

CLASS XI – ANNUAL EXAMINATION
COMPUTER SCIENCE
PAPER 1
(THEORY)

(Maximum Marks: 70)

(Time allowed: Three hours)

(Candidates are allowed additional 15 minutes for only reading the paper.
They must NOT start writing during this time.)

Answer all questions in Part I (compulsory) and six questions from Part-II, choosing two questions from Section-A, two from Section-B and two from Section-C.

All working, including rough work, should be done on the same sheet as the rest of the answer.

The intended marks for questions or parts of questions are given in brackets [].

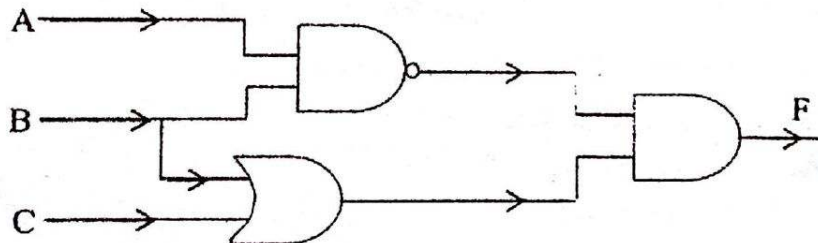
PART I (20 Marks)

Answer all questions.

While answering questions in this Part, indicate briefly your working and reasoning, wherever required.

Question 1

- (a) Write the truth table for a 2-input conjunction in proposition. [1]
- (b) Using NAND gate, draw the logic circuit for an OR gate. [1]
- (c) From the logic circuit given below, find the final output expression F. [1]



- (d) Find the 1's complement for $(1001011)_2$ using 8 bit representation. [1]
- (e) If A denotes "has a computer/mobile" and B denotes "uses e-mail", then express the following symbolic forms in statements: [1]
- (i) $B \Rightarrow A$
- (ii) $\sim B \Rightarrow \sim A$

This Paper consists of 6 printed pages.

Question 2

- (a) Differentiate between *decimal* and *hexadecimal* number systems. Give one example of each. [2]
- (b) Convert the following arithmetic expression into java statement. [2]

$$F = |a| + \frac{\sqrt{3ab}}{2c}$$

- (c) What are *data files*? Name the different types of data files. [2]
- (d) State the difference between *compareTo()* and *equals()* string functions. [2]
- (e) What are *java packages*? Name *any two* java packages. [2]

Question 3

The following is a method /function of some class. Give the output of the function **comp()** [5]
when the value of **a = 4** and **b = 7**. Show the dry run/working.

```
void comp( int a, int b)
{
    int an, s, k;
    if (a < b)
    { s=a;
      k=b;
    }
    else
    { s=b;
      k=a;
    }
    an = k;
    while (an % s !=0 )
        an += k;
    System.out.println(" Answer = " + an );
}
```

PART - II (50 Marks)

Answer six questions in this part, choosing two questions from Section A, two from Section B and two from Section C.

SECTION - A

Answer any two questions.

Question 4

Perform the following conversions / operations:

- (i) $(11011)_2 + (110)_2 + (1001)_2 = (?)_2$ [2]
(ii) $(74.36)_8 + (177.6)_8 = (?)_8$ [2]
(iii) $(10111011)_2 = (?)_8$ [2]
(iv) $(2AB.A)_{16} = (?)_2$ [2]
(v) $(11101)_2 - (1010)_2 = (?)_2$ using 2's complement [2]

Question 5

- (a) A Cricket Association Coach intends to find the possibilities of the team winning a competition based on the following criteria: [5]

- Batsmen perform well and either bowlers or fielders perform well.

OR

- All three perform well.

The inputs are:

INPUTS	
B	Batsmen perform well
F	Fielders perform well
D	Bowlers perform well

(In all the above cases 1 indicates yes and 0 indicates no.)

Output X – Denotes possibilities [1 indicates win and 0 indicates lose in all cases.]

Draw the truth table for the inputs and outputs. Derive the terms with conjunctive operators for each of the true values (1's) from the output column. Also, write a propositional expression by joining the terms with disjunction operators.

- (b) Using a truth table, verify if the following proposition is valid or invalid. [3]

$$(p \Rightarrow q) \wedge (q \Rightarrow \sim p) = (p \vee q)$$

- (c) Draw the logic circuit diagram for the following Boolean expression using only NAND gates. [2]

$$F = a.b + b' + c'.a$$

Question 6

- (a) How is *Half adder* different from *Full adder*? Write the expressions for sum and carry and draw the logic circuit diagram for a Full adder. [5]
- (b) State and prove *Modus Ponens* in proposition. [3]
- (c) Draw the truth table for a 3-input XNOR gate. [2]

SECTION - B

Answer any two questions.

Each program should be written in such a way that it clearly depicts the logic of the problem.

This can be achieved by using mnemonic names and comments in the program.

(Flowcharts and Algorithms are not required.)

The programs must be written in Java.

Question 7

A class **MyString** enables the user to accept a sentence and displays the words beginning and ending with the same alphabet. [10]

Example: EXAMPLE begins and ends with the alphabet 'E'

Some of the members of the class are given below:

Class name : **MyString**

Data members/instance variables:

str : to store the sentence

Member functions/methods:

MyString() : default constructor

void accept() : to accept a sentence in UPPER case

boolean check(String s) : checks the first and last character of the string 's' and returns true if same, otherwise returns false

void show() : displays the sentence along with the words beginning and ending with the same alphabet by calling the function check()

Define the class **MyString** giving details of the **constructor()**, **void accept()**, **boolean check(String)** and **void show()**. Define the **main()** function to create an object and call the functions accordingly to enable the task.

Question 8

A class **NonBound** contains a square matrix which finds the sum of the non-boundary elements of the matrix. [10]

Some of the members of the class are given below:

Class name : **NonBound**

Data members/instance variables:

arr[][] : array to store integer elements
n : to store the order of the matrix

Member functions/methods:

NonBound(int mm) : parameterized constructor to initialize the data member n=mm

void fillarray() : to fill the array elements

void sum_of_non() : finds and displays the sum of the non-boundary elements in the matrix with an appropriate message

void display() : displays the array elements in matrix form

Define the class **NonBound** giving details of the **constructor(int)**, **void fillarray()**, **void sum_of_non()** and **void display()**. Define the **main()** function to create an object and call the functions accordingly to enable the task.

Question 9

A class **ArrangeNum** enables the user to sort any integer number according to the value of its digits. [10]

Example: Input: 59672

Output: 25679 after sorting the digits in ascending order of their values.

Some of the members of the class are given below.

Class name : **ArrangeNum**

Data members/instance variables:

n : to store the integer number
s[] : array to store the digits of the number

Member functions/methods:

ArrangeNum(int nn) : constructor to initialize the data member n=nn

void fill_array() : extracts the digits of the number and stores it in the array

void arrange() : sorts the array elements in ascending order using any **standard sorting technique**

void show() : displays the original number along with the elements of the sorted array with an appropriate message

Define the class **ArrangeNum** giving details of the **constructor(int)**, **void fill_array()**, **void arrange()** and **void show()**. Define the **main()** function to create an object and call the functions accordingly to enable the task.

SECTION – C

Answer any two questions.

Each method should be written in such a way that it clearly depicts the logic of the problem stepwise.

This can be achieved by using mnemonic names and comments in the program.

(Flowcharts and Algorithms are not required.)

The methods must be written in Java.

Question 10

- (a) Write a *Method* to return the n^{th} term of a Fibonacci series 2,3,5,8,..... [4]
using **recursive technique**.

[Fibonacci series: The sum of the previous two terms is equal to the next term]

The method declaration is as follows:

int fibo(int n)

- (b) What is meant by *base case* in recursion? [1]

Question 11

- (a) A text file named "Student.txt" contains the students' names (std) and marks (mks) of number of students. [4]

Write a *Method* to check and display the names of the students who have secured more than 75 marks.

The method declaration is as follows:

void check()

- (b) State the significance of the statement: [1]

FileWriter fileout = new FileWriter("Book.txt", true);

Question 12

Answer the following questions:

- (i) What are *freeware*? [1]
(ii) Explain the term '*Copyright*'. [1]
(iii) What is *ethical hacking*? [1]
(iv) What is *spamming*? [1]
(v) What is *IoT*? [1]