PART 14 — APPLIED PROBABILITY AND STATISTICS

(Answer ALL questions)

76. For any two events A and B, $P(A-B)$ is equal to
1. $P(A)-P(B)$
2. $P(B)-P(A)$
3. $P(B)-P(A n B)$
4. $P(A)-P(A n B)$

77. Two events A and B such that $P(A)=112$ and $P(A\cap B)=114$, then $P(A\cap\overline{B})$ is
1. 112
2. 314
3. 1
4. 1/3

78. If the events A and B are independent, then $P(\overline{A} \text{ n } B)$ is
1. $P(A)P(\overline{B})$
2. $P(\overline{A})P(\overline{B})$
3. $P(\overline{A})P(B)$
4. None of the above

79. With a pair of dice thrown at a time, the probability of getting a sum more than that of 9 is
1. 5118
2. 7/36
3. 116
4. 7/24

80. If A and B are disjoint and $P(B)>0$, then $P(A/B)$ is
1. 1
2. 0
3. 112
4. 114

81. There are two bags. One bag contains 4 red and 5 black balls and the other one contains 5 red and 4 black balls. One ball is to be drawn from either of the two bags. The probability of drawing a black ball is
1. 113
2. 16181
3. 112
4. 10181

82. The quantity $\sum_{I=1}^{n}(x_i - a)^2$ is minimized, if the value of 'a' is
1. $\sum_{i=1}^{n} x_i$
2. $\sum_{i=1}^{n} \frac{x_i}{n}$
3. 0
4. $\sum_{i=1}^{n} x_i^2$

83. If the 'n' observations in a sample are denoted by x_1, x_2, the sample range r is
1. $min(x_i)-\max(x_i)$
2. $\max(x_i)+min(x_i)$
3. $max(x_i)\min(x_i)$
4. $max(x_i)-min(x_i)$

84. If 3 is subtracted from each observation of a set, then the mean of the observation is reduced by
1. 6
2. 3
3. 312
4. –3

85. The standard deviation of the five observations 6, 6, 6, 6, 6 is
1. 0
2. 5
3. 25
4. 125

86. If a distribution has mean = 7.5, mode = 10 and skewness $a=-0.5$, the variance is
1. 5
2. 10
3. 20
4. 25

87. First and third quartiles of a frequency distribution are 30 and 75. Also its coefficient of skewness is 0.6. The median of the frequency distribution is
1. 40
2. 39
3. 38
4. 41

88. The cumulative distribution function for a random variable X is

$$F(x) = \begin{cases} 1 - e^{-2x}, & x \geq 0 \\ 0 & , x < 0. \end{cases}$$

The value of $P(-3 < X \leq 4)$ is
1. $e^{-6} - e^{-8}$
2. $e^{-3} - e^{-4}$
3. $1 - e^{-8}$
4. $1 + e^{-3} + e^{-4}$

89. The mean and the variance of a binomial distribution are 8 and 4 respectively. Then $P(X = 1)$ is equal to
1. $1/2^{12}$
2. $1/2^{4}$
3. $1/2^{6}$
4. $1/2^{10}$

90. The probability mass function of a random variable X is as follows :

$X = x$	1	2	3	4
$P(X = x)$	1/10	2/10	3/10	4/10

The mean and variance of X are
1. 1, 3
2. 3, 0
3. 3, 2
4. 3, 1

91. The distribution for which the mode does not exist is
1. Normal distribution
2. Gamma distribution
3. Continuous rectangular distribution
4. F-distribution

92. The moment generating function for geometric distribution with parameter $p = 1/2$ is
1. $\frac{1}{2}\left(1 - \frac{1}{2}e^{t}\right)$
2. $\frac{1/2}{\left(1 - \frac{1}{2}e^{t}\right)}$
3. $\frac{1}{2}\left(1 - \frac{e^{-t}}{2}\right)$
4. $\frac{1/2}{\left(1 - \frac{1}{2}e^{-t}\right)}$

93. If a random variable X has the p.d.f. $f(x)$ as

$$f(x) = \begin{cases} cx, & 1 \leq x \leq 2 \\ c, & 2 \leq x \; 1 \; 3 \\ 0, & \text{otherwise,} \end{cases}$$ the value of 'c' is
1. 0.4
2. 0.3
3. 0.2
4. 0.1

94. If X and Y are two Poisson variate such that $X - P(1)$ and $Y - P(2)$, then the probability $P(X + Y = 3)$ is
1. $2e^{-3}$
2. $3e^{-3}$
3. $4e^{-3}$
4. $4.5e^{-3}$

95. The cumulative distribution function of a continuous uniform distribution of a random variable X lying in the interval (a, b) is
1. $\frac{1}{b-a}$
2. $\frac{x-a}{b-a}$
3. $\frac{b-a}{x-a}$
4. $\frac{x-b}{b-a}$

96. The random variable X follows Poisson distribution and if $P(X=1)=3$ and $P(X=2)$. Then the variance of X is

1. 1/2
2. 1/3
3. 1
4. 2

97. The moment generating function of the standard normal variate X is

1. $e^{\frac{-1}{2}t^2}$
2. $e^{\frac{1}{2}t^2}$
3. $e^{\frac{1}{3}t^2}$
4. $e^{-\frac{1}{3}t^2}$

98. If the p.d.f. of a random variable X is given by

$$f(x)=\begin{cases}\frac{1}{4}, & \text{if } |x|<2\\ 0, & \text{otherwise,}\end{cases}$$

then $P(|X|>1)$ is

1. 1/2
2. 1/3
3. 114
4. 1

99. For any non negative random variable X and constant $a>0$, the Markov's inequality is

1. $P\{X\le a\}\le\frac{E(x)}{a}$
2. $P\{X\le a\}\le aE(X)$
3. $P\{X\ge a\}\ge aE(X)$
4. $P(X\ge a)\le\frac{E(X)}{a}$

100. Suppose that X is the number of observed "successes" in a sample of n observations where 'p' is the probability of success on each observation, then $\hat{p}=\frac{X}{n}$ is

1. Biased estimator of p
2. Unbiased estimator of 'n'
3. Unbiased estimator of p
4. None of the above

101. If the observations recorded on five sampled items are 3, 4, 5, 6, 7, the sample variance is

1. 1
2. 1.5
3. 2
4. 2.5

102. The terms prosperity, recession, depression and recovery are in particular attached to

1. Secular trend
2. Seasonal fluctuation
3. Cyclical movements
4. Irregular variation

103. A sample of 16 items from an infinite population having S.D. = 4, yielded total scores as 160. The standard error of sampling distribution of mean is

1. 1
2. 112
3. 114
4. 4

104. By the method of moments one can estimate

1. all constants of a population
2. only mean and variance of a distribution
3. all moments of a population distribution
4. all of the above

105. If X is a Poisson $(x;\lambda)$, the sufficient statistics for λ is

1. ΣX_i^2
2. ΣX_i
3. $\Sigma\frac{X_i}{n}$
4. $\Sigma\frac{X_i^2}{n}$

106. If X and Y have a bivariate normal distribution with $\rho_{XY} = 0$, then X and Y are

1. independent
2. dependent
3. mutually exclusive
4. none of the above

107. If $\rho = \pm 1$, the two lines of regressions are

1. Coincident
2. Parallel
3. Perpendicular to each other
4. None of the above

108. If $X_1, X_2, \cdots X_n$ are n independent identically distributed random variables, the correlation between X_i and $\overline{X} = \frac{\sum_{i=1}^{n} X_i}{n}$ is

1. n
2. $\sqrt{n}$
3. $\frac{1}{\sqrt{n}}$
4. $\frac{1}{n}$

109. If the two lines of regression are coincident, the relation between the two regression coefficients is

1. $b_{XY} = b_{YX}$
2. $b_{XY} b_{YX} = 1$
3. $b_{XY} \leq b_{YX}$
4. $b_{YX} \leq b_{XY}$

110. If X and Y are two independent variables with variances $\text{var}(X) = 25$ and $\text{var}(Y) = 15$, the correlation coefficient between $U = X + Y$ and $V = X - Y$ is

1. 0.25
2. 0.5
3. 0.75
4. 1

111. Value of b in $Y = a + bX$ remains same with the change of

1. origin
2. slope
3. data
4. none of the above

112. The best method for finding out seasonal variation is

1. Sample average method
2. Ratio to moving average method
3. Ratio to trend method
4. None of the above

113. For the given five values 15, 24, 18, 33, 42, the three years moving averages are

1. 19, 22, 33
2. 19, 25, 31
3. 19, 30, 31
4. 19, 22, 25

114. The equation of the parabolic trend is $Y = 46.6 + 2.4X - 1.3X^2$. If the origin is shifted backward by three years the equation of the parabolic trend will be

1. $Y = 27.7 - 5.4X - 1.3X^2$
2. $Y = 51.1 - 5.4X - 1.3X^2$
3. $Y = 27.7 + 10.2X - 1.3X^2$
4. None of the above

115. Method of least square for determining trend is used when

1. trend is known
2. trend is curvilinear only
3. the value of Y is not a function of time t
4. none of the above