# Mathematics — Ganita Manjari

## Chapter 11 Test 9

### 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.** An algorithm gives correct answers for three sample inputs. What has this established?

(A) It is correct for every input

(B) It is the fastest algorithm

(C) It works on those three inputs

(D) It uses no memory

**2.** A routine always stops but always outputs 1 for every GCD problem. Which requirement can it still fail?

(A) Correctness (B) Termination

(C) Having an output (D) Having a finite run

**3.** Changing an input from 999 to 1000 changes its number of digits by:

(A) 0 (B) 1

(C) 10 (D) 1000

**4.** The basic divisor-list algorithm assumes that we can directly:

(A) Know the final GCD (B) Sort every list mentally

(C) Draw every input as dots (D) Test divisibility

**5.** The word “algorithm” developed from the Latin form of which mathematician’s name?

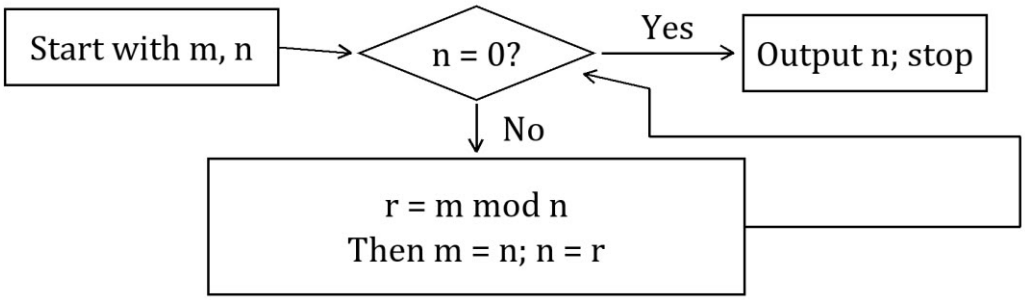
(A) Euclid (B) Al-Khwarizmi

(C) Aryabhata (D) Pythagoras

## SECTION B

(4 questions × 2 marks = 8 marks)

**6.** The routine in figure uses the remainder method. Trace input $(m, n) = (30,18)$ and identify the error in its output box.




**7.** A full divisor scan tests 1 through $n$; a paired scan tests 1 through $\sqrt{n}$ when $n$ is a square. Compare their candidate counts for 100 and 10000.

**8.** A program starts with $m = 40, n = 12$, sets $m$ to $n$, and then sets $n$ to $m \; mod \; n$ using the new $m$. Find the faulty next pair and repair the update.

**9.** Using the definition "greatest positive common divisor", explain why the input pair (0, 0) needs exclusion or a separate convention.

## SECTION C

(3 questions × 3 marks = 9 marks)

**10.** A proposed routine returns the absolute difference of two unequal positive inputs as their GCD. Give one example where it succeeds and one where it fails, with justification.

**11.** Compare subtraction and remainder methods for $gcd(97,2)$. Count reductions to reach a zero entry, excluding swaps. Explain the large difference.

**12.** Describe an algorithm to find the greatest common divisor of three positive integers $a, b, c$ using a two-input GCD routine. Explain why it works.

## SECTION D

(1 application question × 3 marks = 3 marks)

**13.** A controller can perform at most 20 candidate visits or division reductions. For inputs 120000 and 80000, compare scanning every candidate through the smaller input with the remainder method. Find the GCD and select the method meeting the budget.