KRISHNAGAR ACADEMY

Half Yearly Examinations Phase II
Class: XII
Subject: Computer Science

FM 50

Section A
(Attempt All the Questions)

Question 1:

(a) Prove the following Demorgan's laws using laws of boolean algebra. [2]
(A + B)' = A'.B'
(A.B)' = A' + B'

(b) Obtain a simplified expression for the given boolean function using Karnaugh's map: [4]
F (a, b, c, d) = Σ (1, 2, 3, 11, 12, 14, 15)

(c) A factory needs a minimum of 1200 tons of raw material and at least 100 workers to start its production. There are three suppliers each agreed to supply 600, 800 and 1250 tons of raw materials respectively.
A=1 if the first supplier supplies else it is 0.
B=1 if the second supplier supplies else it is 0.
C=1 if the third supplier supplies else it is 0.
D=1 if 100 workers are available else it is 0.
R=1 if production starts else it is 0.
(a) Taking A, B, C and D as inputs and R as output draw truth table for the problem stated above and derive its SOP expression.
(b) Reduce the above SOP expression using the K-map. [10]

(d) Find the complement of the following expressions:
(A + B).(B + C).(A + C) [2]

(e) From premises A ⇒ B and B ⇒ A, conclude B' + A.B. [2]

Section B
(Attempt any Three questions)

Question 1:

Write a program to accept the year, month and the weekday name of the 1st day of that month and generate its calendar. [10]

Example :

INPUT:
Year: 2016
Month : February
1st day of February : Monday

OUTPUT :

```
---------------------------------
          February 2016
---------------------------------
SUN MON TUE WED THU FRI SAT
---------------------------------
     1   2   3   4   5   6
---------------------------------
 7   8   9   10  11  12  13
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 14  15  16  17  18  19  20
---------------------------------
 21  22  23  24  25  26  27
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 28  29
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Question 2:

A square matrix is said to be a Magic Square, if the sum of each row, each column and each diagonal is same. Write a program to enter an integer number 'n'. Create a magic square of size 'n*n'. Finally, print the elements of the matrix as Magic Square. [10]

Note: n <= 5

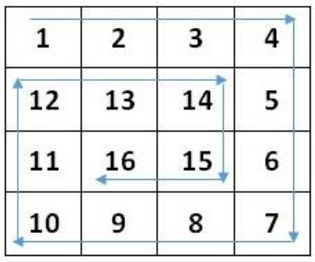
Sample Input: Enter the size of the matrix : 4
Sample Output: The Magic Matrix of size 4×4 is:

16	2	3	13
5	11	10	8
9	7	6	12
4	14	15	1

Question 3:

Write a Program in Java to fill a square matrix of size ‘n*n” in a circular fashion (clockwise) with natural numbers from 1 to n*n, taking ‘n’ as input. [10]

For example: if n = 4, then n*n = 16, hence the array will be filled as given below.



1	2	3	4
12	13	14	5
11	16	15	6
10	9	8	7

Question 4:

Write a Program in Java to input a number and check whether it is a **Keith Number** or not. [10]

Note: A Keith Number is an integer N with ‘d’ digits with the following property:

If a Fibonacci-like sequence (in which each term in the sequence is the sum of the ‘d’ previous terms) is formed, with the first ‘d’ terms being the decimal digits of the number N, then N itself occurs as a term in the sequence.

For example, 197 is a Keith number since it generates the sequence
1, 9, 7, 17, 33, 57, 107, 197, ……..

Some Keith numbers are: 14 ,19, 28 , 47 , 61, 75, 197, 742, 1104, 1537……

Question 5:

Write a program to count the number of spaces, words, vowels, digits and consonants in a sentence using recursive method.

Also find out the same using iterative method. Now compare the two process and give a conclusion. [10]