## CHAPTER-16

## Probability

## 1 Mark questions

1. Define a random experiment.	(К)
2. Define sample space of a random experiment.	(К)
3. Write the sample space for the random experiment, "tossing a coin twice".	(К)
<ol> <li>Write the sample space for the random experiment, "tossing a coin three times".</li> <li>Write the sample space for the random experiment "rolling a pair of dice once".</li> </ol>	(К) (К)
6. A coin is tossed and a die is thrown. Write the sample space for this random experiment.	(A)
7. Write the sample space for the random experiment "a coin is tossed and then a die is rolled of	only in case
a head is shown on the coin".	(A)
8. A box contains 1 red and 3 identical white balls. Two balls are drawn at random in succession	without
replacement. Write the sample space for this experiment.	(U)
9. An experiment consists of recording boy-girl composition of families with two children. What	is the sample
space if we record, whether it is a boy or a girl in order of their births? (U)	
10. An experiment consists of recording boy-girl composition of families with two children. What	t is the sample
space if we record, the number of boys in the family? (U)	
11. An experiment consists of rolling a die and then tossing a coin once, if the number on the di	e is a
multiple of 3. Find the sample space for this experiment.	(A)
12. Suppose 3 bulbs are selected at random from a lot. Each bulb is tested and classified as defe	ective (D)
or non-defective (N). Write the sample space for this experiment.	(U)
13. Write the sample space for the random experiment," A coin is tossed twice and number of h	neads is recorded". (K)
14. A die is thrown repeatedly until a six comes up. What is the sample space for this experimen	t? (A)
15. Write the sample space for the random experiment," A coin is tossed repeatedly until a tail	comes up". (A)
15. Write the sample space for the random experiment," A coin is tossed repeatedly until a tail 16. Write the sample space for the random experiment "selecting a boy and a girl from a group	comes up". (A) of 3 boys and 2 girls" (U)

Department of Pre-university Education

17. Write the sample space for the random experiment "drawing a die at random from a bag contai	ining one red,
one blue dice and rolling it once". (U	))
18. A coin is tossed 'n' times. Find the number of elements in its sample space. (U	I)
19. What is the number of sample points in the sample space of the experiment," rolling of a pair of (U	f dice once"? I)
20. A card is selected from a pack of 52 cards. How many sample points are there in the sample space (U	bace? I)
21. How many sample points are there in the sample space of the experiment, "drawing two cards in	'n
succession without replacement from a pack of 52 playing cards"? (U	I)
22. A bag contains 3 non-identical black balls and 4 non-identical white balls .Two balls are drawn	
at random in succession. Then find the number of elements in the sample space of the experiment.	. (A)
23. Define a simple event. (K)	)
24. Define a compound event. (K)	)
25. Three coins are tossed once. State whether the event "three heads show" is a simple event or a	1
compound event. (U	1)
26. A die is rolled once. State whether the event "getting a prime number" is a simple event or a	
compound event. (U	I)
27. Consider the random experiment "rolling a die once". Write the event, "a number less than 5 ap (U	ppears". I)
28. A coin is tossed twice. Find the total number of events that can be associated with this experime (U	ent. I)
29. What is the probability of an impossible event? (K)	)
30. What is the probability of a sure event? (K)	)
31. If P(AUB)=P(A)+P(B), then what can be said about the events A and B? (U	I)
<b>32.</b> If $E_1$ and $E_2$ are exhaustive events then find the probability of the event ' $E_1 or E_2$ ' (A	<b>)</b>
33. If the probabilities of three mutually exclusive and exhaustive events A, B, C are p, 2p, 3p respec	ctively,
then find the value of p. (A)	
34. 6 boys and 5 girls participated in a debate competition. How likely is it that the winner of the competition	
is a boy? (A	.)

Department of Pre-university Education

74

35. Events E and F are such that P(not E or not F)=0.75. State whether E and F are mutually exc	lusive. (U)
36. If $P(A)=0.5$ , $P(B)=0.7$ and $P(A \cap B)=0.6$ then check whether $P(A)$ and $P(B)$ are consistently de	fined. (A)
37.A letter is chosen at random from the word 'PROBABILITY'. Find the probability that the lett	er
is a consonant. (S)	
38.A letter is chosen at random from the word 'ASSASSINATION'. Find the probability that the	letter
is a vowel.	(S)
39. Find the probability that in a random arrangement of the letters of the word 'QUESTION', T	always comes
at the first place.	(S)
40. An integer is chosen at random from 1 to 20. What is the probability that the integer is a m	ultiple of 4. (U)
41. What is the probability that a natural number selected at random from 1 to 10 is a prime ne	umber, if each
of the ten numbers is equally likely to be selected?	(U)
42. There are four men and six women on the city council. If one council member is selected for	or a committee
at random, how likely is it that it is a woman?	(U)
43. If $\frac{2}{11}$ is the probability of an event A, what is the probability of the event 'not A'?	(S)
44. If $S = \{w_1, w_2, w_3, w_4\}$ is the sample space of an experiment, then find the value of $P(w_1) + P(w_2)$	$+ P(w_3) + P(w_4).$
45. If $S = \{w_1, w_2, w_3, w_4\}$ is the sample space of an experiment, then check whether the following	ng
assignment of probabilities $P(w_1) = \frac{1}{4}$ , $P(w_2) = \frac{1}{3}$ , $P(w_3) = \frac{1}{6}$ , $P(w_4) = \frac{1}{4}$ is valid.	(U)
46. If $S = \{w_1, w_2, w_3, w_4, w_5, w_6\}$ is the sample space of an experiment, then check whether the formula $w_1, w_2, w_3, w_4, w_5, w_6\}$	ollowing
assignment of probabilities $P(w_1) = 0.2$ , $P(w_2) = 0.3$ , $P(w_3) = 0.1$ , $P(w_4) = 0.15$ $P(w_5) = 2.5$ $P(w_6) = 0.15$	(5) = -0.3
is valid.	(U)
47. A book contains 60 pages. A page is chosen at random. What is the chance that the numbe	r on the page
is a multiple of 10?	(U)
48. A card is drawn from a well shuffled deck of 52 playing cards. Find the probability that the o	card drawn
is an ace of hearts.	(S)
Department of Pre-university Education 75	

49. A card is drawn from a well shuffled deck of 52 playing cards. Find the probability that the card drawn is a king of spades. (S) 50. A card is drawn from a well shuffled deck of 52 playing cards. Find the probability that the card drawn is a red card. (S) 51. A card is drawn from a well shuffled deck of 52 playing cards. Find the probability that the card drawn is a club. (S) 52. A card is drawn from a well shuffled deck of 52 playing cards. Find the probability that the card drawn is a Jack of diamonds or a king of clubs. (S) 53. A card is drawn from a well shuffled deck of 52 playing cards. Find the probability that the card drawn is an ace. (S) 54. A card is drawn from a well shuffled deck of 52 playing cards. Find the probability that the card drawn is a (S) face card. 55. A card is drawn from a well shuffled deck of 52 playing cards. Find the probability that the card drawn is not a diamond. (S) 56. Two cards are drawn from a well shuffled pack of 52 playing cards without replacement. Find the probability that both cards drawn are queens. (S) 57. Three unbiased dice are rolled once simultaneously. Find the probability that the same number appears on all the three dice. (S) (S) 58. In a leap year, find the probability of 53 Sundays and 53 Mondays. 2 Mark Questions 1. A box contains 15 identical cards and numbers 1 to 15 are written on them separately. A card is selected (S) at random. What is the probability that the number on the card is not a multiple of 5? 2. A letter is chosen at random from the word 'MATHEMATICS'. Find the probability that letter is a (i) vowel (ii) consonant (S) 3. Two letters are chosen at random from the word 'TUESDAY'. What is the probability that both the letters are vowels? (S) 4. A die is rolled. Let E be the event, "die shows 4" and F be the event, "die shows even number". Write the events E and F. Check whether E and F mutually exclusive. (S) Department of Pre-university Education 76

5. A die is rolled. Let E be the event, "die shows a prime" and F be the event," die shows a multiple	e of 3".	
Write the events E and F. Check whether E and F mutually exclusive. (S)		
6. A coin is tossed twice. Write the events, A: "at least one head appears", B:"at most one tail app	ears".	
Check whether they are exhaustive events. (S)		
7. A coin is tossed thrice. Write the events, A:"no head appears", B: "at least two head appears".		
Check whether the events are mutually exclusive. (S)		
8. Three coins are tossed simultaneously. Write the events		
<ul><li>(i) A:"getting 3 heads"(ii)B:"getting a tail on two coins". Are they mutually exclusive?</li><li>9. Three coins are tossed once. Write the events A:"a tail shows on the first coin</li></ul>	(S)	
" and B:" at least one head shows". Check whether the events A and B are exhaustive. (S)		
10. Three coins are tossed. Write two events which are mutually exclusive.	(U)	
11. Three coins are tossed. Write three events which are mutually exclusive and exhaustive.	(U)	
12. Three coins are tossed. Write two events which are not mutually exclusive.	(U)	
13. Three coins are tossed. Write two events which are mutually exclusive but not exhaustive.	(U)	
14. Three coins are tossed. Write three events which are mutually exclusive but not exhaustive.	(U)	
15. Consider the random experiment "rolling a die once". Write the events, A: "an even number g	reater	
than 4 appears" and B:"a number not less than 3 appears". Check whether they are mutually excl	lusive.	(S)
16. Consider the random experiment "rolling a die once". Write the events, A: "a prime number a	appears"	
AndB: "an even number greater than 2 appears ". Check whether they are mutually exclusive.		(S)
17. A coin is tossed thrice. Find the number of sample points in the sample space. Also find the nu	mber of	
events that can be associated with this experiment. (S)		
18. Consider the random experiment "rolling a die once". Write the events, A: "a number less that	n 5 appears	."
and B: "a multiple of 3 appears". Check whether they are mutually exclusive. (S)		
19. A die is rolled once and the number appearing on the uppermost face is noted. Write the even	its, A:	
"a number greater than 1 appears", B:"a number not more than 3 appears". Check whether the ev	vents	
are exhaustive.	(S)	

20. A die is thrown. Write the following events:

A:" an even number greater than 4 appears"	B: "a number less than 5 appears" .
Also Write the event' A or B '.	

21. A die is thrown. Write the following events:

A: "a number less than 7 appears" B: "a multiple of 3 appears". AlsoWritethe event ' A and B ' .

(S)

(S)

22. A die is thrown. Write the following events: A:" a number not less than 3 appears" B: "a prime number appears". Also Write the event' A but not B'. (S)

23. Given P (A) = 
$$\frac{3}{5}$$
 and P (B) =  $\frac{1}{5}$ . Find P (A or B), if A and B are mutually exclusive events. (U)

24. Given P (A) = 
$$\frac{2}{7}$$
 and P (B) =  $\frac{3}{7}$ . If A and B are mutually exclusive events, find P(A or B). (U)

25. A die is thrown.Find the probability of the event: "A prime number will appear".
26. A die is thrown.Find the probability of the event: "An even number less than 4 will appear".
27. A die is thrown. Find the probability of the event: "A number not less than 3 will appear".
28. A coin is tossed twice. What is the probability that at least one tail occurs?
29. A coin is tossed twice. What is the probability that at most one head occurs?
29. A coin is tossed twice. What is the probability that at most one head occurs?
20. Three coins are tossed at once. Find the probability of getting at least two heads?

1. Two dice are thrown .Then Write the event," the sum of the numbers which come up on the dice	is even".
Also find the probability of the event.	(S)
2. Two dice are thrown .Then write the event, "the sum of the numbers which come up on the dice	is greater
than 8". Also find the probability of the event.	(S)
3. Two dice are thrown .Then write the event, "the sum of the numbers on the dice is less than or e	qual to 5".
Also find the probability of the event.	(S)
4. On her vacations Veena visits four cities A,B,C and D in random order. What is the probability tha	t she
visits A before B?	(S)
5. On official work Sharathvisits four cities A,B,C and D in random order. What is the probability tha	it he
isits A first and B last?	(S)
6. A salesman visits four shops P,Q, R,S on a day, in a random order .What is the probability that he	visits
P just before Q?	(S)
artment of Pre-university Education 78	

37. The number lock of a suitcase has 4 wheels, each labelled 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 perso	on getting the
right sequence to open the suitcase?	(S)
38. 4 cards are drawn from a well shuffled deck of 52 cards. What is the probability of	obtaining 3
diamonds and one spade?	(U)
39. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck	c of 52 cards,
it contains 'all Kings'.	(S)
40. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck	of 52 cards,
it contains '3 Kings'.	(S)
41. Three letters are dictated to three persons and an envelope is addressed to each of	f them, the letters
are inserted into the envelopes at random so that each envelope contains exactly one	letter.
Find the probability that at least one letter is in its proper envelope.	(S)
42. A and B are two events such that P(A)=0.42,P(B)=0.48 and P(A and B )=0.16. Dete	rmine
(i) P(not A) (ii)P( A or B).	(U)
43. A and B are two events such that $P(A)=0.54$ , $P(B)=0.69$ and $P(A \cap B)=0.35$ . Find (i) $F$	$P(A \cap B')$ (ii) $P(B \cap A')$
	(S)
44. If $P(E)=0.6$ , $P(F)=0.4$ and $P(E \cap F)=0.1$ , then find $P(neither E nor F)$ .	(S)
45. The probabilities that at least one of the events A and B occurs is 0.8. If A and B oc	cur simultaneously
with probability 0.1, then find $P(A') + P(B')$ .	S)
46. <i>A</i> and <i>B</i> are events such that $P(A \cup B) = \frac{5}{7}$ , $P(A \cap B) = \frac{1}{7}$ and $P(A') = \frac{4}{7}$ then find <i>P</i>	$(A' \cap B).$ (S)
47. In a lottery, a person chose six different natural numbers at random from 1 to20,a	nd if these six
numbers match with the six numbers already fixed by the lottery committee, he wins	the prize.
What is the probability of winning the prize in the game?(Order of the numbers is not	important). (S)
48. In class XI of a school 40% of the students study Mathematics and 30% study Biolo	gy. 10% of the
class study both Mathematics and Biology. If a student is selected at random from the	class, find
the probability that he will be studying Mathematics or Biology.	(A)
49. A card is drawn at random from a well shuffled pack of 52 cards. Find the probabili	ity that it is
either a queen or a spade.	(S)

Department of Pre-university Education

50. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely,	calculate
the probability that the card will be (i) a diamond (ii) a Jack	(U)
51. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely,	
calculate the probability that the card will be (i) an ace (ii) a black card.	(U)
52. Three numbers are chosen randomly from {1,2,3,4,5,6}. What is the probability that they a	are
not consecutive?	(S)
53. A fair coin is tossed four times, and a person wins Rupee.1 for each head and looses Rupe	es
1.50 for each tail that turns up. Find the probability that the person wins Rupees.1.50.	(A)
54. In an entrance test that is graded on the basis of two examinations, the probability of a ra	ndomly
Chosen student passing the first examination is 0.8 and the probability of passing the second	
examinatio is 0.7. The probability of passing at least one of them is 0.95. What is the proba	bility
of passing both?	(A)
<b>3 Mark Questions</b> 1. Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify	r the
examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability that both	h
will qualify the examination is 0.02. Find the probability that both Anil and Ashima will not qualify	
in the examination.	(A)
2. Two friends Ramesh and Arati appeared in a competitive examination. The probability that Ram	nesh
will qualify the examination is 0.08 and that Arati will qualify the examination is 0.15. The probab	ility
that both will qualify the examination is 0.03. Find the probability that only one of them will	
qualify the examination. (	A)
3.If A and B are two events such that $P(A) = 0.54$ , $P(B) = 0.69$ and $P(A \cap B) = 0.35$ then find	
(i) $P(A \cup B)$ (ii) $P(A^1 \cap B^1)$ (	S)
4. If E and Fare events such that $P(E) = \frac{1}{3}$ , $P(F) = \frac{1}{6}$ and $P(EandF) = \frac{1}{9}$ then find (i) $P(EorF)$	
(ii) $P(notEandnotF)$ . (S)	
5. If E and Fare events such that $P(E) = \frac{1}{4}$ , $P(F) = \frac{1}{2}$ and $P(E.and.F) = \frac{1}{8}$ then find (i) $P(EorF)$	
(ii) P(not.E.and.notF).	S)
Department of Pre-university Education 80	

6. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calc	ulate
the probability that the card will be (i) a spade (ii) a red card (iii) not a King (S)	
7. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calc	ulate
the probability that the card will be (i) a heart (ii) a queen (iii) not a black card	(S)
8. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely,	
calculate the probability that the card will be (i) a diamond (ii) not an ace (iii) not a club.	(S)
9. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 card	ls,
it contains 'at least 3 Kings'.	(S)
10. A committee of two persons is to be selected from 2 men and 2 women. What is the probab	ility
that the committee will have (i) no man? (ii) One man? (A)	
11. A group of two persons is to be selected from 3 men and 2 women .what is the probability t	hat
the group will have (i) no woman? (ii) at least one woman ?	(A)
12. A team of three persons is to be selected from 2 boys and 3 girls. What is the probability that	at
the team will have (i) three girls (ii) at most one boy? (A)	
13. The numbers 1 to 100 are written separately on 100 slips of paper. The slips are put in a box	and
mixed thoroughly. A person draws a slip from the box. What is the probability that the number	
written on the slip drawn is (i) even (ii) greater than 90(iii) less than or equal to 12.	(S)
14. In a class of 60 students, 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and	1 NSS.
If one of these students is selected at random, find the probability that	
(i) the student has opted for NCC or NSS (ii) the student has opted NSS but not NCC	(A)
15. The probability that a student will pass the final examination in both English and Hindi is 0.5	and
the probability of passing neither is 0.1. If the probability of passing the English examination is (	0.75 <i>,</i>
what is the probability of passing the Hindi examination?	(A)
16. A bag contains 9 discs of which 4 are red, 3 are blue and 2 are yellow. The discs are similar in	ı
shape and size. A disc is drawn at random from the bag. Calculate the probability that it will be	
(i) yellow(ii) not blue (iii) either red or blue.	(S)

17. A box contains 10 red marbles, 20 blue marbles and 30 green marbles. 5 marbles are drawn from the box, in succession without replacement, what is the probability that (i) all will be blue? (ii)at least one will be green? (S) 18. A die has two faces each with number '1', three faces each with number '2' and one face with number '3'. If die is rolled once, determine (i) P(2) (ii)P(1 or 3)(iii) P(not 3) (S) 19. In a certain lottery 10,000 tickets are sold and ten equal prizes are awarded. What is the probability of not getting a prize if you buy (i) one ticket? (ii) two tickets? (S) 20. If 4-digit numbers greater than 5,000 are randomly formed from the digits 0,1,3,5 and 7, what is the probability of forming a number divisible by 5, when the repetition of digits is not allowed? (S) 21. In a relay race there are five teams A,B,C,D and E. (a) What is the probability that A, B and C finish first, second and third, respectively?(b) What is the probability that A, B and C are first three to finish (in any order)? (Assume that all finishing orders are equally likely). (A) 22. 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 section? (A) 23. Out of 50 students, two groups of 20 and 30 are formed. If you and your friend are among the 50 students, what is the probability that you and your friend enter different groups? (A) 24. Three coins are tossed once; find the probability of getting (i) 2 heads(ii) at least 2 heads (iii) at most 2 tails. (S) 25. Three coins are tossed once; find the probability of getting (i) 3 tails (ii) at least 2 tails (iii) one head. (S) 26. A fair coin with 1 marked on one face and 6 on the other and a fair die are both tossed. Find the probability that the sum of numbers that turn up is (i) 3 (ii) 12 (S) 27. A fair coin with 3 marked on one face and 5 on the other and a fair die are both tossed. Find the probability that the sum of numbers that turn up is (i) 6 (ii) 11 (S) 28. Two dice are thrown. Write the following events. A: getting an even number on the first die B: getting the sum of the numbers on the dice  $\leq 5$ . Also Write the event "Abut not B". (S) Department of Pre-university Education 82

29. Two dice are thrown simultaneously and numbers on their uppermost faces are noted. Write the events,
A:"getting a total of more than 5 but less than 10", B:"getting a total of 12". Also find the probability of the event "A or B".

30. A die is rolled twice. Write the following events. A:"getting the sum of the numbers on the die in two throws is  $\ge 9$ ". B:"getting an even number on the first throw and a multiple of 3 on the second throw". Also find the probability of the event "A and B". (5)

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**31.** If A, B, C are three events associated with a random experiment, prove that  $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(A \cap C) + P(A \cap B \cap C)$  (S)

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