Mathematics — Ganita Manjari

Chapter 11 Test 4

The World of Algorithms

Class IX | 2026–27

Time Allowed: 45 Minutes | Maximum Marks: 25

General Instructions

1. All 13 questions are compulsory. Choose one option in A; show working in B–D.
2. No calculators. Give exact answers unless an approximation is requested.
3. Unless stated otherwise, inputs are positive integers. Give precise algorithm steps.

SECTION A

(5 questions × 1 mark = 5 marks)

1. Why does an algorithm name an intermediate value, such as “divisors-of-m”?

(A) To make its value constant
(B) To refer to it in later steps
(C) To make every list increasing
(D) To avoid every calculation

2. An increasing list is scanned from left to right, and selected entries are appended to a new list. The new list is:

(A) Always decreasing
(B) Always empty
(C) Still increasing
(D) Always consecutive integers

3. Which list operation can give an empty result when both input lists are [1, 2, 3]?

(A) Entries exclusive to the first list
(B) Entries common to both
(C) All entries of the first list
(D) All entries of the second list

4. A routine reuses yesterday’s output list without clearing it. What is the main risk?

(A) Every divisor becomes prime
(B) The input must become zero
(C) All numbers change order
(D) Unrelated old entries remain

5. A search for the least common multiple of two positive integers must exclude 0 because:

(A) 0 is never a multiple
(B) The required multiple is positive
(C) 0 is larger than both inputs
(D) 0 is a prime number

SECTION B

(4 questions × 2 marks = 8 marks)

6. Let $L = [2,4,7,9,12]$ and $M = [1,4,9,10]$. Find entries of L absent from M, and entries of M absent from L.

7. Lists $L = [1,2,2,3,6]$ and $M = [2,2,4,6]$ may contain duplicates. Find their common values once each, and state the extra check needed while appending.

8. A program scans [12, 6, 4, 3, 2, 1] from left to right, retaining entries also in [1, 2, 3, 6, 9, 18]. Write the output and state where its greatest entry lies.

9. Find all positive divisors of 30 that are not divisors of 42. Explain why 1 cannot appear in this output.

SECTION C

(3 questions × 3 marks = 9 marks)

10. Describe an algorithm that outputs the entries of an increasing, duplicate-free list A that are absent from a second list B. Explain its correctness and output order.

11. Two positive-integer lists are unsorted. Design a routine to find their greatest common entry without storing a third list. It must also handle the case of no common entry.

12. Write a terminating algorithm for the LCM of positive integers m, n by scanning multiples of m. Explain why the first accepted multiple is the answer.

SECTION D

(1 application question × 3 marks = 3 marks)

13. Two buses leave together at 8:00 a.m. One leaves every 12 minutes and the other every 18 minutes. Use a list of multiples to find their next two common departure times.