2019

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.

From Question Nos. **1** *to* **6**, *choose the correct answer and rewrite.*

1. Classical probability is measured in terms of 1

   A. an absolute value

   B. a ratio

   C. both A and B

   D. none of the above

2. Simpson's one-third rule of numerical integration is obtained from the general quadrature formula when n (the number of equal parts of the range of integration is divided), is equal to 1

   A. 1

   B. 2

   C. 3

   D. 4

3. The total N of all the frequencies of 3 attributes is known as the class of 1

A. zero order

B. first order

C. second order

D. third order

4. $\left(\frac{\Delta}{E}\right)x^2$ is equal to 1

A. $2x + 1$

B. $2x + 2$

C. $2x - 1$

D. $2x - 2$

5. For testing the significance of the mean increase in weights of two independent samples of sizes 8 and 11, the degrees of freedom of the test statistic is 1

A. 7

B. 10

C. 18

D. 17

6. The random variable X represents the number of heads in tossing two coins once. The expectation of X is 1

A. 1

B. 2

C. 0

D. 1·5

7. Define mutually exclusive events. 1

8. Define the operator Δ. 1

9. State the range of the random variable X which follows normal distribution. 1

10. What is meant by type-I error? 1

11. At what interval is the population census usually collected in India? 1

12. Find the Sample Space when a coin and a die are thrown together once. 1

13. Write the mean of a Poisson distribution whose parameter is 5. 1

14. Give the inference about the population if the Gross Reproduction Rae is less than unity. 1

15. Indicate the position of the mean, the median and the mode in a normal probability curve. 1

16. X is a normal variate with mean 40 and standrad deviation 5. Show the area in the normal probability curve for $X \leq 35$. 1

17. Define independent and dependent events. 3

18. Find the probability of containing 53 Sundays in a non-leap year. 3

19. A Curve is drawn to pass through the points 3

x :	1	1·5	2	2·5	3	3·5	4
f(x) :	2	2·2	2·5	2·7	3	2·4	2·2

Estimate the area bounded by the curve, the *X-axis* and lines $x=1$ and $x=4$ by using Simpson's one-third rule of numerical integration.

20. Fill in the blanks of the following life table which are marked with question marks. 3

Age	**lx**	**dx**	**qx**	**Lx**
25	7, 48, 514	?	?	?
26	7, 40, 412	—	—	—

21. Show that the operators ∇ and Δ satisfy the relation $(1+\Delta)(1-\nabla) \equiv 1$. 3

22. Draw the probability curve of X^{2-} distribution. Identify critical value, the rejection and acceptance regions such that $P\left[X^2 \rangle X_n^2(\alpha)\right] = \alpha$. 3

23. State and prove addition theorem of probability of two events which are subsets of same sample space. 4

24. State the condition of consistency of two attributes in dichotomy classification. 4

25. Define vital statistics and its uses in public administration. 4

26. Show that

(i) $\Delta^2\left(3e^x\right)=3\left(e^h-1\right)^2 e^x$

(ii) $\Delta^5 y_0 = y_5 - 5y_4 + 10y_3 - 10y_2 + 5y_1 - y_0$ 4

27. Given the following ultimate class frequencies, find N, (A) and (B). 4

$(ABC)=240, \quad (AB\gamma)=564$

$(A\beta\, C)=345, \quad (A\beta\gamma)=1350$

$(\alpha\, B\, C)=250, \quad (\alpha\, B\gamma)=1840$

$(\alpha\, \beta\, C)=190, \quad (\alpha\, \beta\, \gamma)=8460$

28. In Sample-I of 8 observations, the sum of the squares of deviations of the sample values from the sample mean was $98 \cdot 6$ and in the sample-II of 10 observations it was $100 \cdot 4$. Test whether the population variances are the same. 4

Given $F_{5\%}$ for (7, 9) d.f $= 3 \cdot 29$.

29. Deduce Simpson's three-eight rule of numerical integration from the general quadrature formula. 6

30. What is meant by stationary population? State the assumptions which are used in the construction of life table. 2+4=6

31. A bag contains 10 white and 5 black balls. 5 balls are successively drawn out and not replaced. What is probability that they are alternately of different colours beginning with white ? 6

32. From the following table, find the number of students whose marks are more than 54 marks by using Newton's backward inerpolation formula. 6

Marks	**No. of Studedents**
20 -- 30	18
30 – 40	24
40 – 50	32
50 – 60	22
60 – 70	18

33. An unbiased coin is tossed 6 times. Find the mean and the variance of the number of heads obtained and also obtain the probability of obtaining four or more heads. 6

34. To find whether a certain vacinnation prevents a certain disease or not, an experiment was conducted and the following figures in various classes were obtained. A– showing vaccination and B– attacked by the desease

	A	α
B	70	10
β	90	30

Calculate the test statistic for testing the independence of attributes A and B. 6

35. The following summary data relate to the adult population of small village. 6

Adult population : 900

Number of employee : 450

Literate adult population employed : 300

Number of literates : 500

Give the inference about the degree of association.