Chapter-15
Probability and Mathematical Expectation

MTP March, '20

1. Three events A, B and C are mutually exclusive, exhaustive and equally likely. What is the probability of the complementary event of A?

   (a) 1/3 (b) 2/3 (c) 3/7 (d) 1

2. What is the chance of picking a spade or an ace not of spade from a pack of 52cards?

   (a) 4/13 (b) 2/13 (c) 3/26 (d) 3/18

3. Find the probability that a four-digit number comprising the digits 2, 5, 6 and 7 would be divisible by 4.

   (a) 1/4 (b) 1/3 (c) 1/2 (d) 1

4. The probability that an Accountant's job applicant has a B. Com. Degree is0.85, that he is a CA is 0.30 and that he is both B. Com. and CA is 0.25 out of 500 applicants, how many would be B. Com. or CA?

   (a) 25 (b) 150 (c) 50 (d) 450

5. Rupesh is known to hit a target in 5 out of 9 shots whereas David is known to hit the same target in 6 out of 11 shots. What is the probability that the target would be hit once they both try?

   (a) 79/99 (b) 10/13 (c) 14/26 (d) 13/18

6. In connection with a random experiment, it is found that

   P(A) = 2/3, P(B) =3/5 and P(AUB) = 5/6, find P(A/B)

   (a) 7/18 (b) 1/13 (c) 5/18 (d) 13/18

7. In a business venture, a man can make a profit of Rs. 50,000 or incur a loss of Rs. 20,000. The probabilities of making profit or incurring loss, from the past experience, areknown to be 0.75 and 0.25 respectively. What is his expected profit?

   (a) Rs. 33,500 (b) Rs. 34,500 (c) Rs. 35,500 (d) Rs. 32,500

8. Find the probability of a success for the binomial distribution satisfying thefollowing relation

   $4 P (x = 4) = P (x = 2)$ and having the parameter n as six.

   (a) 1/3 (b) 1/2 (c) 1/5 (d) 1/8

9. An experiment succeeds thrice as after it fails. If the experiment is repeated 5times, what is the probability of having no success at all?

   (a) 1/1023 (b) 1/1024 (c) 1/1005 (d) 1/1008

MTP October, '19

10. If one card is drawn at random from a pack of playing cards; find the probability it is neither a hearts nor a club:

    (a) ½ (b) ¼ (c) 1/8 (d) None of these

11. Three balls are drawn at random from a bag containing 6 blue and 4 red balls. What is the chance that 2 balls are blue and 1 is red?

    (a) ¼ (b) ¾ (c) ½ (d) None of these

12. The probability that a person travels by a plane is $\frac{1}{5}$ and that he travels by train is $\frac{2}{3}$ Find the probability of his traveling neither by plane nor by train?

(a) $\frac{13}{15}$ (b) $\frac{2}{15}$ (c) $\frac{1}{15}$ (d) None of these

13. Let X be a random variable with the following distribution

X	-2	4	8
P(x)	1/6	1/3	1/2

Find expected value of the random variable

(a) 5   (b) 6   (c) 7   (d) 8

MTP-April '19

14. If for two events A and B, P(A∩B) = P(A) x P(B), then the two events A and B are

(a) Independent   (b) Dependent   (c) Not equally likely   (d) Not exhaustive.

15. Addition Theorem of Probability states that for any two events A and B,

(a) P(A∪B) = P(A) + P(B)   (b) P(A∪B) = P(A) + P(B) + P(A∩B)

(c) P(A∪B) = P(A) + P(B) − P(A∩B)   (d) P(A∪B) = P(A) P(B)

16. If a random variable x assumes the values x1, x2, x3, x4 with corresponding probabilities p1, p2, p3, p4 then the expected value of x is

(a) $p_1 + p_2 + p_3 + p_4$ (b) $x_1p_1 + + x_2p_3 + x_3p_2 + x_4p_4$

(c) $p_1x_1 + p_2x_2 + p_3x_3 + p_4x_4$ (d) none of these.

17. If an unbiased die is rolled once, the odds in favour of getting a point which is a multiple of 3 is

(a) 1:2   (b) 2:1   (c) 1:3   (d) 3:1

18. A, B, C are three mutually independent with probabilities 0.3, 0.2 and 0.4 respectively. What is P (ABC)?

(a) 0.400   (b) 0.240   (c) 0.024   (d) 0.500

19. What is the chance of throwing at least 7 in a single cast with 2 dice?

(a) 5/12   (b) 7/12   (c) 1/4   (d) 17/36

MTP March '19

20. If P(A∩B) = 0, then the two events A and B are

(a) Mutually exclusive   (b) Exhaustive

(c) Equally likely   (d) Independent.

21. If A, B and C are mutually exclusive and exhaustive events, then P(A) + P(B) + P(C) equals to

(a) $\frac{1}{3}$ (b) 1   (c) 0

(d) any value between 0 and 1.

22. Variance of a random variable x is given by

(a) $E(x - \mu)^2$ (b) $E[x - E(x)]^2$ (c) $E(x^2 - \mu)$ (d) (a) or (b)

23. If a card is drawn at random from a pack of 52 cards, what is the chance of getting a Spade or an ace?

(a) 4/13   (b) 5/13   (c) 0.25   (d) 0.20

24. Given that P (A) = 1/2, P (B) = 1/3, P (AB) = 1/4, what is P (A'/B')?

(a) 1/2   (b) 7/8   (c) 5/8   (d) 2/3

25. An investment consultant predicts that the odds against the price of a certain stock going up are 2:1 and odd are in favor of the price remaining the same are 1:3 .what is the probability that the price of stock will go down ?

    (a) 5/12   (b) 7/12   (c) 1/3   (d) 1/4

26. A pair of dice rolled. If the sum of the two dice is 9, find the probability that one of the dice showed is 3

    (a) 1/3   (b) ¼   (c) ½   (d) 1/8

27. The overall percentage of failures in a certain examination was 30. What is the probability that out of a group f 6 candidates at least four passed the examination?

    (a) 0.747331   (b) 0.757331   (c) 0.76991   (d) 0.72339

28. What is the probability of getting neither total of 7 nor 11 when the pair of dice is tossed?

    (a) 7/9   (b) 2/9   (c) 3/9   (d) 4/9

29. What is the probability that a leap year selected at random contains either 53 Sundays or 53 Mondays

    (a) 2/7   (b) 3/7   (c) 4/7   (d) 1/7

30. if A and B are two events, such that P(A) = ¼, P(B) = 1/3 and P(AUB)=1/2, then P(B/A) is equal to

    (a) ¾   (b) ½   (c) ¼   (d) 1/3

31. What is the probability of getting exactly 2 head in 7 tosses of a fair coin?

    (a) 5/64   (b) 7/64   (c) 7/128   (d) 21/128

MTP March '21

32. If X and Y are two random variables then v(x+y), when x is independent of y

    (a) $v(x) + v(y)$ (b) $v(x) + v(y) - 2v(x,y)$
    (c) $v(x) + v(y) + 2v(x,y)$ (d) $v(x) - v(y)$

33. In a non-leap year, the probability of getting 53 Sundays or 53 Tuesday or 53 Thursday is :

    (a) 4/7   (b) 2/7   (c) 3/7   (d) 1/7

34. If A and B are two events and P (A) = 2/3, P(B) =3/5, $P(A \cup B)$ = 5/6, then the value of $P(A'/B')$ is :

    (a) ¼   (b) 5/12   (c) 5/8   (d) 5/4

35. The odds are 9:5 against a person who is 50 years living till he is 70 and 8:6 against a person who is 60 living till he is 80. Find the probability that at least one of them will be alive after 20 years.

    (a) 11/14   (b) 22/49   (c) 31/49   (d) 35/49

MTP-March '22

36. For a probability of a random variable x is given below :

X:	1	2	4	5	6
P:	0.15	0.25	0.2	0.3	0.1

What is the Standrard deviation of x ?

Chapter 15

(a) 1.49   (b) 1.56   (c) 1.69   (d) 1.72

37. Given that for two events A and B, P (A) = 3/5, P (B) = 2/3 and P (A U B) = 3/4, what is P (A/B)?

(a) 0.655   (b) 13/60   (c) 31/60   (d) 0.775

38. X and Y stand in a line with 6 other people. What is the probability that there are 3 persons between them?

(a) 1/5   (b) 1/6   (c) 1/7   (d) 1/3

39. Four unbiased coins are tossed simultaneously. The expected number of heads is :

X:	0	1	2	3	4
P(x)	1/16	4/16	6/16	4/16	1/16

(a) 1   (b) 2   (c) 3   (d) 4

40. Assume that the proabaility for rain on a day is 0.4 . An umbrella salesman can earn ₹ 400 per day in case of rain on that day will lose ₹ 100 per day if there is no rain . The expected eranings (in ₹) per day of the salesman is

(a) 400   (b) 200   (c) 100   (d) 0

41. What is the probability of getting 3 heads if 6 unbaised coins are tossed simultaneously ?

(a) 0.3125   (b) 0.25   (c) 0.6825   (d) 0.50

MTP-Oct'21

42. Following are the wages of 8 workers in rupees: 50, 62, 40, 70, 45, 56, 32, 45. If one of the workers is selected at random, what is the probability that his wage would be lower than the average wage?

(a) 0.625   (b) 0.500   (c) 0.375   (d) 0.450

43. A problem in probability was given to three CA students A, B and C whose chances of solving it are 1/3, 1/5 and 1/2 respectively. What is the probability that the problem would be solved?

(a) 4/15   (b) 7/8   (c) 8/15   (d) 11/15

44. A packet of 10 electronic components is known to include 2 defectives. If a sample of 4 components is selected at random from the packet, what is the probability that the sample does not contain more than 1 defective?

(a) 1/3   (b) 2/3   (c) 13/15   (d) 3/15

45. The probability that there is at least one error in an account statement prepared by 3 persons A, B and C are 0.2, 0.3 and 0.1 respectively. If A, B and C prepare 60, 70 and 90 such statements, then the expected number of correct statements

(a) 170   (b) 176   (c) 178   (d) 180

46. A bag contains 6 white and 4 red balls. If a person draws 2 balls and receives ₹ 10 and ₹ 20 for a white and red balls respectively, then his expected amount is

(a) ₹ 25   (b) ₹ 26   (c) ₹ 29   (d) ₹ 28

MTP-Nov'21

47. If X and Y are two random variables and if E(X) =3 and E(Y) = 6, then E(XY) = ?

(a) 3   (b) 6   (c) 18   (d) 24

48. An unbiased coin is tossed 6 times. Find the probability that the tosses result in heads only,

(d) None

(a) 1/64   (b) 5/64   (c) 10/64

49. In a Binomial Distribution B (n, p), n= 4, then P (x=2) = 3 P (x= 3) find P

(d) 4/3

(a) 1/3   (b) 2/3   (c) 6/4

50. One card is drawn from a pack of 52 , what is the probability that it is a king or queen ?

(d) None

(a) 11/13   (b) 2/13   (c) 1/13

51. The probability that a leap year has 53 Wednesday is

(d) 1/7

(a) 2/7   (b) 5/3   (c) 2/3

52. A coin is tossed six times, then the probability of obtaining heads and tails alternatively is

(c) 1/16

(a) ½   (b) 1/64   (c) 1/32

53. Two different dice are thrown simultaneously, then the probability, that the sum of two numbers appearing on the top of dice 9 is

(a) 8/9   (b) 1/9   (c) 7/9   (d) None

54. The probability distribution of the demand for a commodity is given below

Demand (x)	5	6	7	8	9	10
Probability: P(x)	0.05	0.10	0.30	0.40	0.10	0.05

The expected value of demand will be :

(a) 7.55   (b) 7.85   (c) 1.25   (d) 8.35

55. A bag contains 4 Red and 5 Black balls. Another bag contains 5 Red and 3 Black balls. If one ball is drawn at random each bag. Then the probability that one Red and One Balck is

(a) 12/72   (b) 25/72   (c) 37/72   (d) 13/72

MTP-2 Nov'22

56. Two events A and B are such that they do not occur simultaneously then they are called _____ events.

(a) Mutually exhaustive   (b) Mutually Exclusive

(c) Mutually Independent   (d) Equally Likely

57. If a coin is tossed 5 times then the probability of getting Tail and Head occurs alternatively is:

(a) 1/8   (b) 1/16   (c) 1/32   (d) 1/64

58. When 2 dice are thrown simultaneously then the probability of getting at least one 5 is:

(a) 11/36   (b) 5/36   (c) 8/15   (d) 1/7

59. The probability that a leap year has 53 Wednesday is:

(a) 2/7   (b) 3/5   (c) 1/7   (d) 2/3

60. Ram is known to hit a target in 2 out of 3 shots whereas Shyam is known to hit the same target in 5 out of 11 shots. What is the probability that the target would be hit if they both try?

(a) 9/11

(b) 6/11

(c) 10/33

(d) 3/11

61. The probability that a student is not a swimmer is 1/5, then the probability that out of five students four are swimmers is:

(a) $\left(\dfrac{4}{5}\right)^4 \left(\dfrac{1}{5}\right)$

(b) $^5C_1 \left(\dfrac{1}{5}\right)^4 \left(\dfrac{4}{5}\right)$

(c) $^5C_4 \left(\dfrac{4}{5}\right)^4 \left(\dfrac{1}{5}\right)$

(d) None of these

MTP-1 Nov'22

62. Let P be a probability function on S = {X_1, X_2, X_3} if P(X_1)=1/4 and P(X_3) = 1/3 then P(X_2) is equal to:

(a) 5/12

(b) 7/12

(c) 3/4

(d) none of these

63. A speaks truth in 60% of the cases and B in 90% of the cases. In what percentage of cases are they likely to contradict each other in stating the same fact:

(a) 36%

(b) 42%

(c) 54%

(d) none of these.

64. A candidate is selected for interview for 3 posts. For the first there are 3 candidates, for the second there are 4 and for the third there are 2. What are the chances of his getting at least one post?

(a) 3/4

(b) 2/3

(c) 1/10

(d) 1

65. A card is drawn from a pack of playing cards and then another card is drawn without the first being replaced. What is the probability of getting two kings:

(a) 7/52

(b) 1/221

(c) 3/221

(d) none of these.

66. In a non- leap year, the probability of getting 53 Sundays or 53 Tuesdays or 53 Thursdays is:

(a) 4/7

(b) 2/7

(c) 3/7

(d) 1/7

67. Thirty balls are serially numbered and placed in bag. Find chance that the first ball drawn is a multiple of 3 or 5

(a) 8/15

(b) 2/15

(c) 1/2

(d) 7/15

68. The odds in favour of event A in a trail is 3:1. In a three independent trails, the proability of non occurrence of the event A is

(a) 1/64

(b) 1/32

(c) 1/27

(d) 1/8

MTP-2 June'22

69. If P(A) = $\dfrac{1}{2}$; P(B) = $\dfrac{1}{3}$ and $P(A \cap B) = \dfrac{1}{4}$ then the value of P($\overline{A} \cap \overline{B}$) is:

(a) 1/4

(b) 3/4

(c) 2/5

(d) None of these

70. From the following probability distribution table, find E(x).

x:	1	2	3
f(x):	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{6}$

(a) 1   (b) 1.50   (c) 1.67   (d) None of these

71. A husband and a wife appear in an interview for two vacancies in the same post. The probability of husband's selection is 3/5 and that of wife's selection is 1/5. Then the probability that only one of them is selected is:

(a) 16/25   (b) 17/25   (c) 14/25   (d) None of these

72. A bag contains 5 Red and 4 Black balls. A ball is drawn at random from the bag and put into another bag contains 3 red and 7 black balls. A ball is drawn randomly from the second bag. What is the probability that it is red?

(a) 32/99   (b) 1/3   (c) 74/99   (d) None of these

73. A non-leap year, the probability of getting 53 Sundays or 53 Tuesdays or 53 Thursdays is

(a) 4/7   (b) 2/7   (c) 3/7   (d) 1/7

ANSWER KEYS

1	(b)	2	(a)	3	(b)	4	(d)
5	(a)	6	(d)	7	(d)	8	(a)
9	(b)	10	(a)	11	(c)	12	(b)
13	(a)	14	(a)	15	(c)	16	(c)
17	(a)	18	(c)	19	(b)	20	(a)
21	(b)	22	(d)	23	(a)	24	(c)
25	(a)	26	(c)	27	(a)	28	(a)
29	(b)	30	(d)	31	(d)	32	(a)
33	(c)	34	(b)	35	(c)	36	(c)
37	(d)	38	(c)	39	(b)	40	(c)
41	(a)	42	(b)	43	(d)	44	(c)
45	(c)	46	(d)	47	(c)	48	(a)
49	(a)	50	(b)	51	(a)	52	(c)
53	(b)	54	(a)	55	(c)	56	(b)
57	(b)	58	(a)	59	(a)	60	(a)
61	(c)	62	(a)	63	(b)	64	(a)
65	(b)	66	(c)	67	(d)	68	(a)
69	(d)	70	(c)	71	(c)	72	(a)
73	(c)						

---0---0---

Chapt