

## PARSHVANATH CHARITABLE TRUST'S

## A.P. SHAH INSTITUTE OF TECHNOLOGY

Department of Computer Science and Engineering **Data Science** 

ns

Semester: Subject: Subject: Academic Year: 2022-2023
* Pigeonhole Principle -
Theorem - If n pigeons are assigned to m
pigeomiotes, and man then at least one
pigeonhole contains two or more goigeons.
Proof -
Consider labelling the m pigeonholes with
the numbers I through m and the n pigeo with the numbers I through n.
Now beginning with Digon I wasin
each pigeon in order to the pigeonhole with the same number. This assigns as
many pigeons as possible to individual
pigeon hotes, but because man, there are
n-m pigeons that have not yet been
assigned to a pigeonhole.
At least one pigeonhole will be assigned
a second pigeon.
n = pigeons
m= pigeenhole m < n
1 0 Cart put shid by the later than
1 45 × 11 7 229
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Extended pigeonhole principle -
IF there are m pigeonholes and more
than am piagons than there ar more
pigeons will have to be assigned to at least one of the pigeonholes.  If m and m are positive integers then In/m I stands for the larger integer less than or equal to the rational number n/m.
then In/m I stands for the larger
number n/m.
Thus 1 3/2 1 is 1,  19/41 is 2,
L 613 J is 2.
Theorem:
If n pigeons are assigned to m, pigeonholes, then one of the pigeonhole must contain at least \( (n-1)/m \( 1+1 \)
must contain at least [ (n-1)/m]+1
pigeons:
Proof:
Assume that each pigeonhole does not
ontain more than [(n-1)/m] pigeons.
Then there will be at most
$m[(n-1)/m] \leq m(n-1)/m = n-1$ pigeons
in all.
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