OPEN STUDENT FOUNDATION

Date : 29-02-2024 **STD 12 Commerce Statistics** **Total Marks : 74**

*** Answer The Following Questions as Directed.** **[14]**

1. The probability distribution of a random variable X is as follows:

X	2	3	4	5
p(x)	0.2	0.3	4C	C

Determine the value of constant C.

2. If n=4 for a symmetrical binomial distribution then find P (4).

3. Find the standard deviation of the binomial distribution having n=8 and probability of failure $\frac{2}{3}$.

4. Find parameters of the binomial distribution where mean = 4 and variance = 2.

5. For a binomial distribution, standard deviation is 0.8 and probability of failure is $\frac{2}{3}$. Find the mean of this distribution.

6. A shopkeeper has 6 tickets in a box. 2 tickets among them are worth a prize of Rs 10 and the remaining tickets are worth a prize of Rs 5 . If a ticket is drawn at random from the box, find the expected value of the prize.

7. For a symmetrical binomial distribution with $n = 8$, find $P(X \leq 1)$

*** Answer The Following Questions as Directed.** **[21]**

8. Examine whether the following distribution is a probability distribution of a discrete random variable $X : P(x) = \frac{x+2}{25}; x = 1, 2, 3, 4, 5$

9. A person has kept 4 cars to run on rent. The probability that any car is rented during the day is 0.6. Find the probability that more than one but less than 4 cars are rented during a day.

10. An example Is given to 6 students to solve. The probability of getting correct solution of the problem by any student is 0.6. Students are trying to solve the problem independently. Find the probability of getting the correct solution by only 2 out of the 6 students.

11. Determine when the following distribution is a probability distribution of discrete variable. Hence obtain the probability for x =2

$p(x) = c\left(\frac{1}{4}\right)^x, \quad x = 1, 2, 3, 4$

12. A random variable X denotes the number of accidents per year in a factory and the probability distribution of X is given below :

$X = x$	0	1	2	3	4
$p(x)$	$4K$	$15K$	$25K$	$5K$	K

(i) Find the constant K and rewrite the probability distribution.

(ii) Find the probability of the event that one or two accidents will occur in this factory during the year.
(iii) Find the probability that no accidents will take place during the year in the factory.

13. The probability that a person living in a city is a non-vegetarian is 0.20. Find the probability of at the most two persons out of 6 persons randomly selected from the city is non-vegetarian.

14. In a factory, packets of produced blades are prepared having 50 blades in each packet. A quality control engineer randomly selects a packet from these packets and examines all the blades of the selected packet. If 4 or more defective blades are observed in the selected packet then the packet is rejected. The probability distribution of the defective blades in the packet is given below :

Number of defective blades in the packet	0	1	2	3	4	5	6 or more
Probability	$9K$	$3K$	$3K$	$2K$	$2K$	$K-0.02$	0.02

From the given probability distribution, (i) Find constant K. (ii) Find the probability that the randomly selected packet is accepted by the quality control engineer.

* Answer The Following Questions as Directed. [24]

15. The probability that a bomb dropped from a plane over a bridge will hit the bridge is \frac{1}{5} . Two bombs are enough to destroy the bridge. If 6 bombs are dropped on the bridge, find the probability that the bridge will be destroyed.

16. Normally, 40 % students fail in one examination. Find the probabilities that at least 4 students in a group of 6 students pass in this examination.

17. The probability distribution of a random variable X is as follows :

$X = x$	-2	-1	0	1	2
$p(x)$	$\frac{K}{3}$	$\frac{K}{3}$	$\frac{K}{3}$	$2K$	$4K$

18. The probability distribution of the monthly demand of laptop in a store is as follows :

Demand of laptop	1	2	3	4	5	6
Probability	0.10	0.15	0.20	0.25	0.18	0.12

Determine the expected monthly demand of laptop and find variance of the demand.

19. The probability distribution of a random variable X is defined as follows:
$P(x) = \frac{k}{(x+1)!}; x = 1, 2, 3$ and $k =$ constant Hence, find (i) constant k (ii) $P(1

20. Let X denote the maximum integer among the outcomes of tossing two dice simultaneously. Obtain the probability distribution of variable X and find its mean and variance.

*** Calculate The Following Sums In Detail.** **[15]**

21. Find constant C for the following discrete probability distribution. Hence obtain mean and variance of this distribution.
$p(x) = C \cdot {}^{4}P_{x}, x = 0, 1, 2, 3, 4$

22. There are 2 black and 2 white balls in a box. Two balls are drawn without replacement from it. Obtain probability distribution of the number of white balls in the selected balls. Hence find its mean and variance.

23. A box contains 4 red and 2 blue balls. Three balls are simultaneously drawn at random. If X denotes the number of red bails in the selected balls, find the probability distribution of X and find the expected number of red balls in the selected balls.

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