CHAPTER-16

PROBABILITY

02 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	A card is drawn from a pack of 52 cards. Find the probability that the card is (a) an ace (b) a black card	**2**
2.	In a single throw of two dice, what is the probability of getting a total of 8 on the faces of the dice?	**2**
3.	Find the probability of getting the product as perfect square (square of natural number), when two dice are thrown together	**2**
4.	The odds in favour of occurrence of an event are 5:13. Find the probability that it will occur.	**2**
5.	An urn contains 5blue and an unknown number x of red balls. Two balls are drawn at random. if the probability of both being blue is $\frac{5}{14}$. find x.	**2**
6.	A card is drawn from a deck of 52 cards. Find the probability of getting a king or a heart or a red card.	2
7.	From 8 gentlemen and 5 ladies a committee of 6 is to be formed. In how many ways can this be done so that the committee contains at least 3 ladies?	2
8.	Give an example of two mutually exclusive events.	2
9.	The number lock of a suitcase has wheels each labelled with ten digits i.e. from to . The lock opens with a sequence of four digits with no repeats. What is the probability of a person getting the right sequence to open the suitcase?	2
10.	Out of 100 students two sections of 40 and 60 are formed. If you and your friend are among the 100 students. What is the probability that you both enter the same sections?	2
11.	The chance of one event happening is the square of the chance of second event. But the odds against the first are the cube of the odds against the second. Find the chance of each. 	2
12.	Minkar tosses a coin 3 times and write the result obtained in a notebook everytime. He repeates this event everyday. One day, he considers the three events A, B and C as :- A : No head appears B: Exactly one head appears C : At least two heads appears Do they form a set of mutually exclusive and exhaustive events? 	2

<table>
<tr><td></td><td></td><td></td></tr>
<tr><td>13.</td><td>From the employees of a company, 5 persons are selected to represent them in the managing committee of the company. Particulars of five persons are as follows:
<table>
<tr><th>S.No.</th><th>Name</th><th>Sex</th><th>Age (in years)</th></tr>
<tr><td>1</td><td>Manish</td><td>M</td><td>30</td></tr>
<tr><td>2</td><td>Satish</td><td>M</td><td>33</td></tr>
<tr><td>3</td><td>Riya</td><td>F</td><td>46</td></tr>
<tr><td>4</td><td>Siya</td><td>F</td><td>28</td></tr>
<tr><td>5</td><td>Santanu</td><td>M</td><td>41</td></tr>
</table>
A person is selected at random from this group to act as a spokesperson. What is the probability that the spokesperson will be either male or over 35 years.</td><td>2</td></tr>
<tr><td>14.</td><td>An ordinary deck of cards contains 52 cards divided into four suits. The red suits are diamond and hearts while the black suits are clubs and spades. The cards J, Q, K are called face cards. Suppose we pick one card from the deck at random.
(a) What is the sample space of the experiment?
(b) What is the event that the chosen card is a black face card?
  </td><td>2</td></tr>
<tr><td>15.</td><td>The probability that a truck met an accident due to faulty brakes or badly worn tires are 0.23 and 0.24, respectively. Also, the probability is 0.38 that a truck met an accident, will have faulty brakes and / or badly working tires. What is the probability that a truck met an accident will have faulty brakes as well as badly worn tires?
  </td><td>2</td></tr>
<tr><td>16.</td><td>A coin is tossed repeatedly until a head comes for the first time. Describe the sample space.</td><td>2</td></tr>
<tr><td>17.</td><td>Find the probability that in a random arrangement of the letter of the word ‘UNIVERSITY’ the two ‘I’s come together.</td><td>2</td></tr>
<tr><td>18.</td><td>In a relay race there are five teams A,B,C,D and E
(i) What is the probability that A,B and C finish first second and third, respectively?
(ii) What is the probability that A,B and C are first three to finish (in any order assuming that all finishing orders are equally likely}</td><td>1+1=2</td></tr>
<tr><td>19.</td><td>Out of 100 students two sections of 40 and 60 are formed. If you and your friend are along 100 students. What is the probability that
(i) You both enter in the same section?
(ii) You both enter in the different sections?</td><td>1+1=2</td></tr>
<tr><td>20.</td><td>The number lock of a suitcase has 4 wheels, each levelled with ten digits i.e. from 0 to 9.The lock opens with a sequence of four digits with no repeats. What is the probability of a person getting right sequence to open the suitcase?</td><td>2</td></tr>
<tr><td>21.</td><td>Seven persons are to be seated in a row .Find the probability that two persons sit next to each other.</td><td>2</td></tr>
</table>

22.	Find the probability of getting 53 Sundays in a i) leap year ii) non leap year.	2
23.	Two different dice are thrown together. Find the probability of getting a doublet.	2
24.	The probability of selecting a rotten mango randomly from a heap of 900 mangoes is 0.18. What is the number of rotten mangoes in the heap?	2
25.	Rahim has a cubical block with one word written on each face. 'COME TO LEARN GO TO SERVE' The block is thrown. What is the probability of getting 'TO'	2

ANSWERS:

Q. NO	ANSWER	MARKS
1.	(a) probability= $\frac{4}{52}$ (b) probability=$\frac{26}{52}$	2
2.	Total outcomes=36 Sum 8 (2,6) (6,2) (3,5) (5,3) (4,4) Favourable outcomes=5 Probability=$\frac{5}{36}$	2
3.	Total outcomes=36 Product perfect square (1,1) (1,4) (4,1) (2,2) (3,3) (4,4) (5,5) (6,6) Favourable outcomes=8 Probability=$\frac{8}{36}$	2
4.	Odds in favour $P(A): P(\bar{A}) = 5:13$ $$P(A) = \frac{5}{5+13} = \frac{5}{18}$$	2
5.	Total balls=5+x a/q, $\frac{c_2^5}{c_2^{5+x}} = \frac{5}{14}$ $$\frac{(5 \times 4)}{(5+x)(4+x)} = \frac{5}{14}$$ $$x^2 + 9x - 36 = 0$$ $x = 3$ or $x = -12$(rejected)	2
6.	Total number of playing cards = 52 ∴ n(S) = 52 Total number of king cards = 4 Total number of heart cards = 13 Total number of red cards = 13 + 13 = 26 ∴ Favourable outcomes = 4 + 13 + 26 – 13 – 2 [Here, we subtract 13 and 2 cards because already these cards come in king cards and heart cards] = 28 $$\textbf{Probability} = \frac{\textbf{Number of favourable outcome}}{\textbf{Total number of outcomes}}$$ $$\therefore \text{Required Probability} = \frac{28}{52}$$ $$= \frac{7}{13}$$	2
7.	The possible committees may include 3 ladies and 5 gentlemen, 4 ladies and 4 gentlemen or 5 ladies and 3 gentlemen.	2

	∴Required number of ways $= {}^5C_3 \times {}^8C_3 + {}^5C_4 \times {}^8C_2 + {}^5C_5 \times {}^8C_1$ $= \frac{5!}{3!2!} \times \frac{8!}{3!5!} + \frac{5!}{4!1!} \times \frac{8!}{2!6!} + 1 \times 8$ $= \frac{5 \times 4}{2} \times \frac{8 \times 7 \times 6}{3 \times 2} + 5 \times \frac{8 \times 7}{2} + 1 \times 8$ $= 10 \times 56 + 140 + 8$ $= 560 + 148$ $= 708$	
8.	Consider the experiment of tossing a fair coin. The outcomes of this experiment are "Heads" and "Tails." Let's define two events: Event A: Getting "Heads" Event B: Getting "Tails" These two events are mutually exclusive because they cannot both occur simultaneously.	2
9.	Number of wheels in number lock of suitcase . Now, first wheel can have any one of the tens digits from to . Since, repetition is not allowed, so second wheel can have any of the remaining digits. Similarly, third wheel can have any of the remaining digits. And fourth wheel can have any of the remaining digits So, number of four digit lock code that can be formed without repetition of digits =9×8×7×6=5040 So, total four digit numbers formed But since, the lock can open with only one of the all four digit numbers. Hence, required probability is 1/5040	2
10.	My friend and I are among the 100 students Total number of ways of selecting 2 students out of 100 students $={}_{100}C_2$ (a) The two of us will enter the same section if both of us are among 40 students or among 60 students ∴ Number of ways in which both of us enter the same section = ${}_{40}C_2+{}_{60}C_2$ ∴ Probability that both of us enter the same section $={}_{100}C_2{}_{40}C_2+{}_{60}C_2=99\times100(39\times40)+(59\times60)=33/17$	2
11.	Let the two events be E1 and E2. Let the chances of their happening be x and y respectively such that $x = y^2$ ----------(1)	2

	The chances of not happening of the events are 1-x and 1-y respectively Odds against the first event are $\frac{1-x}{x}$, Odds against the second event are $\frac{1-y}{y}$ According to condition, $\frac{1-x}{x} = \left(\frac{1-y}{y}\right)^3$ Using equation (1) : $\frac{1-y^2}{y^2} = \left(\frac{1-y}{y}\right)^3$ ----------(2) By solving equation (2), we have y = 1/3 As x= y^2 and hence x = 1/9.	
12.	When a coin is tossed three times, total 8 sample space will be there. S = HHH, HHT, HTH, THH, HTT, THT, TTH, TTT According to statement : A = TTT B = HTT, THT, TTH C = HHH, HHT, HTH, THH Here, $A \cap B = \emptyset, B \cap C = \emptyset, A \cap C = \emptyset \ and \ A \cup B \cup C = S$ Hence event A, B and C are mutually exclusive exhaustive events.	2
13.	Let E be the event that a male person is selected at random. P(E) = 3/5 Let F be the event that a person who is over 35 yrs. is selected. P(F)=2/5 $E \cap F$ represents a male who is over 35 years. $P(E \cap F)$ = 1/5 $E \cup F$ represents either a male is selected or age is more than 35 years $P(E \cup F) = P(E) + P(F) - P(E \cap F) = \frac{3}{5} + \frac{2}{5} - \frac{1}{5} = \frac{4}{5}$	2
14.	(a) The outcomes in the sample space S are 52 cards in the deck. (b) Let E be the event that the chosen card is black face card. So E = {J, Q, K} of club and {J, Q, K} of spades. So, P(E) = 12 / 52 = 3/13	2
15.	Let B be the event that it was due to faulty brake. P(B) = 0.23 Let T be the event that it was due to bad tires. P(T) = 0.24 It is also given that $P(B \cup T) = 0.38$ As, $P(B \cap T) = P(B) + P(T) - P(B \cup T)$ So, $P(B \cap T) = 0.23 + 0.24 - 0.38 = 0.09$	2
16.	S = {H, TH, TTH, TTTH, TTTTH, ……}	
17.	9! / (10! /2!) = (9! x 2!) /10! = 2/10 = 1/5	
18.	If we consider the sample space consisting of all finishing orders in the first three places we will have $^5P_3$, i.e., 5!/(5-3)!= 5×4×3 =60 sample points, each with a probability of 1/60 (a) A,B and C finish first, second and third, respectively. There is only one finishing order for this that is ABC Thus P(A,B and C finish first ,second and third respectively) = 1/60 (b) A, B and C are the first three finishers. There will be 3! Arrangements for A, B and C. therefore, the sample points corresponding to this event will be 3! In	

	number So, P(A,B and C are first three to finish)= 3!/60 = 6/60 = 1/10	
19.	Out of 100 students, two sections of 40 and 60 students can be formed $^{100}C_{40} \times {}^{60}C_{60}$= 100!/40!60! ways. (i) You and your friend can be in the same section in $^{98}C_{38} \times {}^{60}C_{60} + {}^{98}C_{58} \times {}^{40}C_{40}$= (98!/60!38!+98!/58!40!)ways. Therefore, probability that you and your friend enter the same sections (98!/60!38!+98!/58!40!)/ (100!/40!60!) = ((40 × 39)/100×99)+ ((60 × 59)/100×99) = 17/33 P(You both enter in the different sections) = 1 – 17/33= 16/33	
20.	There are $^{10}C_4 \times 4!$ = 5040 sequences of four distinct digits out of which there is only one sequence in which the lock opens. Therefore, required probability = 1/5040	
21.	If two persons sit next to each other then consider them as 1 group. Now we have average 6 persons.Total number of arrangement of 7 persons is 7! Req. prob.= 6! x 2!/7! = 2/7	2
22.	i) A leap year has 366 days. i.e there will be 52 Sundays and 2 day will be left. This 2 day could be (Sun M), (M T), (T We), (We Th), (Th Fr), (Fr Sa), (Sa Su). Of these total 7 outcomes, the favourable outcomes are 2. Hence the probability of getting 53 Sundays = 2 / 7. ii) A non-leap year has 365 days. i.e there will be 52 Sundays and 1 day will be left. This 1 day could be Sunday, Monday, Tuesday, Wednesday, Thursday, friday , Saturday, Sunday. Of these total 7 outcomes, the favourable outcomes are 1. Hence the probability of getting 53 Sundays = 1 / 7.	2
23.	After mentioning all possible outcomes now choose doublet. doublets are (1,1),(2,2) (3,3) (4,4) (5,5) (6,6) Total no. of doublets=6 Probability=6/36=1/6	2
24.	Let the number of rotten apples be x The probability is $\frac{x}{900}$ =0.18 on solving we get x= 162	2
25.	No. of all possible outcomes=6 No. of favourable outcomes=2 Probability = 2/6=1/3	2