FREE NOTES · NCERT + JEE LEVEL

Probability

Random experiments, outcomes aur sample space, events aur unke types, events ka algebra, axiomatic approach, equally likely outcomes ki probability, "ya", "aur", "nahi" events aur addition theorem.

01 Random experiment
02 Sample space S
03 Events & unke types
04 Events ka algebra
05 Axiomatic probability
06 Addition rule & complement
07 Standard experiments ek nazar me
08 JEE Extra + Tricks
09 Solved examples
10 Common mistakes
11 Formula sheet & practice
12 Quick revision: exam se 5 minute pehle

01 Random experiment

Aisa experiment jiske ek se zyada nateeje ho sakte aur pehle se bata nahi sakte kya aayega (sikka uchhalna, dice phenkna). Har possible nateeja ek **outcome**.

02 Sample space S

- Ek sikka: {H, T}. Do sikke: {HH, HT, TH, TT}. n sikke: 2^n outcomes.
- Ek dice: {1, ..., 6}. Do dice: 36 ordered pairs.
- Taash ki gaddi: 52 patte, 4 suits (♠ ♣ kaale, ♥ ♦ laal) har ek me 13; face cards J, Q, K = 12.

	1	2	3	4	5	6
1	1,1	2,1	3,1	4,1	5,1	6,1
2	1,2	2,2	3,2	4,2	5,2	6,2
3	1,3	2,3	3,3	4,3	5,3	6,3
4	1,4	2,4	3,4	4,4	5,4	6,4
5	1,5	2,5	3,5	4,5	5,5	6,5
6	1,6	2,6	3,6	4,6	5,6	6,6

36 outcomes; sum 7 shaded ⇒ P = 6/36 = 1/6

Do dice ka sample space

03 Events & unke types

Event S ka koi bhi subset hai.

Type	Matlab
Impossible	φ (kabhi nahi hota)
Sure	Khud S
Simple	Ek sample point
Compound	Ek se zyada sample points
Mutually exclusive	A ∩ B = φ (saath nahi ho sakte)
Exhaustive	A ∪ B ∪ … = S

04 Events ka algebra

Shabd	Set notation
A nahi	A′ = S − A
A ya B	A ∪ B
A aur B	A ∩ B
A par B nahi	A − B = A ∩ B′
A, B me se sirf ek	(A ∩ B′) ∪ (A′ ∩ B)
Na A na B	A′ ∩ B′ = (A ∪ B)′

05 Axiomatic probability

1. Har event ke liye 0 ≤ P(E) ≤ 1.
2. P(S) = 1.
3. E, F mutually exclusive hon to P(E ∪ F) = P(E) + P(F).

$$\text{Equally likely: } P(E) = n(E)/n(S)$$

06 Addition rule & complement

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Mutually exclusive: $P(A \cup B) = P(A) + P(B)$

$P(A \text{ nahi}) = 1 - P(A)$

$P(A \text{ par } B \text{ nahi}) = P(A) - P(A \cap B)$

A ke paksh me odds = P(A) : P(A′).

07 Standard experiments ek nazar me

- Do dice: jod 7 sabse zyada baar (6 baar); doublets 6 baar.
- Teen sikke: P(kam se kam ek head) = 1 - 1/8 = 7/8.
- Taash: P(king) = 4/52 = 1/13; P(heart) = 13/52 = 1/4; P(laal king) = 2/52.
- n me se r chunna: n(E) aur n(S) dono ke liye ${}^{n}C_{r}$.

08 JEE Extra + Tricks

JEE LEVEL

- $P(A \cup B) = P(A) + P(B) - P(A \cap B)$; A, B me se sirf ek: $P(A) + P(B) - 2P(A \cap B)$.
- Paksh me odds a : b ⇒ $P = a/(a + b)$.
- Do dice: P(jod = 7) = 6/36 (sabse sambhav jod). Teen dice me kul 216.
- Sikke: n baar me kam se kam ek head = $1 - (½)^n$.
- Complement trick: "kam se kam ek" ⇒ 1 − P(ek bhi nahi).

09 Solved examples

Q1. Do dice phenke. P(jod prime ho)?

Jod 2, 3, 5, 7, 11: 1 + 2 + 4 + 6 + 2 = 15 baar ⇒ **15/36 = 5/12**.

Q2. P(A) = 0.42, P(B) = 0.48, $P(A \cap B) = 0.16$. $P(A \cup B)$ aur P(A nahi)?

0.42 + 0.48 − 0.16 = **0.74**; 1 − 0.42 = **0.58**.

Q3. Gaddi se 4 patte nikale. P(chaaron ikke)?

${}^{4}C_{4}/{}^{52}C_{4}$ = **1/270725**.

Q4. 4 mard aur 3 auraton me se 2 ki committee. P(dono auratein)?

${}^{3}C_{2}/{}^{7}C_{2}$ = 3/21 = **1/7**.

10 Common mistakes

- Do dice me (1, 2) aur (2, 1) ko ek outcome ginna (alag hain).
- Overlap ho sakne wale events me seedha P(A) + P(B) jodna.
- Probability 1 se zyada ya negative aaye aur dhyan na dena.
- Mutually exclusive aur exhaustive me confusion.

11 Formula sheet & practice

Classical	$P(E) = n(E)/n(S)$
Addition	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
Complement	$P(A') = 1 - P(A)$
Range	$0 \le P \le 1$

1. Sikka 3 baar uchhala. P(exactly 2 heads)?
2. Dice phenka. P(number > 4)?
3. P(A) = 3/5, P(B) = 1/5, A, B mutually exclusive, to P(A ya B)?
4. P(leap year me 53 Sundays)?

ANSWERS

1) 3/8 · 2) 1/3 · 3) 4/5 · 4) 2/7

12 Quick revision: exam se 5 minute pehle

BASICS

- Event = S ka subset.
- n sikke: 2^n; 2 dice: 36.

AXIOMS

- $0 \le P \le 1$, P(S) = 1.
- Exclusive ⇒ jodo.

RULES

- P(A∪B) formula.
- P(A′) = 1 − P(A).

COUNTING

- Selection ke liye ${}^nC_r$.
- "Kam se kam ek" = 1 − P(ek bhi nahi).

Koi doubt? padhaiadda.netlify.app pe AI Doubt Solver se poocho, ya is chapter ka mock test do.