

2018

STATISTICS

Full Marks : 100

Pass Marks : 33

Time : Three hours

Attempt all questions.

The figures in the right margin indicate full marks for the questions.

1. For two independent events A and B, $P(A \cap B) = \frac{1}{12}$, $P(A) = \frac{1}{3}$, then P(B) is equal to – 1

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{4}$

D. $\frac{1}{6}$

2. The third order differences of a function, denoted by $\Delta^3 f(x)$, are obtained by taking – 1
- A. the differences of the first order differences.
 - B. the differences of the second order differences.
 - C. the differences of the third order differences.
 - D. the mean of the first and the second order differences.
3. Simpson's $\frac{3^{\text{th}}}{8}$ rule is derived from the general quadrature formula by putting n is equal to – 1
- A. 1
 - B. 2
 - C. 3
 - D. 4.
4. The probability of 4 successes of a Poisson distribution is 0.4 when the parameter is 2. The probability of 5 successes of the distribution is – 1
- A. 0.14
 - B. 0.15
 - C. 0.16
 - D. 0.17.
5. The number of positive class frequencies of three attributes in dichotomy classification is – 1
- A. 6
 - B. 7
 - C. 8
 - D. 9.

6. In theory, gross reproduction rate ranges from – 1
- A. 0 to 2
- B. 0 to 3
- C. 0 to 4
- D. 0 to 5.
7. Define a random variable. 1
8. Define Simple event. 1
9. Define the operator ∇ . 1
10. Write down the formula of Trapezoidal's rule of numerical integration. 1
11. The value of the definite integral $\int_0^{\pi/2} \cos x \, dx$ using Trapezoidal's rule is 1.002. Predict the error by comparing the exact value of the integration. 1
12. When are two attributes A and B said to be negatively associated? 1
13. For evaluating the value of $\int_0^6 \frac{1}{1+x}$ by Simpson's rule with 7 ordinates, what is the middle value of the ordinate? 1
14. Draw an approximate diagram of rejection region for Z^2 test with n d.f. and probability α . 1
15. Draw a rough Sketch of probability curve of chi-square distribution for 1 degree of freedom. 1
16. What are the sources of data used for the construction of life table? 1

17. Find the expectation of the product of points on n dice. 3
18. Evaluate $\left[\frac{\Delta^2}{E} \right] x^2 + \Delta^2 (x^2)$, the interval of differencing being unity. 3
19. A normal curve has mean, $\bar{X} = 20$ and standard deviation, $\sigma = 10$. Draw the approximate probability curve for $x_1 = 15$ and $x_2 = 40$. 3
20. Define class frequencies and order of classes in the theory of attributes. 3
21. A random sample of size 16 has 53 as mean. The sum of the squares of the deviations taken from the mean is 150. Test, whether the sample is drawn from a population having 56 as mean.
- $[t_{0.05}$ for 15 d.f. = 2.13 and $\sqrt{10} = 3.16]$ 3
22. Define Stable and Stationary population of vital Statistics. 3
23. An urn contains 9 balls, identical except for colour of which 2 are red, 3 are blue and 4 are black. Three balls are drawn at random. What is the chance that the three balls drawn are of different colours? 4
24. From a pack of 52 cards two cards are drawn at random. What is the probability of drawing either two red cards or two black cards? 4
25. Define the operator E. Write down the three properties of the operator E.

1+3=4

26. Test, whether the attributes A and B are independent or positively associated if
4
 $N=1000$, $(A)=435$, $(B)=600$, $(A\beta)=155$.
27. If 60, 100, 100 and 56 are the expected frequencies in fitting a distribution corresponding to 4 observed frequencies 75, 85, 111 and 65, find the value of Chi-Square Statistic for testing the goodness of the fit. 4
28. Write the meaning of the symbols l_x , d_x , T_x and e_x^0 as used in a life-table. 4
29. State and prove the multiplicative law of probability. 6
30. x : 5 6 9
 $y=f(x)$: 12 13 15
 Calculate the value of y when $x=8$ by using Lagrange's interpolation formula. 6
31. Establish the general quadrature formula for equidistant ordinates in numerical integration. 6
32. Prove that the mean of the binomial distribution is np , where n and p are the parameters. 6
33. In an experiment on immunization of cattle from tuberculosis the following results were obtained : 6

	Affected	Not affected
Innoculated :	14	26
Not Innoculated :	16	144

By Calculating the Yule's coefficient of association, interpret the result.

34. Define : 2×3=6

(i) Simple hypothesis,

(ii) Composite hypothesis

and (iii) Level of Significance.

35. Define the terms : 2×3=6

(i) Specific death rate,

(ii) Age-specific deate rate

and (iii) Total fertility rate.
