CHAPTER-16

PROBABILITY

03 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	A committee of two persons is selected from two men and two women. What is the probability that the committee will have (a) no man (b) one man	**3**
2.	A bag contains 8 red and 5 white balls. Three balls are drawn at random. Find the probability that i. All the three balls are white ii. All the three balls are red iii. One red and two white balls	**3**
3.	Find the probability that when a hand of 7 cards are drawn from a pack of 52 well shuffled cards. i. All king cards ii. At least 3 king cards	**3**
4.	In a town, there are 6000 people of which 1200 are over 50 years old and 2000 are females. It is said that 30% of females are over 50 years. Find the probability that an individual chosen randomly from the town is either female or over 50 years.	3
5.	In a class of 60 students, 30 opted for NCC, 32 opted for NSS, 24 opted for both NCC and NSS. If one of these students is selected at random. Find the probability that (i) The student opted for NCC or NSS. (ii) The student has opted neither NCC nor NSS. (iii) The student has opted NSS but not NCC	3
6.	Determine the probability p, for each of the following events. (a) An odd number appears in a single toss of a fair die. (b) At least one head appears in two tosses of a fair coin. (c) The sum of 6 appears in a single toss of a pair of fair dice.	3
7.	In a certain lottery, 10000 tickets are sold and ten equal prizes are awarded. What is the probability of not getting the prize if you buy (i) One ticket (ii) 10 tickets 	3
8.	Suppose that each child born is equally likely to be a boy or a girl. Consider a family with exactly three children. Write each of the following events as a set and find its probability: (a) The event that exactly one child is a girl. (b) The event that atleast two children are girls. (c) The event that no child is a girl. 	3
9.	Two students Anil and Sunil appeared for an examination. The probability that Anil will qualify the examination is 0.05 and that Sunil will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that :	3

	(A) Both Anil & Sunil will not qualify the exam. (B) Atleast one of them will not qualify the exam. (C) Only one of them will qualify the exam.	
10.	An urn contains 5 blue and an unknown number x of red balls.Two balls are drawn at random. If the probability of both of them being blue is 5/14, find x	3
11.	Two unbiased dice are thrown. Find the probability that neither a doublet nor a total of 10 will appear.	3
12.	A bag contains 5 red ,4 green and 3 yellow balls. Three balls are drawn out of it at random, find the probability of drawing exactly 2 red balls	3
13.	A bag contains 15 white and some black balls. If the probability of drawing a black ball from the bag is thrice that of drawing a white ball, find the number of black balls in the bag.	3
14.	Three different coins are tossed together. Find the probability of getting i) exactly two heads ii) at least two heads iii) at least two tails.	3
15.	Three numbers are chosen from 1 to 20.Find the probability that they are not consecutive.	3

ANSWERS:

Q. NO	ANSWER	MARKS
1.	(a) $\frac{c_0^2 \times c_2^2}{c_2^4} = \frac{1}{6}$ (b) $\frac{c_1^2 \times c_1^2}{c_2^4} = \frac{2}{3}$	3
2.	i. $\frac{c_3^5}{c_3^{13}} = \frac{5}{143}$ ii. $\frac{c_3^8}{c_3^{13}} = \frac{28}{143}$ iii. $\frac{c_1^8 \times c_2^5}{c_3^{13}} = \frac{40}{143}$	3
3.	Total cards=52 Total possibilities of drawing 7 cards= c_7^{52} i. $P(\text{ all king cards}) = \frac{c_4^4 \times c_3^{48}}{c_7^{52}} = \frac{1}{7735}$ ii. $P(\text{ at least 3 king cards})$ P(3king or 4 king)= $\frac{c_3^4 \times c_4^{48} + c_4^4 \times c_3^{48}}{c_7^{52}} = \frac{46}{7735}$	3
4.	Probability(Female) = Number of Females / Total Population = 2000 / 6000 = 1/3 Probability(Over 50 years old) = Number of People over 50 / Total Population = 1200 / 6000 = 1/5 Probability(Female and Over 50) = Number of Females over 50 / Total Population = 600 / 6000 = 1/10 Now, using the principle of inclusion-exclusion: Probability(Female or Over 50) = Probability(Female) + Probability(Over 50) - Probability(Female and Over 50) = 1/3 + 1/5 - 1/10 = (10 + 6 - 3) / 30 = 13 / 30	3
5.	(i) P(NCC or NSS) = (Number of NCC students + Number of NSS students - Number of students who opted for both) / Total number of students P(NCC or NSS) = (30 + 32 - 24) / 60 = 38 / 60	3

	= 19 / 30. (ii)P(neither NCC nor NSS) = 1- probability of tge students opted for either NCC or NSS P(neither NCC nor NSS) = 1- 19 / 30. = 11/ 30 (iii)P(NSS but not NCC) = (Number of NSS students - Number of students who opted for both) / Total number of students P(NSS but not NCC) = (32 - 24) / 60 = 8 / 60 = 2 / 15.	
6.	(a)In a fair six-sided die, there are three odd numbers: 1, 3, and 5. The probability of rolling an odd number is Probability (odd number) = 3/6 = ½. (b)There are four possible outcomes when tossing a fair coin twice: HH, HT, TH, TT. Among these, three outcomes have at least one head: HH, HT, TH. Probability (at least one head) = ¾. © There are five ways to get a sum of 6 with two dice: (1, 5), (2, 4), (3, 3), (4, 2), (5, 1). Probability (sum of 6) = 5/36.	3
7.	Total number of tickets sold = 10000 Number prizes awarded = 10 (i) If we buy one ticket, then P(getting a prize) = $\frac{10}{10000} = \frac{1}{1000}$ P(not getting a prize) = $1 - \frac{1}{1000} = \frac{999}{1000} = 0.999$ (ii) If we buy ten tickets, then number of tickets not awarded = $10000 - 10 = 9990$ P(not getting a prize) = $\frac{C(9990,10)}{C(10000,10)}$ (here C is combination)	3
8.	All possible combinations can be expressed as S = {BBB, BBG, BGB, GBB, GGB, GBG, BGG, GGG} **(a)** Let P denotes the event "exactly one child is a girl". P = {BBG, BGB, GBB} So, P(P) = 3/8 **(b)** Let Q denotes the event "atleast two children are girls" Q = {GGB, GBG, BGG, GGG} So, P(Q) = 4/8 **(c)** Let R denotes the event "no child is a girl" R = {BBB} So, P(R) = 1/8	3
9.	Let E be the event that Anil will be qualified such that P(E) = 0.05 Let F be the event that Sunil will be qualified such that P(F) = 0.10 And $P(E \cap F) = 0.02$ $P(E \cup F) = P(E) + P(F) - P(E \cap F)$ $P(E \cup F) = 0.05 + 0.10 - 0.02 = 0.13$ **(A)** The event both Anil and sunil will not qualify the examination is denoted by $\bar{E} \cap \bar{F}$ Here $P(\bar{E} \cap \bar{F}) = P(\overline{E \cup F}) = 1 - P(E \cup F) = 1 - 0.13 = 0.87$ **(B)** P(atleast one of them will not qualify) = 1– P(both will qualify)	3

	$= 1 - P(E \cap F) = 1 - 0.02 = 0.98$ **(C)** P(only one of them will qualify) = $P(E \cap \bar{F}) + P(F \cap \bar{E})$ $=\{P(E) - P(E \cap F)\} + \{P(F) - P(E \cap F)\}$ $= 0.05 - 0.02 + 0.10 - 0.02 = 0.11$	
10.	Total balls = (5+x) $^5C_2 / ^{5+x}C_2 = 5/14$ $= 5\times4/(5+x)\ (4+x)$ $=5/14$ $= x^2+9x-36 = 0$ $= (x+12)(x-3) = 0$ x = -12 and x = 3 (-12 rejected as number of objects cannot be negative)	
11.	When two dice are throw, then Total outcome = 36 A doublet: {(1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)} Favourable outcome = 6 Sum is 10: {(4, 6), (5, 5), (6, 4)} Favourable outcome = 3 Again, A doublet and sum is 10: (5, 5) Favourable outcome = 1 Now, P(either dublet or a sum of 10 appears) = P(A dublet appear) + P(sum is 10) – P(A dublet appear and sum is 10) ⇒ P(either dublet or a sum of 10 appears) = 6/36 + 3/36 – 1/36 = (6 + 3 – 1)/36 = 8/36 = 2/9 So, P(neither dublet nor a sum of 10 appears) = 1 – 2/9 = 7/9	
12.	Total balls in bag = 5R + 4G + 3Y = 12 balls Total possibilities of drawing three balls $=^{12}C_3$ Total possibilities of drawing exactly two red balls = $^5C_2\times^7C_1$ Therefore, probability of drawing exactly two red balls $=^5C_2\times^7C_1/^{12}C_3$ $= 7/22$	
13.	Let the number of black balls in the bag be x. Total number of balls=15+x. Probability of drawing a black ball=$\frac{x}{15+x}$ Probability of drawing a white ball=$\frac{15}{15+x}$ According to the question, $\frac{x}{15+x} = 3 \times \frac{15}{15+x}$ On solving we get ⇒x=45 Hence, there are 45 black balls in the bag.	3
14.	n(S)={HHH, HHT,HTH,THH ,HTT,THT,TTH,TTT} n(S)=8 (i) Exactly two heads Favourable cases ={HHT,HTH,THH} Probability of getting exactly two heads =3/8	3

	(ii) At least two heads Favourable cases ={HHH,HHT,HTH,THH} Probability of getting at least two heads =4/8=1/2 (iii) At least two tails Favourable cases ={HTT,THT,TTH,TTT} Probability of getting at least two tails =4/8=1/2	
15.	No. of ways to choose three numbers from 1 to 20 = $^{20}C_3$ =1140 now the set of three consecutive numbers from 1 to 20 are (1,2,3),(2,3,4)…..(18,19,20).They are 18,now no. of ways to choose 3 numbers from 1 to 20 = 18/1140= 3/190. req. prob. =1- 3/190 = 187/190	3