

COMPETENCY BASED QUESTIONS

STD XII MATHEMATICS (041)

Name of the topic/unit : PROBABILITY

Expected learning outcome :

Finds the conditional probability involving two events associated with a random experiment.

Finds the probability of Independent events.

Applies Baye's theorem in solving problems.

Finds the probability distribution of a random variable and also its mean.

Highlight of the core concept and major areas :

Conditional probability, Independent events, Baye's theorem, Mean of Probability distribution.

Multiple Choice questions

1. A flash light has 8 batteries out of which 3 are dead. If 2 batteries are selected without replacement and tested, the probability that both are dead is
a) $\frac{33}{56}$ b) $\frac{9}{64}$ c) $\frac{1}{14}$ d) $\frac{3}{28}$
2. Three persons A, B & C fired at a target in turn, starting with A. Their probability of hitting the target are 0.4 , 0.3 & 0.2 respectively. The probability of two hits is
a) 0.024 b) 0.188 c) 0.336 d) 0.452

Assertion - Reasoning questions

In the following questions, a statement of Assertion(A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices

- a. Both A and R are true and R is the correct explanation of A.
 - b. Both A and R are true and R is not the correct explanation of A.
 - c. A is true but R is false.
 - d. A is false but R is true.
3. Assertion (A) : A four digit number is formed using the digits 1,2, 3,5 with no repetitions, then probability that the number is divisible by 5 is $\frac{1}{4}$.
- Reason (R): If A and B are independent events , then $P(A' \cup B) = 1- P(A)P(B')$

4. Assertion (A): A probability distribution table is given below

X	0	1	2
P(X)	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$

Mean of the distribution is 1.

Reason (R) : Mean of the distribution is $\sum pixi$.

Case based question

5. Read the following passage and answer the questions given below:

A shopkeeper sells three types of flower seeds E_1, E_2 and E_3 . They are sold as a mixture where the proportions are 4:4:2 respectively. The germination rates of the three types of seeds are 45%, 60% and 35%.



Calculate

- probability of a randomly chosen seed to germinate.
- probability that it will not germinate, given that the seed is of type E_2 .

OR

probability that it will not germinate, given that the seed is of type E_3 .

iii) probability that it is of type E_2 , given that a randomly chosen seed does not germinate.

Answer Key

1. $P(X=2) = \frac{3}{8} \times \frac{2}{7} = \frac{3}{28}$.

Option d is the correct answer.

2. $P(ABC') + P(AB'C) + P(A'BC)$
 $= (0.4 \times 0.3 \times 0.8) + (0.4 \times 0.7 \times 0.2) + (0.6 + 0.3 + 0.2) = 0.188$

Option b is the correct answer.

3. Assertion : Probability $= \frac{3!}{4!} = \frac{1}{4}$

Assertion (A) is true.

Reason (R): $1 - P(A)P(B') = 1 - P(A)(1 - P(B))$
 $= 1 - P(A) + P(A)P(B)$
 $= P(A') + [1 - P(A')]P(B)$
 $= P(A') + P(B) - P(A')P(B)$
 $= P(A' \cup B)$

Reason (R) is true.

But R is not the correct explanation of A.

Correct option is b.

4. Mean $= \sum p_i x_i = 1$

Assertion (A) is true.

Reason (R) is true and R is the correct explanation of A.

Correct option is a.

5. Let A be the event that seed will germinate

$$P(E_1) = \frac{4}{10}, P(E_2) = \frac{4}{10}, P(E_3) = \frac{2}{10}$$

$$P(A/E_1) = \frac{45}{100}, P(A/E_2) = \frac{60}{100}, P(A/E_3) = \frac{35}{100}$$

$$P(A'/E_1) = \frac{55}{100}, P(A'/E_2) = \frac{40}{100}, P(A'/E_3) = \frac{65}{100}$$

i) $P(A) = P(E_1)P(A/E_1) + P(E_2)P(A/E_2) + P(E_3)P(A/E_3)$

$$= 0.4 \times 0.45 + 0.4 \times 0.60 + 0.2 \times 0.35$$
$$= 0.18 + 0.24 + 0.07 = 0.49$$

ii) $P(A'/E_2) = \frac{40}{100}$ OR $P(A'/E_3) = \frac{65}{100}$

iii) $P(E_2/A') = \frac{160}{510} = \frac{16}{51}$

