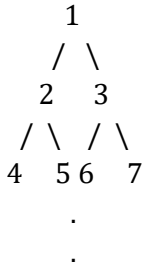
PROGRAMS

Program-1:
We have some fixed no. of coins of some fixed denomination.
For example, let's say we have-
1 coin of 100 Rs.
2 coins of 50 Rs.
5 coins of 20 Rs.
10 coins of 10 Rs.
20 coins of 5 Rs.
30 coins of 2 Rs.
50 coins of 1 Rs.
Now we are given one amount. Let say 157 Rs.
Write an efficient algorithm that give us combination of coins such that no. of coins minimum.
Return null if no any combination is possible.

Program-2:
Implementing one game with one Dice.
When we roll a dice, we get one number. Every time out of 6 faces, 5 faces are visible. Only one face is invisible.
Sum of numbers on all five visible faces is called a Score.
Implement efficient algorithm to implement this game for 3 or 4 players.
Each can roll dice one by one and player who gets the highest Score is winner.
Print/Return id and score of winning player.

Program-3:
Write an efficient algorithm to traverse each node of Binary Tree from root to leaf level and from left to right.



Expected Output: 1 2 3 4 5 6 7 ...

Program-4:
We are given a date. Let's say, today's date in DD/MM/YYYY format.
Write an efficient algorithm to add some specific number of days into it and print new date in same format.
You are not allowed to use inbuilt java's date APIs. You must take care for leap and non-leap years.

Program-5:
Write a simple program to explain synchronization concept.

Program-6:
Write a simple program to explain singleton design pattern.

Program-7:
Suppose we have some coins, let's say 9. Out of 9 coins, 8 coins are of the same weight.
Only one coin is defective one having the different weight than the others.
Write an efficient algorithm/approach to find the defective coin.

- Depending on your solution, there can be discussion on no. of loops and comparisons, required memory, etc., to decide the correctness and efficiency.

Program-8:

Given NxN matrix of characters and one string.
Write an efficient algorithm to find if this string present in matrix either horizontally, vertically or diagonally.
It can be present in any row, column or diagonal starting at any index or may be absent.
You are supposed scan only in mentioned three directions. No need to scan in opposite directions.
Suppose you want to search String KAVI in following 6x6 Matrix:

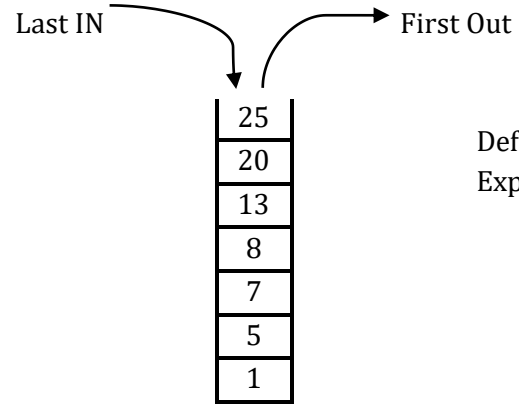
A	B	A	S	I	C
J	A	V	A	E	E
R	U	T	V	I	K
O	K	A	V	I	N
H	A	R	I	O	P
K	P	J	O	R	N

Program-9:

Given a mathematical expression in String format, e.g., 2 + 3 * (4 / 2) – 5
Write an efficient algorithm to scan this string and validate of the given expression is valid one.
If it is valid then evaluate the same.
Please follow the standard maths rules for operators' precisions- B O D M A S

Program-10:

Write a program to print a stack into the reverse order in efficient way.
Stack:



Default Order of stack: 25 20 1 3 8 7 5 1
Expected Output (Stack in reverse order): 1 5 7 8 13 20 25

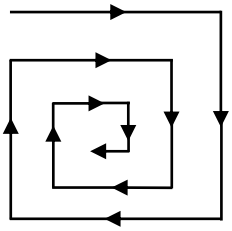
Program-11:

Write a simple program to check whether given number is palindrome or not.

Program-12:

Write a simple to traverse given matrix in spiral way.

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16



Expected Output:
1 2 3 4 8 12 16 15 14 13 9 5 6 7 11 10

Program-13:

Write a simple program to print Pyramid.

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    *
   **
  ****
 ******
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Program-14:

Write a simple program to decide whether given string is a magic string or not. String is said to be a magic string if there is a combination of three characters in a string in such a way that all three characters are either same or they are in sequential order (ascending or descending) as shown below.

a a a
a b c
c b a

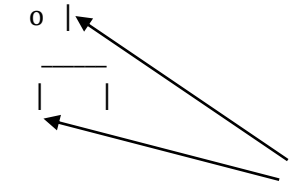
johnaaason – Magic String
onmanthan – Magic String

PUZZLES

Puzzle-1:

This is a glass with 4 matchsticks. There is an insect- o inside it.
Move only two matchstick in such a way that insect is out of the glass.

Solution:



These two matchsticks are as it is. Other two are moved to create glass in reverse direction and hence insect-o is outside the glass now.
You can refer some other matchsticks puzzles online.

Puzzle-2:

We have one candle with one mark exactly in its center. We don't have scale to make any measurement.
We don't have clock either.
We can burn candle from any of its two ends. If candle is burnt from only one end, it takes 60 minutes to burn completely.
How to burn this candle in such a way that it burns exactly in 45 minutes?

Solution:
Burn candle from one end. When it burns till centre mark (**This will be 30 minutes as it is mentioned that it takes 60 minutes to burn candle completely if it burns from only one end**), start burning it from another end.
So now it will take another 15 minutes to burn remaining half candle as now it is burning from both the end. So total 45 minutes for complete candle.

Puzzle-3:

Given 4 pairs of socks each of different color- Red Green Blue Yellow.
Need to arrange these socks in such a way that there are-
One sock between red pair.
Two socks between green pair.
Three socks between blue pair.
Four socks between yellow pair.

Solution:
G B Y G R B R Y

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SUGGESTIONS BASED ON INTERVIEWS

- Keep your programming logic strong.

- Go through the core concepts of- Synchronization, Various Data-Structures, Collection Framework, JSP, Servlets.

- You may get questions or programs related to usage of some common and useful utility/collection classes such as- Arrays, ArrayList, LinkedList, HashMap, TreeMap, SortedMap, SortedSet, HashSet, etc.

- Prepare programs related to manipulations of String, Date, Matrix, Queue, Stack, Tree/Binary Tree.

- Prepare programs showing efficient way for performing various operations such as Traversing, Searching and Sorting.

- It may help you for solving other programs as well which will be asked to you.
  Try to understand calculation of approximate cost, i.e. Time-Space Complexity, of the algorithms/programs which you write. Normally it means running time and memory required to run it.
  Knowledge of big O and small o notations can be helpful.

- Prepare basics of Database. You may get some advantages.
  At least SQL concepts- Data Types and Constraints,
  CREATE, INSERT, UPDATE, DELETE, SELECT, Subqueries, Various JOINS,
  ORDER BY, GROUP BY, HAVING, UNION/UNION ALL, INTERSECT, MINUS,
  Group Functions- COUNT, MIN, MAX, AVG
  TO_CHAR, TO_DATE, TO_NUMBER, CONCAT, SUBSTR, CASE .. WHEN .. THEN ..

- Some references which may be helpful to prepare for programs. You can explore more on your own.
  https://www.geeksforgeeks.org/oracle-interview-preparation/
  https://javarevisited.blogspot.com/2015/01/top-20-string-coding-interview-question-programming-interview.html
  https://www.sanfoundry.com/java-programming-examples-string-handling/

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