

Probability — CBSE Pattern Test 2

Class 12 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 2 — CBSE Pattern (90 minutes, 40 marks)

Class 12 Maths · Probability · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.
 (2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.
 (3) For MCQ questions choose the single correct option; for VSA answers write a single line.
 (4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

1. For independent events A and B, $P(A|B)$ equals
 - (A) $P(A)$
 - (B) $P(B)$
 - (C) $P(A)P(B)$
 - (D) 1
2. The events $E_1, E_2, \dots, E_n$ in Bayes' theorem form a
 - (A) partition of the sample space
 - (B) single event
 - (C) mutually inclusive set
 - (D) null set
3. The denominator in Bayes' theorem is
 - (A) $P(A)$
 - (B) $P(E_i)$
 - (C) $P(A|E_i)$
 - (D) $P(E_i)A$
4. A random variable assigns a real number to each
 - (A) outcome of a random experiment
 - (B) event of probability 1
 - (C) sample point twice
 - (D) impossible event
5. The mean of a random variable X is
 - (A) $\sum x P(X = x)$
 - (B) $\sum P(X = x)$
 - (C) $\sum x$
 - (D) $\sum x^2 P(X = x)$
6. The variance of X is
 - (A) $E(X^2) - [E(X)]^2$
 - (B) $E(X^2)$
 - (C) $E(X)$
 - (D) $[E(X)]^2$
7. In a binomial distribution, the trials are
 - (A) independent

- (B) dependent
 - (C) mutually exclusive
 - (D) exhaustive only
8. The sum of p and q in a binomial distribution is
- (A) 1
 - (B) 0
 - (C) p
 - (D) q
9. Write the multiplication theorem of probability.
10. Write the formula for the mean of a random variable.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. What is meant by a partition of the sample space?
12. State the partition condition for Bayes' theorem.
13. Write the formula for the variance of X .
14. Write the binomial probability formula.

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. If $P(A) = 0.3$ and $P(B|A) = 0.4$, find $P(A \cap B)$.
16. Given $P(A) = 0.6$, $P(B) = 0.5$ and $P(A \cap B) = 0.3$, find $P(A|B)$ and $P(B|A)$.
17. For $P(X = 0) = 0.3$, $P(X = 1) = 0.5$, $P(X = 2) = 0.2$, find $E(X^2)$ and $\text{Var}(X)$.
18. A die is thrown 4 times. Find the probability of getting a 6 exactly once.

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. A die is thrown twice. Find the probability that the sum is 8, given the first throw is 3.
20. Two cards are drawn; let X be the number of aces. Find the probability distribution of X . The probability that a bulb is defective is 0.1. Find the probability that in a lot of 5 bulbs exactly 2 are defective.

Answer Key (Marking Scheme)

- Q1 — (A) $P(A)$. Q2 — (A) partition of the sample space. Q3 — (A) $P(A)$. Q4 — (A) outcome of a random experiment.
- Q5 — (A) $\sum x \cdot P(X = x)$. Q6 — (A) $E(X^2) - [E(X)]^2$. Q7 — (A) independent. Q8 — (A) 1.
- Q9 — $P(A \cap B) = P(A)P(B|A)$.
- Q10 — $E(X) = \sum x \cdot P(X = x)$.
- Q11 — A set of mutually exclusive, exhaustive events covering the sample space.
- Q12 — The E_i are mutually exclusive and exhaustive with $P(E_i) > 0$.
- Q13 — $\text{Var}(X) = E(X^2) - [E(X)]^2$.
- Q14 — $P(X = r) = {}^nC_r \cdot p^r \cdot q^{n-r}$.
- Q15 — 0.12.
- Q16 — $P(A|B) = 0.6$, $P(B|A) = 0.5$.
- Q17 — $E(X^2) = 1.3$, $\text{Var}(X) = 0.49$.
- Q18 — $4(1/6)(5/6)^3 = 500/1296$.

Q19 — $1/6$.

Q20 — Distribution of $X = 0, 1, 2$; $10(0.1)^2(0.9)^3 = 0.0729$.