SPT- MCQ question bank

1.If $P(A) = {}^{1}/_{4}, P(B) = {}^{1}/_{3}$, $P(A \cup B) = {}^{1}/_{2}$ then $P(A|B)$ is _____

a)${}^{1}/_{12}$ b)${}^{1}/_{3}$ c)${}^{1}/_{4}$ d)${}^{1}/_{6}$

2. Probability of an impossible event is

(a) Zero (b) 1 (c) 1/4 (d) ½

3.The pdf of random variable X is $f(x) = kx$, $0 < x < 1$ then k is----------

a)0 b)1 c)2 d)3

4. If X is a discrete random variable with $(x, p(x))$ values as $(0, k), (1,2k), (2,3k), (3,4k)$,then value of k is____

a) 0.4 b) 0.1 c)1 d)10

5.If $P(A) = 0.4, P(B) = 0.04$, $P(A \cap B) = 0.01$ then $P(A|\ \overline{B}\ )$ = _____

a)0.05 b) 0.40625 c) 0.593 d) 0.64

6. If A and B are mutually exclusive events then $P\left(\frac{A}{B}\right)$ is_____

a)0 b) S c)Ø d)1

7. If A and B are independent events then $P\left(\frac{A}{B}\right)$= _____

a)P(A) b) P(B) c)$P(A \cap B)$ d)1

8. If X is a discrete random variable with V(X)=7.15 then V(19-4X)=

a) 114.4 b)-9.6 c)-95.4 d)7.2

9.If $E[X] = 3$, $E[X^2] = 10$ then $V(X)$ is _____

a)1 b)7 c)97 d)0

10.If $E[X] = 2$, $E[X^2] = 12$ then standard deviation is _____

a)8 b)2.8284 c)0.2828 d)3.1622

11.If $V(X) = 15$ then $V(8X)$ is _____

a)30.9838 b)10.9544 c)120 d)960

12.If A and B are mutually exclusive events then $P(A \cap B)$ is_____

a)0 b) S c)Ø d)1

13.If $E[X] = 3$, $V[X] = 18$ then $E(X^2)$ is _____

a) 9 b)27 c)21 d)15

14.The pdf of random variable is $2x$, $0 < x < 1$ then $P(0 < X < 0.5)$ is_____

a) 0.125 b)0.5 c)0.25 d)1

15.If $(x, p(x))$ values are $(0,0.5), (1,0.2), (2,0.1), (3,0.2)$ then $P(0 < X < 2)$ is_____

a) 0.8 b)0.3 c) 0.7 d) 0.2

16.If X and Y are independent random variable then E(XY)=_____

a)E(X+Y) b)E(X)E(Y) c)E(X-Y) d)0

17.If marginal distribution of X is $(0,0.4), (1,0.2), (2,0.1), (3,0.3)$ then E(X) is_____

a)1 b)1.3 c)1.7 d)3.3

18. If X and Y are independent random variable then $V(X-Y) =$

a) $V(X)+V(Y)$ b) $V(X)-V(Y)$ c) $V(X)V(Y)$ d)none of these

19. If X and Y are independent random variables with variances of X and Y are respectively 1 and 2,

Then V[2X-3Y]=_____

(a)8 (b) -14 (c) 22 (d) 0

20. If marginal distribution of X is $(0, 0.4), (1, 0.2), (2, 0.1), (3, 0.3)$ then $E(X^2)$

is_____

a)1 b)1.3 c)1.7 d)3.3

21. If $P(A) = 0.4$, $P(B) = 0.04$, $P(A \cap B) = 0.01$ then $P(\overline{A} \mid \overline{B}) =$ _____

a)0.05 b)0.25 c)0.59375 d)0.64

22. $E(X-E(X))=$

a) $V(X)$ b) $E(X)$ c) 0 d) $E(X)-X$

23. If the joint pdf of X is $f(x,y)=e^{-(x+y)}, 0<x,y<\infty$ then the marginal distribution of X is

a) e^{-x} b) $-e^{-x}$ c) e^{x} d) e^{-y}

24. If X and Y are random variables with a and b constants, then Cov(aX+bY)=_____

a) (a+b)Cov(X,Y) b) a^2Cov (X)+ b^2Cov(Y) c) abCov(X,Y) d) V(aX+bY)

25.If X and Y are independent random variables, then Cov(X,Y) is ____

a) -1 b) 0 c) 1 d)

26.The mean of binomial distribution is

a)np b)nq c)npq d)$\sqrt{npq}$

27. The pdf of standard normal distribution is symmetric about _____

(a) y-axis (b)x- axis (c) the line $x=\mu$ (d) both (a) and (b)

28. In binomial distribution if n=10 and p=0.1 then standard deviation is _____

a) 9 b)0.9486 c)0.9 d)1

29. The variance of binomial distribution is

a)np b)nq c)npq d)$\sqrt{npq}$

30.If p is a probability of success and q is a probability of failure then $(p+q)^5$ is

a)1 b)0 c)0.5 d)2^n

31.The standard deviation of binomial distribution is

a)np b)nq c)npq d)$\sqrt{npq}$

32.If 6 coins are tossed then probability of getting exactly 3 heads is

a)0.2325 b)0.3125 c)0.2135 d)0.3852

33.The probability function for poisson distribution is

a)$\frac{\lambda^x e^{-\lambda}}{x!}$ b)$\frac{x!}{\lambda^x e^{-\lambda}}$ c)$\frac{\lambda^x}{x! e^{-\lambda}}$ d)$\frac{\lambda^x e\lambda}{x!}$

34.The probability function for binomial distribution is

a)$n_{C_x}p^x q^{n+x}$ b) $n_{C_x}p^x q^{n-x}$ c)$n_{C_x}p^x q^n$ d)$n_{C_x}p^x q^x$

35. Probability distribution which is the limiting case of binomial distribution is _____

a)Poisson distribution b)exponential distribution c)normal distribution d)both a and c

36.For standard normal distribution, standard deviation is _____

a)0 b)1 c)0.5 d)0.25

37.For standard normal distribution mean is _____

a)0 b)1 c)0.5 d)0.25

38. In Poisson distribution if n=10000 and p=0.001 then standard deviation is _____

a) 10 b)3.1622 c)2.8284 d)3.4641

39.In exponential distribution if $\alpha = {}^1/_3$ then mean is _____

a)3 b)${}^1/_3$ c)$\sqrt{3}$ d)${}^1/_{\sqrt{3}}$

40.In exponential distribution if $\alpha = {}^1/_2$ then variance is _____

a)$\sqrt{4}$ b)${}^1/_4$ c)4 d)${}^1/_{\sqrt{4}}$

41.The variance of poisson distribution with parameter λ=2 is _____

a)4 b)0.5 c)1.4142 d)2

42. In a Poisson distribution if $2P(X=1) = P(X=2)$ the variance is

a)0 b)-1 c)4 d)2

43.In a Poisson distribution if $P(X=2) = P(X=3)$ then$P(X=0)$ is _____

a)e^3 b)e^{-3} c)e^1 $d)e^{-1}$

44. Which of the following is not a characteristic of the binomial distribution?

a) There is a sequence of identical trials b) Each trial results in two or more outcomes

c) The trials are independent of each other c) Probability of success is same from one trial to

another.

45. If λ is the mean of Poisson distribution then $P(X=0)$ is given by

a) $e^{-\lambda}$ b) e^{λ} c) e d) 0

47. If a random variable X satisfies the Poisson distribution with a mean value of 2 then $P(X \geq 1)$ is

a) $1-e^{2}$ b) $1-e^{-2}$ c) $1+e^{-2}$ d) $1+e^{2}$

48. Which of the following statement is correct?

a) The mean of the Poisson distribution (with parameter λ) equals the mean of the exponential distribution (with parameter α) only when $\lambda=\alpha=1$.

b) The exponential distribution is continuous and defined over the interval $(-\infty,\infty)$.

c) The binomial distribution has equal mean and variance only when p=0.5.

d) All the above.

49. If X is a normal variate and $\frac{X}{2}=Y+6$ where Y has $N(0,1)$ then mean and variance of X are

a) 6, 2 b)12, 4 c)6,4 d)12, 2

50. Suppose X ~ N(5, 32). What is P(X<8) in terms of the standard normal variable Z?

a) P(Z<1) b) P(Z<0.5303) c)P(Z<0.0937) d) P(Z<0.2243)

51. If Z is a standard normal variate then $P(0 \leq Z \leq \infty)$ is

a) 0.5 b)-0.5 c)-1 d)1

52. The variance of uniform distribution is given by_____

a) $\frac{(b-a)}{\sqrt{11}}$ b) $\frac{(b-a)}{\sqrt{14}}$ c)$\frac{(b-a)}{\sqrt{10}}$ d) $\frac{(b-a)^2}{12}$

53. Moment generating function of uniform variate X over the interval [-a , a] is_____

a) $\frac{\sinh at}{at}$ b) $\frac{\cosh at}{at}$ c) $\frac{\tanh at}{at}$ d) $\frac{\coth at}{at}$

54. If X_1, X_2 ,....., X_n are independent random variables with MGFs

$M_{X_1}(t)$, $M_{X_2}(t)$, ..., $M_{X_n}(t)$, respectively and Y= $X_1 + X_2 + \ldots\ldots\ldots + X_n$, then $M_Y(t) =$

a) $M_{X_1}(t) M_{X_2}(t) \ldots\ldots M_{X_n}(t)$ b) $M_{X_1}(t) + M_{X_2}(t) + \ldots\ldots + M_{X_n}(t)$

c) none of a) and b)

55. If X has the moment generating function $M_X(t) = (1-2t)^{-\frac{n}{2}}$, then the distribution of X has mean

a) 0 b)2 c) 1 d) -1

56. If $\overline{X}$ is the mean of a random sample of size *n* taken from a population with mean μ and finite variance σ^2, then the liming form of the distribution of $\frac{\overline{X} - \mu}{\sigma/\sqrt{n}}$ as $n \to \infty$ is _____

a)Standard normal distribution b)t-distribution c)Chi-square distribution d)Exponential distribution

57.When sample size $n < 30$, we use---------- distribution

a) normal b)t-distribution c)Chi-square distribution d)Exponential distribution

58.If $X \sim N(\mu, \sigma^2)$ where μ and σ^2 are unknown. Then which of the following is a statistic?

a) $X^2 + 5X$ b) $X + \mu$ c) $X^2 - \sigma^2$ d) $\frac{X^2}{\sigma^2}$

59. Let $\hat{\theta}$ be an estimate for the unknown parameter θ associated with the distribution of random variable X. If $E(\hat{\theta}) = \theta$, for all , then $\hat{\theta}$ is _____

a)Biased estimator b)Mean c) unbiased estimator d) Variance

60. If the regression lines are $x = 0.7y + 5.2$ and $y = 0.3x + 2.8$

then the $(\bar{x}, \bar{y})$ is _____

a) (9 , 5.52) b) (0.7, .3) (5.2,2.8) d) (1,1)]

61. Which statement is an example for uncorrelated random variables?

a)Volume of a cube $V = L^3$ b) Rainfall and crop yield

c) Two coins being tossed simultaneously d) Poverty and Crime

62. Which statement is correct?

a) Coefficient of correlation is the geometric mean between the regression coefficients

b) Coefficient of correlation is the arithmetic mean between the regression coefficients

c) Coefficient of correlation ρ lies in [1,2].

d) Coefficient of correlation ρ lies in [0,1].

63. Which statement is not correct?

a) Coefficient of correlation is the geometric mean between the regression coefficients

b) Coefficient of correlation is the arithmetic mean between the regression coefficients

c) Coefficient of correlation ρ lies in [-1,1].

d) Coefficient of correlation ρ is independent of origin

64. $\frac{nS^2}{\sigma^2}$ is in chi-square distribution with _____ degrees of freedom.

a) n-1 b) 0 c) 1 d)n^2

65. Samples of size 25 are selected from a population with mean 40 and standard deviation 7.5. The mean of the sampling distribution of sample means is

a) 7.5 b)40 c)8 d)25

66. The confidence coefficient for 99% confidence interval for population mean is__

a) 2.58 1.96 2.56 d)2.50

67. A statistic is _____

a) a function of population units b)a characteristic of a population c) a part of a population

d) a function of sample observations

68. The range of Chi-square variable is_____-

$a) -\infty$ to ∞ b) $-\infty$ to 0 c) 0 to ∞ $d) -1$ to 1

69. One among the three normal equations for fitting of a parabola $y = a + bx + cx^2$ is ____

a) $\sum xy = a\sum x^2 + b\sum x^3 + a\sum x^4$ b)$\sum xy = a\sum x + b\sum x^3 + c\sum x^4$

c) $\sum xy = a\sum x + b\sum x^3 + c\sum x^2$ d) $\sum xy = a\sum x + b\sum x^2 + c\sum x^3$

70. The standard deviation of x and y are 6 and 8 respectively. The correlation coefficient between them is 0.6. Then the value of regression coefficient $b_{yx}$is _____

a)0.6 b)0.45 c)0.8 d)0.75

71.One of the normal equations for fitting of a straight line $y = a + bx$ is $\sum y$ =_____

a) $na + b\sum x$ b) $na + b\sum x^2$ c)$n^{2a} + b\sum x$ d) $a + b\sum x$

72.If $\bar{X}$ is the sample mean and μ is the population mean, then $E[\bar{X}] =$ _____

a) nσ b) $\bar{X}$ c) μ d) σ

73.Samples of size 25 are selected from a population with mean 40 and standard deviation 7.5. The variance of the sampling distribution of sample means is_____

a) 0.3 b) 2.25 c) 7.5 d) 1.5

74. If $X \sim N(\mu, \sigma^2)$ where μ and σ^2 are unknown. Then which of the following is a statistic?

a) $X^2 + X + 4$ b) $X + 2\mu$ c) $\frac{X^2}{\sigma^2}$ d) $X^2 - \sigma^2$

75. If $\{X_n,\ n \geq 0\}$ is a Markov chain on $\{1,\ 2,\ 3\}$ with transition probability matrix

$P = \begin{bmatrix} \frac{2}{5} & 0 & \frac{3}{5} \\ 0 & \frac{3}{5} & \frac{2}{5} \\ \frac{3}{5} & \frac{2}{5} & 0 \end{bmatrix}$, then the stationary distribution is _____

a) $\left(\frac{1}{3}, \frac{2}{3}, 0\right)$ b) $\left(\frac{1}{3}, \frac{1}{3}, \frac{1}{3}\right)$ c) $\left(\frac{1}{5}, \frac{2}{5}, \frac{2}{5}\right)$ d) $\left(0, \frac{3}{5}, \frac{2}{5}\right)$

76. Let $\{X_n\}$ be a Markov Chain with state $\{0, 1, 2\}$ with following transition probability matrix

P=$\begin{bmatrix} \frac{1}{2} & 0 & \frac{1}{2} \\ \frac{1}{3} & \frac{2}{3} & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then $P[X_3 = 2 \mid X_1 = 0]$ is_____

a)1/4 b)1/2 c) 1/3 d)1/8

77. Which of the following best describes queuing theory?

a)The study of arrival rates b) The study of service times

c)The study of waiting lines d) The evaluation of service time costs

78. Customer behaviour in which he moves from one queue to another in multiple channel situation is_____

a) Balking b) Reneging c) Jockeying d) Alternating

79. A customer who leaves the queue by loosing his patience to wait is said to be

a) Balking b) Reneging c) Jockeying d) Alternating

80. Which among the following vectors is a probability vector?

a)(0.25 , -0.25, 0.5 , 0.5) b)(1/12 , 1/2 , 1/6 , 0 ,1/4)

c) (5/2 , 0 , 8/3 , 1/6 , 1/6) d) (1/3 ,0 , -2/3, 1/5, 3/5)

81. Which matrix is stochastic matrix?

a) $\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$ b) $\begin{pmatrix} 1/4 & 3/4 \\ 0 & 1 \end{pmatrix}$ c) $\begin{pmatrix} 1/2 & 1/3 \\ 0 & 1/2 \end{pmatrix}$ d) $\begin{pmatrix} 1/2 & 1/3 \\ -1 & 1/2 \end{pmatrix}$

82. Let $\{X_n\}_0^\infty$ be a Markov chain with $P[X_0 = 0] = P[X_0 = 1] = \frac{1}{4}$and $[X_0 = 2] = \frac{1}{2}$. The T.P.M is

given by $\begin{bmatrix} \frac{1}{2} & \frac{1}{3} & \frac{1}{6} \\ 0 & \frac{1}{3} & \frac{2}{3} \\ \frac{1}{2} & 0 & \frac{1}{2} \end{bmatrix}$ then $P[X_1 = 1]$ is given by_____

a)1/3 b)1/4 c) 1/5 d) 1/6

83. A Markov Chain is irreducible if and only if its transition matrix is

a) regular stochastic matrix b) stochastic c)not regular stochastic d) not stochastic

84. If P= $\begin{pmatrix} 0 & 1/4 & 3/4 \\ 0 & 1 & 0 \\ 1/2 & 0 & 1/2 \end{pmatrix}$ is the transition matrix of a markov chain with state space

S={1,2, 3}, then which states are absorbing states?

a) only state 2 b) states 2 and 3 c) only state 1 d) states 1 and 2

85. If P= $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ is the transition matrix of a Markov chain with state space {1,2} , which states are recurrent states?

a) only state 1 b) only state 2 c) both states 1 ad 2 d) no states are recurrent

86. If P= $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ is the transition matrix of a Markov chain with state space {1,2} , which states are transient states?

a) state 1 b) state 2 c) both 1 and 2 d) no states are transient.

87. If P= $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ is the transition matrix of a Markov chain with state space {1,2} , which states are aperiodic states?

a) both 1 and 2 b) only state 1 c) only state 2 d) no states are aperiodic.

88. If P= $\begin{bmatrix} 1 & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{4} & \frac{1}{4} & \frac{1}{2} \end{bmatrix}$ is the transition probability matrix of a Markov chain with state space {1,2,3}, then, $P(X_2=1/X_1=2)$=_____

a) 1 b)1/2 c)1/4 d) 0

89. If P= $\begin{bmatrix} 1 & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{4} & \frac{1}{4} & \frac{1}{2} \end{bmatrix}$ is the transition probability matrix of a Markov chain with state space {1,2,3},

then, $P(X_3=2/X_1=2, X_2=1)$=_____

a) 1 b)1/2 c)1/4 d) 0