COMPUTER SCIENCE

Paper – 2

(PRACTICAL)

(Maximum Marks: 30)

Time allowed:

Day 1 - Planning session: 90 minutes

Day 2 - Examination session: 90 minutes

(*On Day 1, candidates are allowed additional 15 minutes for only reading the paper.*

*They must NOT start writing during this time.***)**

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*This paper consists of **three** problems from which candidates are required to attempt **any one** problem.*

Candidates are expected to do the following:

A. During Planning Session on Day 1:

1. Write an algorithm for the selected problem. **[3marks]**
(Algorithm should be expressed clearly using any standard scheme such as pseudo code or in steps which are simple enough to be obviously computable.)

2. Write a program in **JAVA** language. The program should follow the algorithm and should be logically and syntactically correct. Document the program using mnemonic names / comments, identifying and clearly describing the choice of data types and meaning of variables. **[7marks]**

Note: At the end of this session, the candidates must hand over the Answer Scripts, along with their Question Papers, to the Supervising Examiner. These Answer Scripts and the Question Papers will be handed over to the candidates on the day of the Examination Session.

B. During Examination Session on Day 2:

1. Code / Type the program on the computer and get a printout (hard copy). Typically, this should be a program that compiles and runs correctly. **[2marks]**

2. Test run the program on the computer using the given sample data and get a printout of the output in the format specified in the problem. **[3marks]**

Note: The candidates must not carry any stationery items such as pen / pencil / eraser to the Computer Laboratory for this session.

This Paper consists of 4 printed pages

*Solve **any one** of the following Problems.*

Question 1

Design a program which takes two integer parameters namely number of the day (between 1 and 366) and the year (in 4 digits) as inputs and displays the date i.e. day, month and year.

Also find the corresponding date exactly after (N) days of the present date by accepting the value of (N) from the use, where the value of (N) is in the limit (1 <= N <= 100)

Design your program which will enable the output in the format given below:

Sample 1

INPUT: DAY NUMBER : 233
YEAR : 2020
DATE AFTER : 17

OUTPUT:

20TH. AUGUST 2020
DATE AFTER 17 DAYS :
6TH. SEPTEMBER 2020

Sample 2

INPUT: DAY NUMBER : 360
YEAR : 2020
DATE AFTER : 45

OUTPUT:

25TH. DECEMBER 2020
DATE AFTER 45 DAYS :
8TH. FEBRUARY 2021

Question 2

Write a program to accept a sentence which may be terminated by either '**.**' , '**?**' or '**!**' only. The words are to be separated by a single blank space and are in lower case.

Perform the following tasks:

(a) Check for the validity of the accepted sentence and for the terminating character.

(b) Arrange the words contained in the sentence according to the size of the words in ascending order. If two words are of the same length then the first occurring comes first. The sentence should begin with a capital alphabet in both the cases i.e. Input and Output.

(c) Display both the sentences separately with each sentence beginning with a capital alphabet.

Design your program which will enable the output in the format given below:

Sample 1

INPUT: the lines are printed in reverse order.

OUTPUT:

The lines are printed in reverse order.
In the are lines order printed reverse.

Sample 2

INPUT: print the sentence in ascending order.

OUTPUT:

Print the sentence in ascending order.
In the print order sentence ascending.

Sample 3

INPUT: i love my country.

OUTPUT:

I love my country.
I my love country.

Question 3

A **MOBIUS** function M(N) returns the value -1 or 0 or 1 for a natural number (N) by the following conditions are defined :

When,

M (N) = 1 if N=1.

M (N) = 0 if any prime factor of N is contained more than once.

M (N) = $(-1)^{P}$ if N is the product of 'P' distinct prime factors.

Write a program to accept a positive natural number (N) and display the MOBIUS result with proper message.

Design your program which will enable the output in the format given below:

Sample 1

INPUT: 78

OUTPUT: 78 = 2 x 3 x 13
NUMBER OF DISTINCT PRIME FACTORS = 3
M(78) = -1

Sample 2

INPUT: 34

OUTPUT: 34 = 2 x 17
NUMBER OF DISTINCT PRIME FACTORS = 2
M(34) = 1

Sample 3

INPUT: 12

OUTPUT: 12 = 2 x 2 x 3
DUPLICATE PRIME FACTORS
M(12) = 0

Sample 4

INPUT: 1

OUTPUT: 1 = 1
NO PRIME FACTORS
M(1) = 1

In addition to the above, the practical file of the candidate containing the practical work related to programming assignments done during the year will be evaluated as follows:

- Programming assignments done throughout the year (by the teacher) **[10marks]**
- Programming assignments done throughout the year (by the Visiting Examiner) **[5marks]**