ISC Class 12th Computer Science 2024 Question Paper (Part 1)

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

(i) According to the *Principle of duality*, the Boolean equation $(A + B') \cdot (A + 1) = A + B'$ will be equivalent to: [1]

(a) $(A' + B) \cdot (A' + 1) = A' + B$

(b) $(A \cdot B') + (A \cdot 0) = A \cdot B'$

(c) $(A' \cdot B) + (A' \cdot 1) = A' \cdot B$

(d) $(A' \cdot B) + (A' \cdot 0) = A' \cdot B$

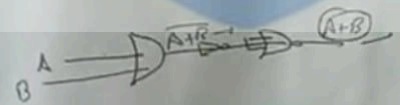
(ii) When a sequence of OR, NOT, NOR are connected in series, the logic gate obtained is: [1]

(a) AND

(b) NOT

(c) OR

(d) XOR



(iii) Idempotence Law states that:

(a) $X + X = X$

(b) $X + X' = 0$

(c) $X + X = 1$

(d) $X + X' = X$

(iv) **Assertion:** For proposition $\sim A \Rightarrow B$, its contrapositive is $B \Rightarrow \sim A$

Reason: Contrapositive is the converse of inverse for any proposition.

(a) Both Assertion and Reason are true, and Reason is the correct explanat for the Assertion.

(b) Both Assertion and Reason are true, but Reason is not the corr explanation for the Assertion.

(c) Assertion is true but Reason is false.

(d) Assertion is false but Reason is true.

(v) The complement of the Boolean expression $(P' \cdot Q) + (R \cdot S')$ is:

(a) $(P' + Q) \cdot (R' + S)$

(b) $(P + Q') \cdot (R' + S)$

(c) $(P' + Q) \cdot (R + S')$

(d) $(P + Q') \cdot (R + S')$

(vi) **Assertion:** Recursive data structure follows the LIFO principle.

Reason: Execution of recursive code follows the concepts of data structure Queue.

(a) Both Assertion and Reason are true, and Reason is the correct explanation for the Assertion.

(b) Both Assertion and Reason are true, but Reason is not the correct explanation for the Assertion.

(c) Assertion is true but Reason is false.

(d) Assertion is false but Reason is true.

(vii) State *any one* use of *interfaces* in Java. multiple inheritance

(viii) Write the cardinal form of the maxterm $X + Y' + Z$

(ix) Write the *canonical* SOP expression for $F(A, B) = A \Leftrightarrow B$

(x) State *any one* difference between **instance variable** and **class variable**.

stion 2

Convert the following infix notation to postfix form

(P + Q * R − S) / T * U

An array ARR [−5 ....,15, 10 ...20] stores elements in **Row Major Wise** with each element requiring 2 bytes of storage. Find the address of ARR [ ] [ ] when the base address is 2500.

The following function is a part of some class:

```
int jolly(int[ ] x, int n, int m)
{
  if (n < 0)
        return m;
  else if(n<x.length)
        m = (x[n] > m)? x[n] : m;
  return jolly(x, --n, m);
}
```

(a) What will be the output of **jolly( )** when the value of x[ ]={6,3,4,7,1} and **n=4** and **m=0**?

(b) What function does **jolly( )** perform, apart from recursion?

(iv) The following function is a part of some class which is used to find the smallest digit present in a number. There are some places in the code marked by **?1?, ?2?, ?3?** which must be replaced by an expression / a statement so that the function works correctly.

```
int small_dig(int n)
{   int min = ?1? ;
    while (n != 0)
    {
      int q=n/10;
      int r = ?2? * 10;
      min = r > min ? ?3? : r;
      n=q;
    }
    return min;
}
```

(a) What is the expression or statement at ?1?

(b) What is the expression or statement at ?2?

(c) What is the expression or statement at ?3?