

Unit – 3: Elementary Combinatorics (Concept-wise Table)

No.	Question / Problem	Video Link	Concept / Topic Name
1	In how many ways 10 boys and 10 girls can be arranged in a circle such that boys & girls alternate?	https://youtu.be/kkzab430dAt?si=5100LgipR6Agat0Lnsa1t0	Permutation Problems on Alternating Arrangements
2	Find n if $P(n, 2) = 72$	https://youtu.be/injbcHXCVE0?si=PD0UTaT0RCF0v20La	Permutation Problems for $P(nPr)$
3	Find the number of arrangements of letters in the word 'MATHS'.	https://youtu.be/1WmhCFr8Y-4A?si=FeM8ag2n5U9nR6p	Permutation Problems on Repeated Letters
4	State Pigeonhole Principle	https://youtu.be/uP_b9wCq5LQ?si=Pig0R7XsHtP5sAq2De	Pigeonhole Principle: Definition & Application
5(a)	Find the expansion of $(x+y+z)^5$ (Binomial/Multinomial type)	https://youtu.be/7KtMzqWB9L8?si=Bi0BTatTKZdMmMa2	Binomial & Multinomial Expansion
5(b)	How many ways can 20 similar books be placed on 5 different shelves?	https://youtu.be/6SAjPkdzCD4?si=D1stf1w1tuhYVed0Ca	Distribution of Identical Objects to Distinct Containers
5(c)	How many different 8-digit numbers can be formed by using only digits 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 with repetition?	https://youtu.be/1W61sIn2l8C3B?si=ReG6Kaj0s2m1R	Permutation Problems with Repeated Digits
6	How many integers between 10^{10} and 10^{11} (a) have no digit 9, (b) have at least one digit 9?	https://youtu.be/1KAP2k5zCB4?si=00d0g1st0t0rVed0Ca	Counting Problems: Restrictions & Inclusions
7	In a class of 50 students, 20 play football, 16 play hockey, 10 play both. Find the number of students who play neither.	https://youtu.be/0UlnvJbmd7E6k?si=9Ym8FRe0r0U3QY	Set Theory: Principle of Inclusion and Exclusion
8	Prove that among any 30 people, we can choose 5 who have the same birthday.	https://youtu.be/0Xyke6De1w4s?si=P1e0T030P7Wp0C1	Pigeonhole Principle: Application Problems
9(a)	Find the coefficient of $u^2w^3x^4y^2$ in $(u+v+2w+x+3y+z)^4$	https://youtu.be/0kvQkwt_XSU?si=AGF40Xzj4vTke0Tm	Multinomial Theorem
9(b)	Bit string of length 8: (i) exactly five 1s, (ii) equal 0s & 1s.	https://youtu.be/4C5V1\$1V69A3s?si=Qd88r8n0S6zCC	Counting Problems: $C(n, r)$ & Counting Bits
10(a)	From digits 1, 2, 3, 5, 6, 7 (no repetition): (i) 4-digit numbers divisible by 10, (ii) 4-digit numbers divisible by 5.	https://youtu.be/0028SQe1vns?si=Re0mM1j00Pv0t0n5	Permutation Problems on Digits
10(b)	Find the coefficient of $x^{15}y^{10}$ in $(2x - 3y)^{25}$	https://youtu.be/raks0IZ2Saw?si=SPtKmiLLR3v8u5Xo4	Binomial Expansion: General Term
11(a)	Dept. of 8 men and 9 women → committee of (i) 3 men & 2 women, (ii) 4 men & 3 women.	https://youtu.be/2Fkq988nK07si?si=0Ym0r8AnseE26K	Combination Problems: Selection Problems
11(b)	No. of integral solutions to $x_1 + x_2 + x_3 + x_4 + x_5 = 20$ with $x_1 \geq 2, x_2 \geq 1, x_3 \geq 4, x_4 \geq 5, x_5 \geq 0$	https://youtu.be/2KRE4vRvY58k?si=0	Combinations with Repetition (Stars & Bars)
12(a)	From 1 to 250, find how many numbers are not divisible by 3 or 5.	https://youtu.be/7Thd71uovk0?si=Br0DyPRe0fInd0u57	Principle of Inclusion-Exclusion on Divisibility
12(b)	How many different license plates have 1–3 letters followed by 4 digits?	https://youtu.be/157RL3EEU6qE?si=00d0g1st0t0rVed0Ca	Counting Problems: Combinatorial