

ANNUAL EXAMINATION : 2022-23

Class - XI (ISC)

Time : 3 hrs.

Subject - Computer Science Paper 1

M.M. : 70

(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

Attempt ALL questions.

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

Question 1

- (a) State Associative Law. [1]
- (b) Verify if, $(\sim P \vee P) \wedge 1 = 1$ [1]
- (c) Find the 1's complement for $(1001011)_2$ using 8 bit representation. [1]
- (d) What do you mean by the terms tautology and contradiction? [1]
- (e) If A denotes "it is cloudy" and B denotes "it will rain", then express the following statements in symbolic form : [1]
 - (i) If it does not rain then it is not cloudy.
 - (ii) If it is raining then it is cloudy.

Question 2

- (a) Define 'Base' of number system? Give one example. [2]
- (b) Convert the following arithmetic expression into Java statement:- [2]
$$x = \frac{(a^5 + b^7)}{\sqrt{ab}}$$
- (c) State the difference between compareTo() and equals() functions of String class. [2]
- (d) Name the File Stream Class to perform the following operations: [2]
 - (i) to write data into a binary file
 - (ii) to read data from a text file
- (e) Differentiate between Virtual and Augmented Reality. [2]

Question 3

The following function Recur is a part of some class. What will be the output of the function Recur() when the value of n is equal to 10. Show the dry run/working [5]

```
void Recur(int n)
{
    if(n>1)
    {
        System.out.print(n+ " ");
        if (n%2 !=0)
        {
            n = 3 * n + 1;
            System.out.print(n + " ");
        }
        Recur (n/2);
    }
}
```

PART - II

Answer SIX questions in this part, choosing TWO questions from Section A, TWO from Section B and TWO Section C.

SECTION - A

Answer any TWO questions from this section.

Question 4

Perform the following conversions / operations :

- (i) $(11011)_2 - (110)_2 + (1001)_2 = (?)_2$ [2]
- (ii) $(473.21)_8 = (?)_{10}$ [2]
- (iii) $(111011.11)_2 = (?)_8$ [2]
- (iv) $(110100)_2 - (1011)_2$ (using 1's complement) [2]
- (v) $(2AB.A)_{16} = (?)_2$ [2]

Question 5

(a) A local club intends to select members of its locality for social service as per the following criteria:

- The person is a graduate from any discipline and has taken active part in social services.

OR

- The person is either a graduate or an undergraduate but has won an award for social service.

The inputs are:

G : The person is a graduate

S : Has taken active part in social service

A : Has won an award for social service (In all the above cases 1 indicates yes and 0 indicates no) Output X: Denotes selection(1 indicates selected and 0 indicates rejected).

Draw the truth table for the inputs and outputs. Also, write the Boolean expression with conjunctive operators for each of the true values (1's) from the output column of the truth table. [5]

(b) Using a truth table, verify if the following proposition is valid or invalid

$$(p \Rightarrow q) \cdot (q \Rightarrow p') = p + q \quad [3]$$

(c) Draw the logic circuit diagram for the following using NAND gates only : [2]

$$F = a \cdot b + b' + c' \cdot a$$

Question 6

(a) Define Full Adder. Write the sum and carry expression and draw the logic diagram for a full adder. [5]

(b) State De Morgan's Theorem. Find the complement of $A'(BC' + B'C)$. [3]

(c) Draw the truth table for a 3 input XNOR gate. [2]

SECTION 'B'

Answer any TWO questions from this section.

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 name and comments in the program.

(Flowcharts and Algorithms are not required)

The program must be written in JAVA.

Question 7

A class Capital has been defined to check whether a sentence has words beginning with a capital letter or not. [10]

Some of the members of the class are given below:

Class name : Capital

Data member/instance variable:

sent : to store a sentence

freq : stores the frequency of words beginning with a capital letter

Member functions/methods :

Capital() : default constructor

void input() : to accept the sentence

boolean isCap(String vv) : checks and returns true if the word begins with a capital letter, otherwise returns false

void display() : displays the sentence along with the frequency of the words beginning with a capital letter

Specify the class Capital, giving the details of the constructor(), void input(), boolean isCap(String) and void display(). Define the main() function to create an object and call the functions accordingly to enable the task. [10]

Question 8

A class SeriesSum is designed to calculate the sum of the following series:

$Sum = x^2/1! + x^4/3! + x^6/5! \dots \dots n$ terms

Classname : SeriesSum

Datamembers :

x : to store an integer number

n : to store number of terms

sum : double variable to store the sum of the series

Member functions :

SeriesSum(int xx, int nn) : constructor to assign $x = xx$ and $n = nn$

double findfact(int m) : to return the factorial of m using recursive technique.

double findpower(int x, int y): to return x raised to the power of y using recursive technique.

void calculate() : to calculate the sum of the series by invoking the recursive functions respectively

void display() : to display the sum of the series

Specify the class SeriesSum, giving details of the constructor(int, int), double findfact(int), double findpower(int, int), void calculate() and void display(). Define the main() function to create an object and call the functions accordingly to enable the task. [10]

Question 9

A class MatBound contains a square matrix which finds the sum of the boundary elements of the matrix. Some of the members of the class are given below:

Class name : MatBound

Data member/instance variable :

arr[][] : array to store integer elements

m : to store the order of the matrix

Member functions/methods :

ArrayMax(int mm) : parameterized constructor to initialize the data member m=mm and to declare the array

void readarray() : to accept the array elements

void fmdsum() : finds and displays the sum of the boundary elements of the matrix.

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

Specify the class MatBound, giving the details of the constructor(), void readarray(), void fmdsum() and void display(). Define the main() function to create an object and call the functions accordingly to enable the task. [10]

SECTION - C

Answer any TWO questions.

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

This can be achieved by using comments in the program and mnemonic names or pseudo codes for algorithms. The programs must be written in Java and the algorithms must be written in general/standard form, wherever required/specified.

(Flowcharts are not required.)

Question 10

(a) Write a Method to return a^b using recursive technique. The method declaration is as follows :

double power(int a,int b) [4]

(b) Differentiate between recursion and iteration. [1]

Question 11

(a) A text file "Attend.txt" contains the name(emp) and attendance(afd) of a number of employees. Write a method to display the names of the employees whose attendance is more than 80 days. The method declaration is as follows :

void fmd_attend() [4]

(b) State any one difference between binary file and text file. [1]

Question 12

Answer the following questions given below :

(i) Name the package which is imported by default. [1]

(ii) What is Firewall? [1]

(iii) What is Software Piracy? [1]

(iv) What is Phishing? [1]

(v) What is IoT? [1]

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