

# ISC Class 12 • Computer Science

## Important Questions 2027

Most repeated questions from the last few years of board and sample papers, grouped chapter-wise.

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### Propositional Logic

1. Draw a truth table to verify if the following proposition is a Tautology, a Contradiction or a Contingency.  $(A \wedge \sim B) \Rightarrow (\sim A \vee B)$

Seen in: Board 2024, 2025, 2026 · Sample 2023, 2024, 2025

2. Consider the two propositions given below: A = You use ecofriendly methods B = Pollution is reduced If A implies to B, then write its Contrapositive statement.

Seen in: Board 2023, 2024, 2025, 2026 · Sample 2023, 2025

3. Study the given propositions and the statements marked Assertion and Reason that follow. Choose the correct option based on your analysis. P = You practise regularly Q = You become skilled S1 =  $P \Rightarrow Q$  S2 =  $\sim P \vee Q$  Assertion: S1 and S2 are logically equivalent. Reason: A conditional statement  $P \Rightarrow Q$  can be expressed as  $\sim P \vee Q$  (a) Both Assertion and Reason are true and Reason is the correct explanation for Assertion. (b) Both Assertion and Reason are true but Reason is not the correct explanation for Assertion. (c) Assertion is true and Reason is false. (d) Both Assertion and Reason are false.

Seen in: Board 2025, 2026

### Boolean Algebra

4. The complement of the Boolean expression  $a \cdot b' + a' + a' \cdot b$  is: (a)  $a + b' \cdot a' \cdot a' + b$  (b)  $(a' + b) \cdot a \cdot (a + b')$  (c)  $(a + b') \cdot a' \cdot (a + b')$  (d)  $a' \cdot b + a + a \cdot b'$

Seen in: Board 2023, 2024, 2025, 2026 · Sample 2023, 2024, 2025

5. According to the Principle of Duality, the Boolean equation  $Q' \cdot 0 + P' \cdot Q' + P' \cdot Q = P'$  will be equivalent to: (a)  $Q \cdot 0 + P \cdot Q + P \cdot Q' = P$  (b)  $Q' \cdot 1 + P' \cdot Q' + P \cdot Q' = P'$  (c)  $(Q' + 1) \cdot (P' + Q') \cdot (P' + Q) = P'$  (d)  $(Q' + 0) \cdot (P' + Q') \cdot (P' + Q) = P'$

Seen in: Board 2023, 2024, 2025, 2026 · Sample 2023, 2024, 2025

6. According to the ancient laws of the Valley of Peace, a candidate can become the Dragon Warrior only if they satisfy any one of the following conditions: • The candidate belongs to the Panda Clan and has been trained for more than 5 years under the Grand Master OR • The candidate possesses the Secret Chi Power but does not belong to the Panda Clan OR • The candidate is recommended by the Grand Master, but neither belongs to the Panda Clan nor has been trained for more than 5 years The inputs are: C : Belongs to the Panda Clan T : Trained for more than 5 years P : Possesses Secret Chi Power R : Recommended by the Grand Master (In all the above cases, 1 indicates YES and 0 indicates NO) Output: X - Denotes eligibility to become the Dragon Warrior (1 = eligible and 0 = not eligible) Draw the truth table for the inputs and outputs given above. Write the SOP expression for X(C, T, P, R).

Seen in: Board 2023, 2024, 2025, 2026 · Sample 2023, 2024, 2025

7. The Boolean equations  $a + 1 = a$  and  $a \cdot 0 = 0$  correspond to: (a) Involution Law (b) Law of Identity (c) Distributive Law (d) Law of Complements

Seen in: Board 2024, 2025, 2026 · Sample 2023, 2024, 2025

8. (a) Reduce the Boolean function  $F(A,B,C,D) = \pi (0,1,2,3,7,8,9,10,11,12,13,15)$  by using 4-variable Karnaugh map, showing the various groups (i.e., octal, quads and pairs). [4] (b) Draw the logic gate diagram for the reduced expression. Assume that the variables and their complements are available as inputs. [1]

Seen in: Board 2023, 2024, 2026 · Sample 2023, 2024, 2025

9. [context: X (A, S, C, L) is the POS expression from the truth table of part (i) - superhero access to the Avengers facility: Avengers membership, S.H.I.E.L.D. permit, clearance badge, recognised ally] Reduce the above expression X (A, S, C, L) by using 4-variable Karnaugh map, showing the various groups (i.e., octal, quads and pairs). Draw the logic gate diagram using NOR gates only for the reduced expression. Assume that the variables and their complements are available as inputs.

Seen in: Board 2024, 2025 · Sample 2024, 2025

10. The canonical expression of  $F(P, Q, R) = \pi (2, 5, 7)$  is: (a)  $(P + Q' + R) \cdot (P' + Q + R') \cdot (P' + Q' + R')$  (b)  $(P \cdot Q' \cdot R) + (P' \cdot Q \cdot R') + (P' \cdot Q' \cdot R')$  (c)  $(P' + Q + R') \cdot (P + Q' + R) \cdot (P + Q + R)$  (d)  $(P' \cdot Q \cdot R') + (P \cdot Q' \cdot R) + (P \cdot Q \cdot R)$

Seen in: Board 2024, 2025 · Sample 2023, 2024

11. Write the minterms in canonical form for the Boolean Function X (A, B), from the truth table given below: A B | X 0 0 | 1 0 1 | 0 1 0 | 0 1 1 | 1

Seen in: Board 2023, 2024, 2025 · Sample 2024

12. Given that  $P = 0, Q = 1, R = 0, S = 0$ , write its: (a) Maxterm [1] (b) Minterm [1]

Seen in: Board 2023, 2024, 2026 · Sample 2023

- 13.** (a) Reduce the Boolean function  $F(P, Q, R, S) = \Sigma(0,1,2,5,7,8,9,10,13,15)$  by using 4-variable Karnaugh map, showing the various groups (i.e., octal, quads and pairs). [4] (b) Draw the logic gate diagram using NAND gates only for the reduced expression. Assume that the variables and their complements are available as inputs. [1]

Seen in: Board 2023, 2025 · Sample 2023

- 14.** The complement of the reduced expression of  $F(A,B) = \Sigma(0,1,2,3)$  is: (a) 1 (b)  $A \cdot B$  (c) 0 (d)  $A' + B'$

Seen in: Board 2023 · Sample 2025

- 15.** Find the complement of the following expression and reduce it by using Boolean laws.  $P \cdot (P + Q) \cdot Q \cdot (Q + R')$

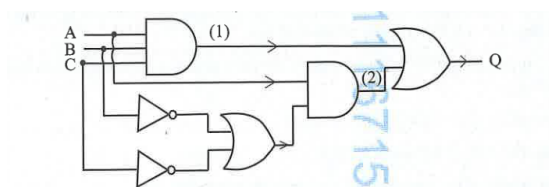
Seen in: Board 2024 · Sample 2023

## Computer Hardware

- 16.** (a) What is a decoder? [1] (b) Draw the logic gate diagram for decoding the binary numbers {0011, 0100, 0101, 0111, 1011, 1110} to hexa-decimal numbers. [3] (c) State any one application of a multiplexer. [1]

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- 17.** From the logic gate diagram given below, derive the Boolean expression for (1), (2) and Q. Reduce the derived expression. [Logic diagram with inputs A, B, C: an AND gate gives (1); NOT gates and an OR gate feed a second AND gate giving (2); (1) and (2) feed an OR gate giving Q - see figure]



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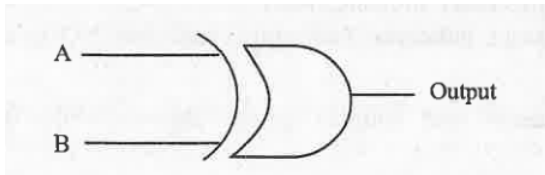
- 18.** Construct the logic gate diagram for a Full Adder using two Half Adders.

Seen in: Board 2023, 2026 · Sample 2023

- 19.** A full adder needs five gates and those are 3 AND gates, 1 OR gate and 1 XOR gate. When a full adder is constructed using 2 half adders, it also requires 5 gates. State the names along with the quantity those gates.

Seen in: Sample 2024, 2025

- 20.** Study the logic gate diagram given below and answer the questions that follow: [Logic gate symbol with inputs A and B and one Output - see figure] What will be the output of the above gate when: (a) A = 1, B = 0 [1] (b) A = 1, B = 1 [1]



Seen in: Board 2025 · Sample 2025

- 21.** Draw the logic gate diagram for 2-input AND gate using NOR gates only. Show the expression at each step.

Seen in: Board 2024, 2026

- 22.** When a sequence of OR, NOT, NOR are connected in series, the logic gate obtained is: (a) AND (b) NOT (c) OR (d) XOR

Seen in: Board 2024 · Sample 2023

## Primitive Values, Variables and Statements

- 23.** With reference to the code given below, answer the questions that follow along with dry run / working. `boolean num(int x) { int a=1; for (int c=x; c>0; c/=10) a *= 10; return (x*x%a)==x; }` (a) What will the function num( ) return when the value of x=25? [2] (b) What is the method num( ) performing? [1]

Seen in: Board 2023 · Sample 2023

## Methods

- 24.** The following function isTech( ) is a part of some class which is used to check if a given number is a Tech number or not. There are some places in the code marked by ?1?, ?2?, ?3? which may be replaced by a statement / expression so that the function works properly. A number is Tech number if the count of digits is even and the square of the sum of its two equal halves is equal to the number itself. Example:  $2025 = 20 + 25 = (45)^2 = 2025$  `boolean isTech(int n) { String s = String.valueOf(n); int len = ?1?; if(len % 2 != 0) return ?2?; int first = Integer.parseInt(s.substring(0, len / 2)); int second = Integer.parseInt(s.substring(len / 2)); int sum = first + second; return ?3? == n; }` What are the expressions or statements at ?1?, ?2? and ?3?

Seen in: Board 2024, 2025, 2026 · Sample 2024, 2025

- 25.** Consider the following statement written in class Student where school<sub>Name</sub> is its data member. static final String school<sub>Name</sub> = "Co-Ed School"; Which of the following statements are valid for school<sub>Name</sub>? I. All objects of class Student share the same value of school<sub>Name</sub>. II. The value of school<sub>Name</sub> cannot be changed during program execution. III. The keywords static and final cannot be used together for a variable. (a) Only I and II (b) Only II and III (c) Only I and III (d) Only III

Seen in: Board 2025, 2026 · Sample 2025

- 26.** State any one difference between instance variable and class variable.

Seen in: Board 2023, 2024 · Sample 2024

## Arrays

- 27.** A matrix G[3...7, 2...5] is stored in the memory, with each element requiring 4 bytes of storage. If the address of G[5][4] is 6000, find the base address when the matrix is stored Column Major Wise.

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- 28.** A class TimeOp has been defined to add any two accepted time periods. Example: Time A = 6 hours 35 minutes 40 seconds Time B = 7 hours 45 minutes 30 seconds Time A + Time B = 14 hours 21 minutes 10 seconds (where 60 minutes = 1 hour and 60 seconds = 1 minute) The details of the members of the class are given below: Class name : TimeOp Data member/instance variable: arr[ ] : integer array to hold three elements (hours, minutes and seconds) Methods/Member functions: TimeOp( ) : default constructor void readTime( ) : to accept the elements of the array TimeOp addTime(TimeOp tt) : to add the time of the parameterised object tt and the current object, to store it in a local object and return it void dispTime( ) : to display the array elements in hours:minutes:seconds format Specify the class TimeOp giving the details of the constructor( ), void readTime( ), TimeOp addTime(TimeOp) and void dispTime( ). Define the main( ) function to create objects and call the functions accordingly to enable the task.

Seen in: Board 2026 · Sample 2023, 2025

- 29.** Design a class Colsum to check if the sum of elements in each corresponding column of two matrices is equal or not. Assume that the two matrices have the same dimensions. Example:  
 Input: MATRIX A MATRIX B 2 3 1 7 4 2 7 5 6 1 3 1 1 4 2 2 5 6 Output: Sum of corresponding columns is equal. The details of the members of the class are given below: Class name : Colsum Data members/instance variables: mat[ ][ ] : to store the integer array elements m : to store the number of rows n : to store the number of columns Member functions/methods: Colsum(int mm, int nn) : parameterised constructor to initialise the data members m = mm and n = nn void readArray( ) : to accept the elements into the array boolean check(Colsum A, Colsum B) : to check if the sum of elements in each column of the objects A and B is equal and return true otherwise, return false void print( ) : to display the array elements Specify the class Colsum giving details of the constructor(int, int), void readArray( ), boolean check(Colsum, Colsum), and void print( ). Define the main() function to create objects and call the functions accordingly to enable the task.

Seen in: Board 2023, 2025 · Sample 2024

## Strings

- 30.** Design a class PendulumS to perform an operation on a word containing alphabets in upper case only. Rearrange the word by putting the lowest ASCII value character at the centre and the second lowest ASCII value character to its right and the third to its left and so on. Example 1 : Input : COMPUTER Output : TPMCEORU Example 2 : Input : SCIENCE Output : SIECCEN The details of the members of the class are given below: Class name : PendulumS Data members/instance variables: wrd : to store the original word newwrd : to store the rearranged word Methods/Member functions: PendulumS(String k) : parameterised constructor to initialise wrd = k and newwrd = "" int minCharIndex(String str) : to find the index of the minimum ASCII value character in str and return it void arrange( ) : to rearrange the characters of wrd as per the given instructions and store it in newwrd by invoking minCharIndex( ) void display( ) : to display the original word and the rearranged word Specify the class PendulumS giving the details of the constructor( ), int minCharIndex(String), void arrange( ) and void display( ). Define the main( ) function to create an object and call the functions accordingly to enable the task.

Seen in: Board 2024, 2025, 2026 · Sample 2025

- 31.** A class Encode has been defined to replace only the vowels in a word by the next corresponding vowel and form a new word. i.e. A → E, E → I, I → O, O → U, U → A and a → e, e → i, i → o, o → u, and u → a Example: Input: Institution Output: Onstotatoun Some of the members of the class are given below: Class name : Encode Data members/instance variables: word : to store a word length : integer to store the length of the word new<sub>word</sub> : to store the encoded word Methods / Member functions: Encode( ) : default constructor to initialize data members with legal initial values void acceptWord( ) : to accept a word void nextVowel( ) : to replace only the vowels from the word stored in 'word' by the next corresponding vowel and to assign it to 'newword', with the remaining alphabets unchanged void display( ) : to display the original word along with the encrypted word Specify the class Encode giving details of the constructor( ), void acceptWord( ), void nextVowel( ) and void display( ). Define a main( ) function to create an object and call the functions accordingly to enable the task.

Seen in: Sample 2023, 2024

## Recursion

- 32.** The following function `workOut( )` is a part of some class. Assume 'n' is a positive integer.
- ```
String workOut (int n) { if (n == 0) return ""; int rem = n % 16; char cr = (rem < 10) ? (char)(rem + '0') : (char)(rem - 10 + 'A'); return workOut (n / 16) + cr; }
```
- Answer the questions given below with the dry run / working. (a) What will the function `workOut(220)` return? [2] (b) What is the function `workOut( )` performing apart from recursion? [1]

Seen in: Board 2023, 2024, 2025, 2026 · Sample 2023, 2024, 2025

- 33.** A class Trimorphic has been defined to accept a positive integer from the user and display if it is a Trimorphic number or not. [A number is said to be Trimorphic if the cube of the number ends with the number itself.] Example 1:  $24^3 = 13824$  ends with 24 Example 2:  $5^3 = 125$  ends with 5 The details of the members of the class are given below: Class name : Trimorphic Data members/instance variables: n : to store the number cube : to store the cube of the number Methods/Member functions: Trimorphic( ) : constructor to initialise the data members with legal initial values void accept( ) : to accept a number boolean check(int num, long c) : to compare num with the ending digits of c using recursive technique void result( ) : to check whether the given number is a trimorphic number by invoking the function check( ) and to display an appropriate message Specify the class Trimorphic giving the details of the constructor( ), void accept( ), boolean check( ) and void result( ). Define the main( ) function to create an object and call the functions accordingly to enable the task.

Seen in: Board 2023, 2024, 2025, 2026 · Sample 2023, 2024, 2025

- 34.** Given below are two statements marked Assertion and Reason. Read the two statements carefully and choose the correct option. Assertion: Recursion utilises more memory as compared to iteration. Reason: Time complexity of recursion is higher due to the overhead of maintaining the function call stack. (a) Both Assertion and Reason are true and Reason is the correct explanation for Assertion. (b) Both Assertion and Reason are true but Reason is not the correct explanation for Assertion. (c) Assertion is true and Reason is false. (d) Assertion is false and Reason is true.

Seen in: Board 2024 · Sample 2025

## Inheritance, Interfaces and Polymorphism

- 35.** A superclass Hotel has been defined to store the details of a hotel. Define a subclass Customer to calculate the total bill for a customer as per the following criteria: Room type | Additional Amount Executive | 10% of room rent Suite | 20% of room rent The details of the members of both the classes are given below: Class name : Hotel Data members/instance variables: hname : to store hotel name roomrent : to store the rent per day Methods/Member functions: Hotel(...) : parameterised constructor to assign values to its data members void show() : to display hotel details Class name : Customer Data members/instance variables: cname : to store customer name days : to store the number of days of stay type : to store the room type surcharge : to store the additional amount amt : to store the total amount Methods/Member functions: Customer(...) : parameterised constructor to assign values to data members of both the classes void compute() : to calculate the surcharge based on the room type as given above. Also, to calculate the total amount as: (room rent + surcharge) × days void show() : to display hotel and customer details Assume that the superclass Hotel has been defined. Using the concept of Inheritance, specify the class Customer, giving details of constructor(...), void compute() and void show(). The super class, main function and algorithm need NOT be written.

Seen in: Board 2023, 2024, 2025, 2026 · Sample 2023, 2024, 2025

- 36.** Given below are two statements marked, Assertion and Reason. Read the two statements carefully and choose the correct option. Assertion: An interface in Java contains abstract and non-abstract methods. Reason: All methods in an interface must be implemented by any class that extends this interface. (a) Both Assertion and Reason are true and Reason is the correct explanation for Assertion. (b) Both Assertion and Reason are true but Reason is not the correct explanation for Assertion. (c) Assertion is true and Reason is false. (d) Both Assertion and Reason are false.

Seen in: Board 2023, 2024, 2026 · Sample 2023, 2024

- 37.** The keyword that allows multi-level inheritance in Java programming is: (a) implements (b) super (c) extends (d) this

Seen in: Board 2023 · Sample 2023

## Stacks and Queues

- 38.** Convert the following infix notation to prefix form.  $P / Q + ( S * F + X / R )$

Seen in: Board 2023, 2024, 2025, 2026 · Sample 2023, 2024, 2025

- 39.** A circular queue is a linear data structure that allows data insertion at the rear and removal from the front, with the rear end connected to the front end forming a circular arrangement. The details of the members of the class are given below: Class name : CirQueue Data members/instance variables: Q[ ] : array to hold integer values cap : maximum capacity of the circular queue front : to point the index of the front rear : to point the index of the rear Methods/Member functions: CirQueue(int n) : constructor to initialise cap = n, front = 0 and rear = 0 void push(int v) : to add integers from the rear index if possible else display the message "QUEUE IS FULL" int remove() : to remove and return the integer from front if any, else return -999 void print() : to display the elements of the circular queue in the order of front to rear (i) Specify the class CirQueue giving the details of the functions void push(int) and int remove(). Assume that the other functions have been defined. The main() function and algorithm need NOT be written. [4] (ii) State one application of a circular queue. [1]

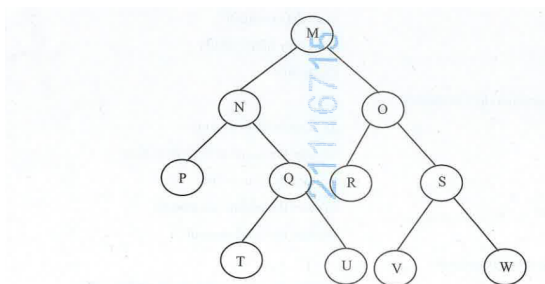
Seen in: Board 2023, 2025 · Sample 2023, 2024, 2025

- 40.** In any internet browser, a user can visit new webpages and go back to previously visited webpages. Each new webpage URL is stored in browser's memory such that when the user clicks 'Back' button, the previous webpage gets displayed. The details of the members of the class are given below: Class name : Browser Data members/instance variables: pages[ ] : an array to hold the URLs of visited webpages max : to store the maximum capacity of the array top : to point to the index of the last visited webpages Methods/Member functions: Browser(int cap) : constructor to assign max = cap and top = -1 void visit(String url) : to add URL of a new webpage if possible, else display the message "Browser history full" String back() : to remove and return the last visited webpage URL, if present, else to return the message "No previous browser history" (i) Specify the class Browser giving details of the functions void visit(String) and String back(). Assume that the other functions have been defined. [4] (ii) Name the entity described above and state its principle. [1]

Seen in: Board 2024, 2026

## Linked Lists and Binary Trees

- 41.** Answer the following questions based on the diagram of a Binary Tree given below: (a) Write the pre-order traversal of the above tree. [1] (b) State the level of Node Q, when the root is at level 0. [1] (c) State the size of the left subtree and the right subtree. [1]



Seen in: Board 2023, 2024, 2025, 2026 · Sample 2023, 2024, 2025

- 42.** A linked list is formed from the objects of the class Word. The structure of the class Word is given below: `class Word { String value; Word next; }` Write an Algorithm OR a Method to count and display the number of nodes whose value starts with a consonant. The method declaration is as follows: `void countConsonant(Word first)`

Seen in: Board 2023, 2025, 2026 · Sample 2023, 2025

- 43.** What is the importance of the reference part in a Linked List?

Seen in: Board 2023 · Sample 2023

### **Complexity and Big O Notation**

- 44.** The worst case complexity for following code segment is: `for(int i=1; i<= n; i++) { for(int j=1; j<= i; j++) { statement; } }` (a)  $O(n+i)$  (b)  $O(n \times i)$  (c)  $O(n)$  (d)  $O(n^2)$

Seen in: Board 2025, 2026 · Sample 2025

- 45.** With the help of an example, briefly explain the dominant term in complexity.

Seen in: Board 2024 · Sample 2024