RANDOM VARIABLES

Single Correct Answer Type

1. A random variable X has the probability distribution

X	1	2	3	4	5	6	7	8
P(x)	0.15	0.23	0.12	0.10	0.20	0.08	0.07	0.05

Events E= {X is a prime number} and F= {X / X < 4}

I: $P\left(\overline{E \cup F}\right) = 0.23$

II: $P\left(\overline{E} \cup \overline{F}\right) = 0.65$

Which of I, II is (are) true

(A) I only (B) II only (C) both I and II (D) neither I nor II

2. The probability distribution of a random variable X is given below

$(X = x)$: 1 2 3 4 5

$p(X = x)$: K 2K 3K 4K 5K

A: $p(2 \le x < 4)$ B: $p(x \ge 4)$ C: $p(x \le 3)$ D: $p(3 \le x \le 5)$

Arrange A, B, C, D in ascending order of magnitude

(A) A, C, D, B (B) A, B, C, D (C) A, C, B, D (D) B, A, C, D

3. A random variable has the following distribution.

$x = x_i$	–3	–2	–1	0	1	2
$P(x = x_i)$	0.1	2K	3K	7K	0.2	0.1

Then for the values, A = K, B = Mean, C = Variance, the ascending order is

(A) A, B, C (B) B, A, C (C) C, B, A (D) C, A, B

4. Assertion : A random variable X takes the values 0,1,2. It's mean is 0.6. If P(X=0) =0.5 then P(X=1) = 0.4

Reason: If $X: S \to R$ is a discrete random variable with range $\{x_1, x_2, x_3, ...\}$ then mean $= \sum_{r=1}^{\infty} X_r P(X = x_r)$

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and B are true but R is not correct explanation of A

(C) A is true but R is false (D) A is false but R is true

5. Three different dice are rolled simultaneously, three times. The probability that all of them show different numbers only two times, is equal to

(A) 100/729 (B) 2/3 (C) 100/243 (D) 143/243

6. A discrete random variable X, can take all possible integer values from 1 to K, each with a probability $\frac{1}{K}$.

Its mean is

(A) K (B) $K+1$ (C) $\frac{K+1}{2}$ (D) $\frac{K+1}{4}$

7. The range of a random variable X is $\{0,1,2\}$ and $P(X=0)=3K^3$, $P(X=1)=4K-10K^2$, $P(x=2)=5K-1$. Then we have

(A) $P(X=0)<P(X=2)<P(X=1)$ (B) $P(X=0)<P(X=1)<P(X=2)$

(C) $P(X=1)+P(X=0)<P(X=2)$ (D) $P(X=1)>P(X=0)+P(X=2)$

8. 4 bad apples accidentally got mixed up with 20 good apples. In a draw of 2 apples at random, expected number of bad apples is

(A) 1 (B) $\frac{2}{3}$ (C) $\frac{1}{3}$ (D) $\frac{1}{6}$

9. If F(x) is the cumulative distributive function of a random variable x whose range is from $-\alpha$ to $+\alpha$, then $P(X<-\alpha)=$

(A) 1 (B) $\frac{1}{2}$ (C) 0 (D) $\frac{1}{3}$

10. If the range of the random variable X is from a to b then $F(X\le b)$ is

1) 0 2) 1 3) 0.5 4) 2

11. Let X denote the number of vowels in word selected at random from this sentence. Find the expected value and standard deviation of the random variable X. (Consider X as a word with one letter)

(A) $2,\sqrt{2}$ (B) $\sqrt{2},2$ (C) 2, 2 (D) $\sqrt{2},\sqrt{2}$

12. A random variable X has its range $X=\{0,1,2\}$ and the probabilities are given by

$P(X=0)=3K^2$

$P(X=1)=4K-10K^2$, $P(X=2)=5K-1$ where K is a constant, then the value of K is

(A) 1 (B) 2 (C) $\frac{1}{7}$ (D) $\frac{2}{7}$

13. If $P(X=x)=C\left(\frac{2}{3}\right)$; $x=1,2,3,4,.....$ is a probability mass function, the value of C is

(A) $\frac{1}{4}$ (B) $\frac{1}{3}$ (C) $\frac{1}{2}$ (D) $\frac{1}{6}$

14. If a random variable X takes values $(-1)^k 2^k/K$; $k=1,2,3,.....$ with probabilities $P(X=k)=\frac{1}{2^k}$, then $E(X)=$

(A) $\log_e 2$ (B) $\log_2 e$ (C) $\log_e\left(\frac{1}{2}\right)$ (D) $\log_e\left(\frac{1}{4}\right)$

15. A person who tosses an unbiased coin gains two points for turning up a head and loses one point for a tail. If three coins are tossed and the total score X is observed, then the range of X is

(A $\{0,3,6\}$ (B) $\{-3,0,3\}$ (C) $\{-3,0,3,6\}$ (D) $\{-3,3,6\}$

16. Let X be the random variable with the probability distribution function $f(X)=\frac{e^{-4}.4^x}{x!}$; $x=0,1,2,3,....$

then the standard deviation of X is

(A) 2 (B) 4 (C) 16 (D) $\sqrt{2}$

17. If it rains a dealer in rain coats can earn Rs.500/- a day. If it is fair he will lose Rs. 40/- a day. His mean profit if the probability of a fair day is 0.6 is

(A) Rs. 230/- (B) Rs. 460/- (C) Rs. 176/- (D) Rs. 88/-

18. Two unbiased coins whose faces are marked 1 and 2 are tossed. The mean value of the total of the numbers is

(A) 3 (B) 4 (C) 5 (D) 2

19. The probability that there would be 1, 2 or 3 persons riding a bicycle are 0.85, 0.12 and 0.03 respectively. The expected number of persons per bicycle is

(A) 2 (B) 1 (C) 1.18 (D) 3

20. An urn A contains 4 white and 6 red balls. Three balls are drawn at random the expected number of white balls drawn is

(A) 3.0 (B) 1.8 (C) 1.2 (D) 1.6

Numerical based

21. A random variable X has its range $X=\{0,1,2\}$ and the probabilities are given by $P(X=0)=3k^2$, $P(X=1)=4k-10k^2$, $P(X=2)=5k-1$ where k is constant. Find the value of $7k$

22. A fair coin is tossed n times. Let X be random variable denoting the number of heads tossed.
If $P(X=4),P(X=5),P(X=6)$ are in AP then $n=$___

23. A die is rolled 3 times. If getting 6 is considered as success. The probability of at least 2 success is ___

24. An unbiased die is tossed 6 times. The mean of number of odd numbers is ____

25. The mean and variance of a binomial variable X all 2 and 1 respectively. Find the probability that X takes values greater than 1.

KEY

1.	C	**2.**	C	**3.**	B	**4.**	A	**5.**	C
6.	C	**7.**	B	**8.**	C	**9.**	C	**10.**	B
11.	A	**12.**	D	**13.**	C	**14.**	C	**15.**	C
16.	A	**17.**	C	**18.**	A	**19.**	C	**20.**	C
21.	2	**22.**	7 or 14	**23.**	0.074	**24.**	3	**25.**	0.687

✻ *Wish You all the Best* ✻