PROBABILITY, STATISTICS

1. If E is an event, the P $(\bar{E})$ is equal to

   (a) P(E) (b) 1 – P(E)

   (c) - P(E) (d) 1 + P (E)

2. If the probability of an event is P (E), then

   (a) P (E) ≥ 0 (b) P (E) ≥ 1

   (c) P (E) ≤ 0 (d) 0 ≤ P (E) ≤ 1.

3. A single letter is selected at random from the word "**PROBABILITY**". The probability that it is a vowel is

   (a) $\frac{3}{11}$ (b) $\frac{4}{11}$

   (c) $\frac{2}{11}$ (d) 0

4. A and B toss 3 coins. The probability that both obtain the same number of heads is

   (a) 1/9 (b) 3/16

   (c) 5/16 (d) 3/8.

5. Ram Lal throws three coins. The probability of at least one head turning up is

   (a) 1/3 (b) 1/8

   (c) 1/4 (d) 7/8

6. Two cards are drawn at random from a pack of 52 cards. The probability of these being queens is

   (a) 1/26 (b) 1/2

   (c) 1/221 (d) none of these

7. An urn contains 6 white and 4 black balls. A fair die is rolled and that number of balls are chosen from the urn. The probability that the balls selected are white is

   (a) 1/5 (b) 1/6

   (c) 1/7 (d) 1/8

8. The chance of throwing an ace in the first only of two successive throws with an ordinary die is

   (a) 1/6 (b) 5/36

   (c) 1/36 (d) 25/36

9. Two events A and B have probabilities 0.25 and 0.50 respectively. The probability that both A and B occur simultaneously is 0.14. Then the probability that neither A nor B occurs is

   (a) 0.25 (b) 0.39

   (c) 0.11 (d) none of these

10. If A and B are two events such that $P(A\cup B)=\frac{5}{6}, P(A\cap B)=\frac{1}{3}.\ P(A)=\frac{1}{3}$, then the events A and B are

    (a) independent

    (b) dependent

    (c) mutually exclusive

    (d) none of these

11. If M and N are any two events, the probability that exactly one of them occurs is

    (a) P (M) + P (N) – 2 P (M ∩ N)

    (b) P (M) + P (N) – P (M ∩ N)

    (c) $P(M^c)+P(N^c)-2(M^c\cap N^c)$

    (d) $P(M\cap N^c)+P(M^c\cap N)$

12. A and B are two candidates seeking admission in I.I.T. the probability that A is selected is 0 · 5 and the probability that both A and B are selected is at most 0 ·3. the probability of B getting selected is at most

    (a) 0 (b) 0·5

    (c) 0·8 (d) 1.

13. Three persons work independently on a problem. If the respective probabilities that they will solve it are $\frac{1}{3}, \frac{1}{4}$ and $\frac{1}{5}$, then the probability that none can solve it is

    (a) $\frac{3}{5}$ (b) $\frac{2}{5}$

    (c) $\frac{1}{3}$ (d) none of these

14. Two persons A and B appear in an interview for two vacancies. If the probability of their selection are 1/4 and 1/6 respectively, then probability that none of them is selected is

(a) $\frac{5}{8}$ (b) $\frac{5}{12}$

(c) $\frac{19}{12}$ (d) $\frac{1}{24}$

15. An urn contains 7 red and 4 blue balls. Two balls are drawn at random with replacements. If the events are independent, then the probability of getting two red balls is

(a) $\frac{49}{121}$ (b) $\frac{28}{121}$

(c) $\frac{56}{121}$ (d) none of these

16. To open a lock, a key is taken out of a collection of n keys at random. If the lock is not opened with this key, it is put back into the collection and another key is tried. The process is repeated again and again. It is given that with only one key in the collection, the lock can be opened, then the probability that the lock will open in n trials is

(a) $\left(\frac{1}{n}\right)^n$ (b) $\left(\frac{n-1}{n}\right)^n$

(c) $1-\left(\frac{n-1}{n}\right)^n$ (d) none of these

17. There are two boxes. One box contains 3 white balls and 2 black balls. The other box contains 7 yellow balls and 3 black balls. If a box is selected at random and from it, a ball is drawn, the probability that the ball drawn is black, is

(a) 1/3 (b) 1/5

(c) 3/20 (d) 7/20

18. 5 tickets are drawn successively with replacement, from a box containing 100 tickets, numbered from 1 to 100. The probability that all the tickets bear numbers divisible by 10, is

(a) $\left(\frac{9}{10}\right)^5$ (b) $\left(\frac{1}{10}\right)^5$

(c) $\left(\frac{9}{100}\right)^5$ (d) none of these

19. A coin is tossed once. If a head comes up, then it is tossed again and if a tail comes up, a dice is thrown. The number of points in the sample space of experiment is

(a) 24 (b) 12

(c) 4 (d) 8.

20. A determinant is chosen at random from the set of all determinants of order 2 with elements 0 and 1 only. The probability that the value of the determinant chosen is positive is

(a) 1/16 (b) 2/16

(c) 3/16 (d) 1/4

21. The mean of first n natural number is

(a) $\frac{n(n+1)}{2}$ (b) n (n + 1)

(c) $\frac{n+1}{2}$ (d) $(n+1)$

22. For a continuous series the mean is computed by the following formula

(a) Mean = $A+\frac{\sum f}{n}$

(b) Mean = $A+\frac{\sum d}{\sum f}$

(c) Mean = $A+\frac{\sum f}{\sum d}$

(d) Mean = $A+\frac{\sum fd}{\sum f}$

23. The mean of the squares of first n natural numbers is

(a) $\frac{1}{2}n^2$ (b) $\frac{1}{8}n(n+1)$

(c) $\frac{1}{6}n(2n+1)$ (d) $\frac{1}{6}(n+1)(2n+1)$

24. If the mean of 3, 4, x, 7, 10 is 6, then the value of x is

(a) 4 (b) 5

(c) 6 (d) 7.

25. Mean of 100 items is 49. It was discovered that three items which should have been 60, respectively. The correct mean is

(a) 48 (b) $82\frac{1}{2}$

(c) 50 (d) 80.

26. The relationship between mean, median and mode for a moderately skewed distribution is

(a) Mode = Median – 2 Mean

(b) Mode = 2 Median – Mean

(c) Mode = 3 Median – 2 Mean

(d) Mode = 2 Median – 3 Mean

27. The median of 10, 14, 11, 9, 8, 12, 6 is

(a) 10 (b) 12

(c) 14 (d) 11.

28. The S.D. of the first n natural numbers is

(a) $\frac{n+1}{2}$ (b) $\sqrt{\frac{n(n+1)}{2}}$

(c) $\sqrt{\frac{n^2-1}{12}}$ (d) none of these

29. For a frequency distribution standard deviation is computed by

(a) $\sigma = \frac{\sum f(x-\bar{x})}{\sum f}$

(b) $\sigma = \frac{\sqrt{\sum f(x-\bar{x})^2}}{\sum f}$

(c) $\sigma = \sqrt{\frac{\sum f(x-\bar{x})^2}{\sum f}}$

(d) $\sigma = \sqrt{\frac{\sum f(x-\bar{x})}{\sum f}}$

30. Quartile deviation for a frequency distribution

(a) $Q = Q_3 - Q_1$ (b) $Q = \frac{1}{2}(Q_3 - Q_1)$

(c) $Q = \frac{1}{3}(Q_3 - Q_1)$ (d) $Q = \frac{1}{4}(Q_2 - Q_1)$

31. The angle of a triangle are in A.P. and the east angle is 30^o.The greatest angle in radians is

(a) $\frac{\pi}{2}$ radians (b) $\frac{\pi}{3}$ radian

(c) $\frac{\pi}{4}$ radians (d) π radians.

32. If x = sec ϕ - tan ϕ and y = cosec ϕ + cot ϕ, then

(a) $xy+1 = x-y$ (b) $xy+1 = x-2y$

(c) $xy+1 = x+y$ (d) $xy+1 = y-x$

33. If tan $\theta = \frac{a}{b}$, then the value of $\frac{a\sin\theta + b\cos\theta}{a\sin\theta - b\cos\theta}$ is

(a) $\frac{a^2+b^2}{a^2-b^2}$ (b) $\frac{a^2-b^2}{a^2+b^2}$

(c) $\frac{a}{\sqrt{a^2+b^2}}$ (d) $\frac{b}{\sqrt{a^2+b^2}}$

34. $\tan 3x - \tan 2x - \tan x$ is equal to:

(a) $\tan x \tan 2x \tan 3x$

(b) $-\tan x \tan 2x \tan 3x$

(c) $\tan x \tan 2x - \tan x \tan 3x - \tan 2x \tan 3x$

(d) none of these.

35. $\sqrt{2+\sqrt{2+2\cos 4\theta}}$ is equal to

(a) $\cos\theta$ (b) $\cos 2\theta$

(c) $2\cos\theta$ (d) $2\cos 2\theta$

36. The value of $\tan\left(\frac{\pi}{4}+\theta\right) - \tan\left(\frac{\pi}{4}-\theta\right)$ is

(a) $\tan 2\theta$ (b) $2\tan\theta$

(c) 2 tan 2θ (d) none of these.

37. The maximum value of $5\cos\theta + 3\cos\left(\theta + \frac{\pi}{3}\right) + 3$, is

(a) 5 (b) 10

(c) 11 (d) - 1

38. If $\sin A = \frac{1}{\sqrt{5}}, \cos B = \frac{3}{\sqrt{10}}$, where A, B are positive acute angles, then A + B is equal to

(a) $\pi/6$ (b) $\pi/4$

(c) $\pi/3$ (d) $\pi/2$

39. $\cos 52^o + \cos 68^o + \cos 172^o =$

(a) 0 (b) 1

(c) 2 (d) none of these

40. If $\sin^6\theta + \cos^6\theta + K\cos^2 2\theta = 1$, then K is equal to

(a) $\frac{1}{2}\tan^2 2\theta$ (b) $\frac{1}{4}\tan^2 2\theta$

(c) $4\cot^2 2\theta$ (d) $\frac{3}{4}\tan^2 2\theta$

41. If $\sin\alpha + \sin\beta = l, \cos\alpha + \cos\beta = m$ and $\tan\frac{\alpha}{2}\tan\frac{\beta}{2} = 4(n \neq 1)$, then $\frac{1+n}{1+n}$ is equal to

(a) $\frac{l^2 - m^2}{2m}$ (b) $\frac{l^2 + m^2}{2m}$

(c) $\frac{l^2 + m^2}{m}$ (d) none of these

42. If $A = \tan^{-1} x$, then the value of sin 2A is

(a) $\frac{2x}{1-x^2}$ (b) $\frac{2x}{\sqrt{1-x^2}}$

(c) $\frac{2x}{1+x^2}$ (d) none of these

43. $4\tan^{-1}\frac{1}{5} - \tan^{-1}\frac{1}{239}$ is equal to

(a) π (b) $\pi/2$

(c) $\pi/3$ (d) $\pi/4$

44. The value of $\cos^{-1}\left(\cos\frac{5\pi}{3}\right) + \sin^{-1}\left(\sin\frac{5\pi}{3}\right)$ is

(a) $\pi/2$ (b) $5\pi/3$

(c) $10\pi/3$ (d) 0

45. If $\tan^{-1} x + 2\cot^{-1} x = \frac{2\pi}{3}$, then x =

(a) $\frac{\sqrt{3}-1}{\sqrt{3}+1}$ (b) 3

(c) $\sqrt{3}$ (d) $\sqrt{2}$

46. $\sec^2(\tan^{-1} 2) + \operatorname{cosec}^2(\cot^{-1} 3) =$

(a) 5 (b) 10

(c) 15 (d) 20.

47. The general solution of tan 3x = 1 is

(a) $n\pi + \frac{\pi}{4}$ (b) $\frac{n\pi}{3} + \frac{\pi}{12}$

(c) $n\pi$ (d) $n\pi \pm \frac{\pi}{4}$

48. The number of solution of $\sin^2\theta + 3\cos\theta = 3$ in [- π, π] is

(a) 4 (b) 2

(c) 0 (d) none of these

49. The set of values of x for which $\frac{\tan 3x - \tan 2x}{1 + \tan 3x \tan 2x} = 1$ is

(a) ϕ

(b) $\pi/4$

(c) $n\pi + \frac{\pi}{4}; n = 1, 2, 3, \ldots$

(d) $2n\pi + \frac{\pi}{4}, n = 1, 2, 3, \ldots$

50. If $5\cos 2\theta + 2\cos^2\frac{\theta}{2} + 1 = 0, -\pi < \theta < \pi$, then θ =

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{3}, \cos^{-1}\left(\frac{3}{5}\right)$

(c) $\cos^{-1}\left(\frac{3}{5}\right)$ (d) $\pm\frac{\pi}{3}, \pi - \cos^{-1}\frac{3}{5}$

ANSWERS

1. (b)	**2.** (d)	**3.** (b)	**4.** (c)	**5.** (d)	**6.** (c)	**7.** (a)	**8.** (b)	**9.** (a)	**10.** (a)
11. (d)	**12.** (c)	**13.** (b)	**14.** (a)	**15.** (a)	**16.** (c)	**17.** (d)	**18.** (c)	**19.** (a)	**20.** (c)
21. (c)	**22.** (d)	**23.** (d)	**24.** (c)	**25.** (c)	**26.** (c)	**27.** (a)	**28.** (c)	**29.** (c)	**30.** (b)
31. (a)	**32.** (d)	**33.** (a)	**34.** (a)	**35.** (c)	**36.** (c)	**37.** (b)	**38.** (b)	**39.** (a)	**40.** (d)
41. (b)	**42.** (c)	**43.** (d)	**44.** (d)	**45.** (c)	**46.** (c)	**47.** (b)	**48.** (d)	**49.** (a)	**50.** (d)