be answered in the same c file.
3) Create a .c file following the file name convention:
   If your roll number is abc and assignment code is: assign02
   Then use the following file name convention as follows: abc-assign02.c
   For example, if the roll number is 92 and assignment code is assign02, then the file name should be 092-assign02.c
4) Strictly follow the file name convention.
5) Do not use scanf() or do not use unnecessary print statement. Just print only those you are asked to do in each assignment.

PROBLEMS [Total Marks: 20]:

1) **[Marks: 3]**
   Compute the sum of first 20 even numbers that are divisible by 3 in [1... 500]
   Print the sum as the output.

2) **[Marks: 3]**
   Identify all integers that are divisible by 7 but not 2 in [1, 100].
   Print all integers.

3) **[Marks: 4]**
   Identify all nonzero odd factors of any positive integer in [60, 200]
   Print all nonzero odd factors in a row with a space

4) **[Marks: 5]**
   Write a program to count the number of even digits in a given number.
   Assume a large integer as your input. Print the count as the output.

5) **[Marks: 5]**
   An arithmetic progression (AP) is given by a, (a + d), (a + 2d), (a + 3d), … where a = the first term, d = the common difference.
   For example, 1, 3, 5, 7, … is an arithmetic progression with a = 1 and d = 2
   Write a program to generate an arithmetic progression up to n where n=100
   Compute the sum of the terms in this arithmetic progression.

   Print the arithmetic progression and the sum, each in a separate line.
