SNS COLLEGE OF TECHNOLOGY

Coimbatore-35.

An Autonomous Institution

COURSE NAME : 19ITB201   DESIGN AND ANALYSIS OF ALGORITHMS

II YEAR/ IV SEMESTER

UNIT – I INTRODUCTION

TOPIC - IMPLEMENTATION OF GCD USING CONSECUTIVE INTEGER CHECKING ALGORITHM

NOTION OF AN ALGORITHM

- Three methods for solving gcd of two integers:
1. Euclid's algorithm
2. Consecutive integer checking algorithm
3. Middle-school procedure

CONSECUTIVE INTEGER ALGORITHM

Common divisor cannot be greater than the smaller of two numbers.

t = min {m,n}

If t divides both m and n then t is the answer , if not decrease t by 1.

Process continues till answer.

CONSECUTIVE INTEGER ALGORITHM

Steps :

Step1: Assign the value of min{m, n} to t.

Step2: Divide m by t. If the remainder of this division is 0, go to
     Step3;otherwise, go to Step 4.

Step3: Divide n by t. If the remainder of this division is 0, return the value of t as
the answer and stop; otherwise, proceed to Step4.

Step4: Decrease the value of t by 1. Go to Step2.

CONSECUTIVE INTEGER ALGORITHM

Example:
1.   Gcd(12 , 8)   m = 12 & n = 8
                                                  t = min (12 , 8) ;   t = 8
m mod t = 12 mod 8 = 4 not equal to 0   &   n mod t = 8 mod 8 = 0
So , t = t-1   = 8 – 1 =7
   12 mod 7 = 5 not equal to 0   &   8 mod 7 = 1 not equal to 0
Process continues till t=4 then,   12 mod 4 =0   & 8 mod 4 =0
 Thus gcd (12 , 8) = 4

MIDDLE-SCHOOL PROCEDURE

Steps :
Step1: Find the prime factors of m.
Step2: Find the prime factors of n.
Step3: Identify all the common factors in the two prime expansions found in Step1 and Step2. (If p is a common factor occurring Pm   and Pn times in m and n, respectively, it should be repeated in   min{Pm, Pn} times.)
Step4: Compute the product of all the common factors and return it as
         the gcd of the numbers given.

MIDDLE-SCHOOL PROCEDURE

Example :
1. gcd(120 , 72)

$$120 = 2*2*2*3*5$$
$$72 = 2*2*2*3*3$$
$$gcd(120,72) = 2*2*2*3 = 24$$
$$gcd(120,72) = 24$$