STATISTICS
(Option I)

1. If two events can *not* happen simultaneously in a single trial, then the two events are said to be :
   (A) Independent
   (B) Mutually exclusive
   (C) Equally likely
   (D) None of the above

2. A card is drawn from a well shuffled pack of 52 cards. The chance that the drawn card is either a queen or a king will be :
   (A) $\frac{1}{13}$
   (B) $\frac{1}{52}$
   (C) $\frac{2}{13}$
   (D) $\frac{4}{52}$

3. If P(A) = 0.4, P(B) = 0.5 and $P(A \cap B) = 0.3$, then P(B/A) is given by :
   (A) 0.6
   (B) 0.65
   (C) 0.85
   (D) 0.75

4. For what value of k, the following is a probability density function :

$$f(x) = kx \quad \text{for } 0 \le x \le 5$$
$$= k(10 - x), \quad 0 \le x \le 5$$

   (A) $\frac{1}{10}$
   (B) $\frac{1}{15}$
   (C) $\frac{1}{25}$
   (D) $\frac{1}{50}$

5. Let X have the following p.d.f. :

$$f(x) = \frac{1}{8} \ , \ x = 0, 3$$

$$= \frac{3}{8} \ , \ x = 1, 2,$$

then E(X) is equal to :

(A) $\frac{1}{8}$

(B) $\frac{4}{73}$

(C) $\frac{1}{5}$

(D) $\frac{2}{3}$

6. The mean and variance of binomial distribution are 4 and $\frac{4}{3}$ respectively, then n is equal to :

(A) 6

(B) 7

(C) 8

(D) 9

7. The variance of a geometric distribution is equal to :

(A) $\frac{1}{p(1-p)}$

(B) npq

(C) $\frac{(1-p)}{p^2}$

(D) $\frac{(1-p)}{p}$

8. If a random variable X has the following p.d.f. :

$$f(X; \mu, \sigma^2) = \frac{1}{3\sqrt{2\pi}} e^{-\frac{1}{18}(x-3)^2}, \mu, \sigma^2 > 0,$$

then we have :

(A) $X \sim N(3, 9)$

(B) $X \sim N(3, 3)$

(C) $X \sim N(6, 9)$

(D) None of the above

9. Let X_1 and X_2 be two independent random variables resulting from two casts of an unbiased die. Then $E(X_1X_2)$ is equal to :

(A) 12.5

(B) 17

(C) 8.5

(D) 9

10. Let X have an exponential distribution with a mean of 50. Then p.d.f. of X is given by :

(A) $\frac{1}{50} e^{\frac{x}{50}}, \ 0 \leq x < \infty$

(B) $\frac{1}{50} e^{\frac{-x}{50}}, \ 0 \leq x < \infty$

(C) $\frac{1}{50} e^{-\frac{50}{x}}, \ 0 \leq x \leq \infty$

(D) None of the above

11. Bar diagrams are :

(A) One-dimensional diagrams

(B) Two-dimensional diagrams

(C) Three-dimensional diagrams

(D) None of the above

12. For determining as well as portraying the number of proportion of cases above or below a given value, we use :

(A) Frequency curve

(B) Histogram

(C) Ogive

(D) None of the above

13. If mean = 139.51 and median = 139.69, then mode is equal to :

(A) 140.05

(B) 138.1

(C) 142

(D) None of the above

14. For a mesokurtic curve, γ_2 will be :

(A) -1

(B) $\frac{1}{2}$

(C) 1.

(D) Zero

15. Coefficient of skewness is given by :

(A) $\frac{(Q_3 + Q_1 - 3 \text{ Median})}{(Q_3 - Q_1)}$

(B) $\frac{(Q_3 + Q_1 - 2 \text{ Median})}{(Q_3 - Q_1)}$

(C) $\frac{(Q_3 + Q_1 - \text{Median})}{(Q_3 - Q_1)}$

(D) $\frac{(Q_3 + Q_1 - 2 \text{ Median})}{(Q_3 + Q_1)}$

16. If Σd_i^2 is positive, then the rank correlation coefficient r_s :

(A) may be positive

(B) positive

(C) negative

(D) may be positive or negative

17. The limits of correlation coefficient (r) are :

(A) $0 \leq r \leq -1$

(B) $-1 \leq r \leq 1$

(C) $1 \leq r \leq -1$

(D) None of the above

18. If one of the regression coefficient is unity, then the other regression coefficient will be :

(A) greater than 1

(B) equal to unity

(C) less than one

(D) none of the above

19. The correlation coefficient between X and Y for the following data :

X :	1	2	3	4	5
Y :	3	4	5	6	7

(A) 1

(B) –1

(C) zero

(D) none of the above

20. For two 2 attributes, the total number of class frequencies are given by :

(A) 3

(B) 6

(C) 9

(D) none of the above

21. Standard Error of observed proportion 'p' is given by :

(A) $\frac{\sigma}{\sqrt{n}}$

(B) $\sqrt{\frac{PQ}{n}}$

(C) $\frac{\sigma^2}{n}$

(D) None of the above

22. Which of the following is a statistic :

(A) σ

(B) μ

(C) $\frac{1}{n}\sum_i (x_i - \mu)^2$

(D) None of the above

23. In a contingency table of 2×2 for testing the independence of two attributes, the d.f. for χ^2 test statistic is :

(A) 1

(B) 2

(C) 3

(D) None of the above

24. If a null hypothesis for testing sample mean *Vs.* population mean is rejected at 0.05 level of significance, then the null hypothesis :

(A) will be rejected at 0.01 level of significance

(B) will be rejected at 0.10 level of significance

(C) will be accepted 0.01 level of significance

(D) none of the above

25. If $x_1, x_2, \ldots\ldots x_n$ are independent random samples having normal distribution, then $\sum ((x_i - \mu_i)/\sigma_i)^2$, $i = 1, 2, \ldots\ldots, n$ has :

(A) t distribution with $n - 1$ d.f.

(B) Chi-square distribution with 1 d.f.

(C) Chi-square distribution with n d.f.

(D) none of the above

26. If $n = 10$, $\bar{x} = 0.742$, $s = 0.040$, $\mu = 0.700$, $t_{0.05}$ for 9 d.f. = 2.262, then $H_0 : \bar{x} = \mu$ is :

(A) Accepted

(B) Rejected

(C) may be accepted

(D) may be rejected

27. The test statistics $\chi^2 = \Sigma(x_i - x \text{ bar})^2/\sigma^2$ is used for testing :

(A) $H_0 : \sigma^2 = \sigma_0$

(B) $H_0 : \sigma_1^2 = \sigma_0$

(C) difference of two means

(D) none of the above

28. If we do not make the assumption that the samples have come from a normal population, then for testing the difference between sample mean and the hypothecated mean, we use :

(A) t-test

(B) Sign test

(C) Mann-Whitney test

(D) None of the above

29. Which of the following is a non-parametric test ?

(A) F-test

(B) t-test

(C) Chi-square test

(D) Sign test

30. The most of the non-parametric tests utilizes measurements on :

(A) Ordinal scale

(B) Ratio scale

(C) Interval scale

(D) None of the above

31. The difference between a parameter and its estimate due to sampling process is called :

(A) Sampling error

(B) Non-sampling error

(C) Significant difference

(D) None of the above

32. Under SRS with replacement, how many samples are there if we take samples of size n out of N population units ($n < N$) :

(A) ${}^{n}C_{N}$

(B) $\frac{1}{N}$

(C) Finite

(D) Infinite

33. If the population is more heterogeneous, then the sample size required will be :

(A) Larger

(B) Smaller

(C) more than 100

(D) None of the above

34. If the population is homogeneous, then which of the following is *not* preferred :

(A) SRS

(B) Systematic sampling

(C) Stratified sampling

(D) None of the above

35. If 20 samples are to be selected out of population of 200 units using systematic sampling and the first sample selected randomly is 23, then the next sample to be selected is :

(A) 24th

(B) 265th

(C) 28th

(D) None of the above

36. A subject receiving a treatment in an experiment is called :

(A) Treatment

(B) Local control

(C) Layout

(D) None of the above

37. In a LSD, number of rows, columns and treatments are :

(A) equal

(B) not equal

(C) may not be equal

(D) None of the above

38. In an RBD with 3 treatments and 4 blocks, we have SST = 8, SSB = 18 and SSE = 10, then MSB is equal to :

(A) 4

(B) 5

(C) 6

(D) None of the above

39. In a 2^n factorial experiment the higher level of a factor is called :

(A) First level

(B) Second level

(C) Zero level

(D) None of the above

40. Which of the following is associated with factorial experiments ?

(A) SRS

(B) Yates method

(C) CRD

(D) RBD

Instruction :—Consider the following L.P.P. and answer the questions **41** and **42**.

Max. : $Z = 4x_1 + 2x_2$

Subject to :

$$2x_1 + 2x_2 \geq 4$$

$$x_1 + x_2 \leq 6$$

$$x_1, x_2 \geq 0$$

41. Which of the following is a basic feasible solution to the above L.P.P. ?

(A) $X^0 = (1, 1)$

(B) $X^0 = (3, -2)$

(C) $X^0 = (2, 3)$

(D) None of the above

42. In order to have the full basis, how many artificial variable should be introduced ?

(A) Zero

(B) One

(C) Three

(D) None of the above

43. Crude Birth Rate is given by :

(A) (Annual Births/Total Population) × 100

(B) (No. of Total Births/Total No. of Individuals) × 100

(C) (Annual Births/Annual Mean Population) × 100

(D) None of the above

44. In India census is conducted every :

(A) Fifth year

(B) Tenth year

(C) Fifteenth year

(D) None of the above

45. Which of the following is an example of non-linear trend ?

(A) $Y = a + bx$

(B) $Y = ax_1 + bx_2$

(C) $Y = a + bx + cx^2$

(D) None of the above

46. Which of the following is an equation of Gompertz curve ?

(A) $Y = ab^X$

(B) $Y = kb^X$

(C) $Y = akb^X$

(D) None of the above

47. Paasche method of calculating index number is given by :

(A) $\frac{\Sigma p_1 q_0}{\Sigma p_0 q_0} \times 100$

(B) $\frac{\Sigma p_1 q_0}{\Sigma p_1 q_0} \times 100$

(C) $\frac{\Sigma p_1 q_1}{\Sigma p_0 q_0} \times 100$

(D) $\frac{\Sigma p_1 q_1}{\Sigma p_0 q_1} \times 100$

48. Factor reversal test is satisfied when :

(A) $P_{01} \times Q_{10} = \frac{\Sigma p_1 q_1}{\Sigma p_0 q_0}$

(B) $P_{01} \times Q_{10} = \frac{\Sigma p_1 q_1}{\Sigma p_0 q_1}$

(C) $P_{01} \times Q_{10} = 1$

(D) None of the above

49. Which of the following is *not* a high level language ?

(A) Fortran

(B) Basic

(C) C++

(D) DOS

50. The binary number 10101 is equal to :

(A) 11

(B) 12

(C) 13

(D) None of the above

51. Which of the following is *not* a requirement of good estimator ?

(A) Unbiasedness

(B) Efficiency

(C) Sufficiency

(D) None of the above

52. $x_1, x_2, \ldots, x_n$ is a random sample of/from N(μ, 1), then $t = \frac{1}{n}\sum_{i=1}^{n} x_i^2$ is an unbiased estimator of :

(A) μ^2

(B) $\mu^2 + 1$

(C) $\mu^2 - 1$

(D) None of the above

53. Let $x_1, x_2, \ldots, x_n$ be random sample from N(μ, 1), then which of the following is MVB estimator ?

(A) X_1

(B) X_2

(C) X_{n+1}

(D) X_n

54. Let $x_1, x_2, \ldots, x_n$ be random sample from P(λ), then which of the following is an mle of λ ?

(A) X_1

(B) $\bar{x} + 1$

(C) $\bar{x}$

(D) None of the above

55. N-P Lemma is used for finding :

(A) an unbiased estimator

(B) consistent estimator

(C) mle

(D) none of the above

56. The probability of second type of error belongs to which of the following ?

(A) Probability of rejecting H_0 when H_0 is true

(B) Probability of accepting H_0 when H_0 is true

(C) Probability of rejecting H_0 when H_1 is false

(D) Probability of accepting H_0 when H_0 is false

57. If the average number of defectives $\overline{C}$ is 5, then the UCL for C control chart is given by ?

(A) 11.708

(B) -1.708

(C) 5.9

(D) None of the above

58. In case of large samples, we should use which of the following control charts ?

(A) C

(B) p

(C) np

(D) σ

59. Probability of rejecting a lot with $\overline{p}$ defectives is known as :

(A) Consumer's risk

(B) Producer's risk

(C) OC curve

(D) None of the above

60. Consumer's risk is akin to which of the following ?

(A) Error

(B) Type II error

(C) Type I error

(D) None of the above