CHAPTER 13

PROBABILITY

ASSERTION REASONING QUESTIONS

Q No	Question
	Directions: In the following questions, a statement of Assertion (A) is followed by a statement of reasoning (R). Mark the correct choice as: (A). Both assertion (A) and reason (R) are true and (R) is the correct explanation of (A) (B). Both assertion (A) and reason (R) are true but (R) is not the correct explanation of (A) (C). Assertion (A) is true but reason (R) is false. (D). Assertion (A) is false but reason (R) is true.
1	Let A and B be two independent events. Assertion : If P (A) = 0.3 and P ($A \cup \bar{B}$) = 0.8, then P (B) is 2/7. Reason : P ($\bar{E}$) = 1 - P(E), where E is any event.
2	Assertion : When two coins are tossed simultaneously then the probability of getting no tail is 1/4. Reason : The probability of getting a head (i.e., no tail) in one toss of a coin is 1/2.
3	Assertion : In a simultaneous throw of a pair of dice. The probability of getting a double is 1/6. Reason: Probability of an event may be negative.
4	Assertion : Cards numbered as 1, 2, 3 .... 15 are put in a box and mixed thoroughly, one card is then drawn at random. The probability of drawing an even number is 1/2. Reason : For any event E, we have $0 \le P(E) \le 1$
5	Assertion (A): P(E) = 0.2, P(F) = 0.3 and P(E ∩ F) = 0.1, then $P(E/F) = \frac{1}{3}$ Reason (R):P(E/F). P(E) =$P(E \cap F)$
6	Assertion (A): If a family has two children and it is given that the youngest is a girl. Then probability that both are girls is $\frac{1}{4}$. Reason (R):P(E/F) =$\frac{P(E \cap F)}{P(F)}$.
7	Assertion (A): Let $\{E_1, E_2, E_3\}$ be a partition of the sample space S and A be any event associated with S, then $P(A) = P(E_1) P(A\|E_1) + P(E_2) P(A\|E_2) + P(E_3) P(A\|E_3)$. Reason (R): Three events E_1, E_2 and $E_3$are said to be mutually independent, if $P(E_1 \cap E_2 \cap E_3) = P(E_1) P(E_2) P(E_3)$

8	Assertion (A): Three persons E, F and G fire a target in turn. Their probabilities of hitting the target are 0.2, 0.3 and 0.5 respectively. The probability that target hit is 0.72. Reason (R): $P(E \cap F \cap G) = P(E)\, P(F\|E)\, P(G\|(E \cap F))$
9	Assertion: if A and B are any two disjoint events of a sample space S and F is an event such that $P(F) \neq 0$, then $P((AUB)/F) = P(A/F) + P(B/F)$ Reason: when A and B are disjoint, $P((A \cap B)/F) \neq 0$.
10	Assertion: if A and B are any two independent events then $P(A \cup B) = P(A).P(B)$ Reason: for two independent events, $P(A/B) = P(A)$ Provided $P(B) \neq 0$, $P(B/A) = P(B)$ Provided $P(A) \neq 0$.
11	Assertion: if A and B are any two independent events then the probability of occurrence of at least one of A and B is given by $1 - P(A').P(B')$ Reason: P(At least one of A or B) = P(AUB)
12	Assertion: The following is not the probability distribution of a random variable. Y: -1, 0, 1 P(Y): 0.6, 0.1, 0.2 Reason: for probability distribution of a random variable Probability of each variable $P_i > 0$ and $_i = 1$
13	Assertion: Four persons independently solve certain problem correctly with probabilities $\frac{1}{2}, \frac{3}{4}, \frac{1}{4}, \frac{1}{8}$. Then probability that the problem is solved by at least one of them is $\frac{21}{256}$ Reason: let $A_1, A_2, A_3 \ldots A_n$ be n independent events and $p_1, p_2, p_3 \ldots p_n$ be their respective probabilities of happening

Inner table for question 12:

Y	-1	0	1
P(Y)	0.6	0.1	0.2

	probability that at least one event happens $= 1 - (1 - p_1)(1 - p_2)\ldots(1 - p_n)$.
14	Assertion(A) : If A and B are mutually exclusive events with $P(A') = \frac{5}{6}$ and $P(B) = \frac{1}{3}$. Then P(A/B') is equal to $\frac{1}{4}$. Reason (R) : If A and B are two events such that P(A)=0.2, P(B)=0.6 and P(A/B)=0.2 then the value of P(A/B') is 0.2
15	Assertion(A) : If $A \subset B$ and $B \subset A$ then P(A) = P(B) Reason (R) : If $A \subset B$ then $P(A') \leq P(B')$
16	Assertion(A) : Let A and B be two events such that the occurrence of A implies occurrence of B, but now vice versa, then the correct relation between P(A) and P(B) is $P(B) \geq P(A)$. Reason (R) : Here, according to the given statement $A \subset B$ $P(B) = P(A \cup (A \cap B)) = P(A) + P(A \cap B)$ Therefore, $P(B) \geq P(A)$
17	Assertion (A) : The probability of an impossible event is 1. Reason (R) : If A is proper subset of B and $P(A) < P(B)$, then P(B-A) is equal to P(B) – P(A)
18	Assertion (A) :: Let A and B be two events such that $P(A) = \frac{1}{5}$ while P(A or B) = $\frac{1}{2}$. Let P(B) = P, then for $P = \frac{3}{8}$, A and B are independent Reason (R) : For independent events, $P(A \cap B) = P(A)P(B)$
19	A: if A and B are two independent events and it given that P(A) = 2/5, P(B) = 3/5, then $P(A \cap B)$ = 6/25 R: $P(A \cap B) = P(A) . P(B)$, where A and B are two independent events.

20	A: E′ and F′ are independent events R: E and F are independent events.
21	A: if a die is thrown, the probability of getting a number less than 3 and greater than 2 is zero. R: Probability of an impossible event is zero.
22	A: The probability of getting a prime number. When a die is thrown once is 2/3. R: Prime numbers on dice are 2, 3, 5.
23	A: A bag contains slips numbered 1 to 100. If Sarita chooses a slip at a random from the bag. It will either be an odd number or an even number. Since this situation has only two possible outcomes, the probability of each is ½. R: When we toss a coin, there are two possible outcomes: head or tail. Therefore, the probability of each outcome is ½ .
24	Assertion: P (A ∩ B) = P(A).P(B|A) Reason: P(B|A)= $\frac{P(A \cap B)}{P(A)}$
25	Assertion: If E and F are two events associated with the same sample space of a random experiment, the conditional probability of the event E , given that F has occurred. I.e. P(E|F) is given by , P(E|F)= $\frac{P(E \cap F)}{P(F)}$, provided that P(F) ≠ 0. Reason: If P(E) = $\frac{7}{13}$, P(F)= $\frac{9}{13}$ and P (E ∩ F) = $\frac{4}{13}$, then P(E|F)= $\frac{5}{9}$.
26	Assertion: Two events E and F are said to be independent if P(F|E) = P(F), provided P(E) ≠ 0 P(E|F) = P(E), provided P(F) ≠ 0 Reason: If E and F are independent, then P (E ∩ F) = P(E).P(F)
27	Assertion: If the events E and F are independent then E' and F are not independent. Reason: If A and B are two independent events, then the probability of occurrence of at least one of A and B is given by 1-P(A'). P(B')
28	Assertion: If E_1, E_2, E_3,........, E_n are n none empty events which constitute a partition of sample space S, I.e. E_1, E_2,E_3,....E_n are pair wise disjointed and $E_1 \cup E_2 \cup E_3 \cup$ .....E_n= S, and A is any event of non zero probability then P(E_i|A)= Reason: If E and F are independent events, then P (E ∩ F) = P(E).P(F).
29	Assertion (A):If A and B are two mutually exclusive events with P($\bar{A}$)=5/6 and P(B)=1/3,then P(A/$\bar{B}$) is equal to ¼. Reason(R): If A and B be two events such that P(A)=0.2 ,P(B)=0.6 and P(A/B)=0.2 then the value of P(A/$\bar{B}$) is 0.2.
30	Assertion(A):The probability of drawing either a king or an ace from a pack of 52 playing cards is 2/13.

	Reason(R):For any two events A and B, $P(A \cup B)=P(A)+P(B) - P(A \cap B)$
31	Let A and B be two events such that $P(A \cup B)= P(A \cap B)$.Then Assertion(A):$P(A \cap \bar{B})=P(\bar{A} \cap B)=0$ Reason(R):$P(A)+P(B)=1$

KEY/ANSWER

(Assertion Reasoning Questions)

Q No	Answer
1	A
2	A
3	C
4	D
5	C
6	D
7	B
8	B
9	C
10	D
11	A
12	A
13	D
14	B
15	C
16	A
17	D
18	A
19	A
20	A
21	A
22	D
23	B
24	A
25	C
26	A
27	D
28	B
29	B
30	A
31	C

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