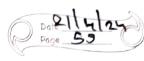
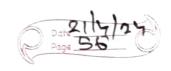
5.3 Benomeal Theorem: Dat 21/4/24 Binomial theorem is used to solve binomial expressions in a simple way. The expansion of cathor for any positive integer in. The Binomial theorem is stated as:  $= (n) \cdot a^{m}b + (n) \cdot a^{m}b + (n) \cdot a^{m-2}b + \dots$ Binomal + (n) at brit + (n) at his
coefficient \_\_\_\_\_\_ => Benomed coefficiente: of the re-combinations from a set of n elimente, denoted by (m). this number is also called a binomial coefficient since it occurs as a coefficient in the expansion of pour of binomial expressions.



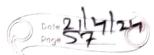
of the binomial theorem gives a power of a binomial expression as a sum of terms involving binomial coefficients. ENAMPLE: What is the coefficient of xi.y's in the

expansion of (2x-3y)25 &

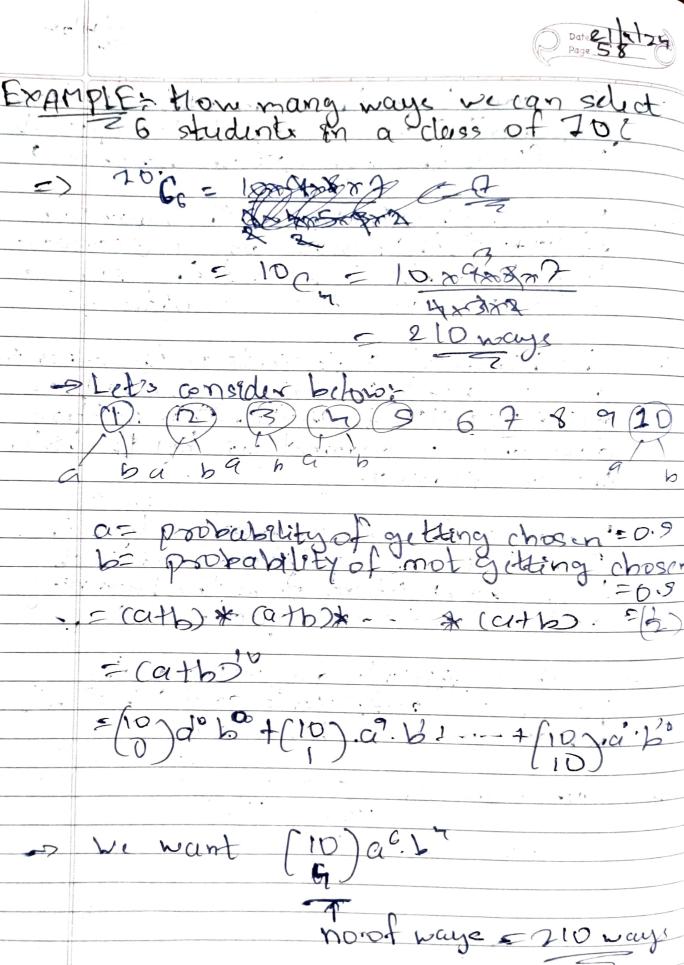
or 1-1-12 · n=13  $(29)(2)^2(-3)^3 x^{12} y^{13}$  ] by 499 hg A Properties: of coefficients: => Symmetry rule: =7 Sum over K: 2 (m)=2 -> Consider Miss (x+y) = = (m) 2n-x yx  $\Rightarrow (2)^{2} = (7)$ 



-> It >= I and y=2 = If x=1 and y==2 Properties of Binonial theorems 1.) There are (n+1) terms in an expansion of a binomial empression with ender m, i.e. more than the power condend of the binomial theorem COBOTRATOR Expression enginthe no of terms presente in the 20) The expansion of catbor has first term go equal to an while the last one is equal to br.

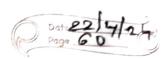


(exponents) of a" and b" is ocqual to "n" ("e", the powers of the binomial. 40) From the beginning of the expansion of Ca+x2, the powers of a decrease-from n'-upto 'D's and the powers of 'x' increase from 'D' upto 'n'. 5.) The binomial coefficients in the expansion are arounged in an array, which is called Pascal's trangle. The patam developed go summed up by the benomed theorem formula. 60 when a= b or a+b=n only, then "(a= "Cis. The confficient of each terom equidistant from the baginning and the end are equal. - Such coefficients are called as the binomical existincents and no = none, whose or is 0,1,21, n: 7.) Sum over 14, = n ( = 2 m

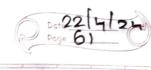




ExAMPLES thow many maye in can select at => (atb)=(6).a+b+(6)a9b coefficient (6) ab for none student getting = (6) + (6) + (6) + (6)+(6)+(6) = 6+ (6x3)+ (6x5)+ (6x5) -, 12 + 30+·2071 = 5/1/2 CATE- C3-2003: n couples are invited to a = pasty with the condition that every husband should be accomplished by his wife. However, a wife need not be accompained by her husband. The number of different gatheringe possible at the party is— CAI (2n)+0" (BI-5" CC) (2n) [D] (2n)

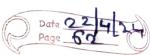


حزا	Let x be husband and of be wife
<b>-</b> 7	Possible solutions were (x,y)=(1,1) and
	Cxxx=1012. As husband should be
	accompained by her wife but wife can
	accompained by hor wife but wife can also come alone.
	Jan
	As there are m-couples, total people will be 2n.
->	As there are m-couples, total people
	will be 2n.
,	
	org
Muspar	10 1 2: 3: h n
6) V ( 4	1:23 h. = n
=>	There are three options for every
	couple.
	1) Nobody goes to gathering 2) wife alone goes
	2.2 wite alore als
	3) Roth and
	3) Both goes.
	So for oxider couple this on 3
-7	spifons every couple there ore 3
,	e propositions in the second s
. ~	Monce; it will be 3x3x n times
	3. ways



=> Binamial theorem for negative or fractional index is: + (1+x)=1+nx+n(n-1).x+n.(n-1).n-2)x3
21
1--ugto 00 where |xK1. -> Grenfredtim of (1+x) where on 1.

negative = n. (n-1). (n-2). (n-k+1). xk CS-2016. The coefficient of 1012 an (x3+x4x3) => = (x3+x1+x3+x61-...) The se of constan = (x3 (1+x+x2+x2+-)3 of 1-x  $= \chi^{9} \cdot \left(\frac{1}{1-\chi}\right)^{3}$   $= \chi^{9} \cdot \left(1-\chi\right)^{3}$ Here the forth term well have x3. here he villed that ZX9. (-3)(-3-1)(-3-2)(-3) = x9.8. (+3) (+3) (+5) +x3 = 10x12 Coefficient of r. 20



=> Another method: =  $x^9 (1+x+x^2+...)^3$ =  $(ax + (1+x+x^2+...)^3$ - Uang binomial expansion, C1+(x+x+x3)3 = (3) + (3) (x+x2+x3) 2) (2+8+23) + (3) CX+x2+p3)3 Evelfluint of x3- (3). x3 (3+3×2+1) x2 21 1023 : Multiplyang 23 w/m x2 = x12 . Coeffquint=10