Ans 1) a) Reflexive since aRa will have gcf as a.

Symmetric since if aRb has gcf greater than 1 then so does bRa.

Not transitive . eg (2,6)(gcf 2),(6,9)(gcf 3), {2,9}(gcf 1)

b) Not reflexive and not symmetric but transitive.(Symmetric part is good as if a is a boy and b a girl it proves that not symmetric)

c) reflexive and symmetric but not transitive

Ans 2) It is reflexive (naïve)

For symmetric .. Suppose x+2y is divisible by 3 . then y+2x is also divisible since

y+2x=(3x+3y)-(x+2y)

hence it is symmetric

For transitivity

Let x+2y=3m .....y+2z=3n (just substitute y from the second equation in the first and you will get that it(x+2z) is divisible by 3)

Ans 3) It is an equivalence relation and the classes would be all Integers such that $m_1 - n_1$ belongs to ths class

eg. [1]={(1,0),(2,1),.....}

so on and so forth

Ans 4)Just draw the adjacency matrix and take the square of it and then find the trace of the matrix obtained.

Ans 5) IT is equivalence and the table is a bit big so it is just time consuming.

Ans 6) Simple warshall technique application . Nothing new or special in it.