2022

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.

For Question Nos. ***1, 2, 3 and 4***, *choose the correct answer and rewrite.*

1. The number of sample points in a sample space for tossing a coin and a die once is   1

   (A) 6

   (B) 8

   (C) 10

   (D) 12

2. If $P(A/B) = \dfrac{1}{4}$ and $P(B/A) = \dfrac{1}{3}$, then $P(A)/P(B)$ is equal to   1

   (A) $\dfrac{7}{12}$

   (B) $\dfrac{3}{4}$

   (C) $\dfrac{1}{12}$

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

3. For deducing Trapezoidal's rule of numerical initration the degree of the polynomial $f(x)$ to be integrated is 1

(A) 1

(B) 2

(C) 3

(D) none of the above

4. Given $(\alpha) = 90$, $(\alpha\beta) = 75$, the class frequency $(\alpha\beta)$ is equal to 1

(A) 5

(B) 25

(C) 15

(D) 35

5. Define numerical integration. 1

6. Evaluate $E^2 x^2$, the value of x vary by a constant increment by 2. 1

7. What is meant by Bernoulli trial ? 1

8. Let x denote the number of boys in a family with 4 children. If the probability that a boy is there in the family is $\frac{1}{3}$, find $P(x=0)$. 1

9. Draw the diagram of the binomial distribution for the parameters $n=6$, $p=0.5$. 1

10. Identify by sketching the area of the standard normal variate Z to the right of $Z=1$. 1

11. If the statistical hypothesis does not specify the population completely, then it is termed as a simple statistical hypothesis.

Is the statement true ? If not, rewrite the correct statement. 1

12. Define vital statistics. 1

13. The registration of births, deaths and marriages are a part of vital records.
Is the statement true or false ? 1

14. The sex ratio of the population is 0.80. Find the female population when the
number of male population is 2,40,000. 1

15. From the following values of $y = f(x)$, obtain the value of the definite integral by
using Trapezoidal's rule. 2

x :	0	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1
$f(x)$:	1	4	8	4	1

16. The probability that an item produced by a certain machine will be defective is
0.01. Find the probability that a random sample of 100 items selected at random
will contain not more than one defective item. 2

17. Define an attribute and give one example. 2

18. Test the independence of the two attributes A and B from the following data :

$(AB) = 256$, $(A) = 304$, $(B) = 1024$, $N = 1216$ 2

19. Define critical and non-critical region. 2

20. Draw the approximate shape of curve of the x^2 distribution for $n=3$, where n is
the degrees of freedom of x^2 distribution. Indicate the type of skewness. 2

21. Define specific death rate. What are the usual specification for calculation of
specific death rate ? 2

22. Compute the crude death rate of population A. 2

Age Group	Population A	
	Population	Deaths
under 20	30,000	650
20 – 40	50,000	340
40 – 60	25,000	1210
above 60	15,000	500

23. The population of a country at the age 70 and 71 are 22960 and 21325. Find the probability of a person of exact age 70 will die within one year. 2

24. State and prove the theorem on expectation of sum of two discrete random variables. 4

25. A problem in statistics is given to 2 students A and B. Their chances of solving it are $\frac{1}{3}$ and $\frac{1}{4}$. What is the probability that the problem will be solved ? 4

26. What is the probability of containing 53 sundays in a leap year ? 4

27. Find $f(6)$ given $f(0) = -3$, $f(1) = 6$, $f(2) = 8$, $f(3) = 12$, third difference being constant.

4

28. Estimate the sales for the year 1947 from the following by using Newton's forward interpolation formula. 4

Year	:	1946	1948	1950	1952
Sales (in thousand Rupees)	:	40	42	45	47

OR

Write the form of the function $y = f(x)$ by using Lagrange's interpolation formula from the following data : 4

x	:	1	2	5
$f(x)$	:	3	12	48

29. During war 1 ship out of 5 ships was sunk on an average in making a certain voyage. What is the probability that exactly 2 out of a convoy of 6 should arrive safely ? 4

30. Test the positive or the negative association of the two attributes A and B from the following data :

$(AB) = 256, (\alpha B) = 744, (A\beta) = 44$ and $(\alpha\beta) = 156$ 4

31. The theory predicts the proportion of beans in the four group A,B,C and D should be $8:3:3:2$. In an experiment among 1600 beans, the numbers in the groups were 850, 350, 250 and 150. Obtain the expected frequencies to find the value of the test statistic x^2. 4

32. In three tosses of a coin, let x be the number of heads. Obtain the sample space and the probability distribution of x. 6

33. Derive General Quadrature Formula. 6

OR

Deduce Simpson's three - eight rule of numerical integration. 6

34. Estimate $f(15.5)$ by using Newton's backward interpolation formula from the

    following data : 6

x	:	11	12	13	14	15	16
$f(x)$	:	11	18	37	74	135	226

OR

In an examination the number of candidates who obtained marks between certain

limits were as follows : 6

Marks	No. of Candidates
0 – 10	42
10 – 20	63
20 – 30	66
30 – 40	51
40 – 50	18

Estimate the number of candidates whose marks are more than 15 by using

Newton's forward interpolation formula.

35. Test the consistency for the following data : 6

   $(A) = 40, (B) = 60, (C) = 592, (AB) = 30$

   $N = 130$

Can vaccination be regarded as the preventive measure for small pox from the data given below :

Out of 1500 persons, 360 had been vaccinated and of these 45 were attacked ?

6

36. Two random samples drawn from two normal populations are

Sample (I) : 20, 16, 26, 25, 23, 22

Sample (II) : 30, 33, 42, 35, 33, 34, 38

Test whether the populations have the same variance :

[given $F_{0.05}$ for 6 and $5^{d.f} = 4.39$

6

37. Fill in the blanks in a portion of life table given below :

6

Age in year	lx	dx	px	Lx	Tx
6	98462	640	?	?	5120426
7	?	512	?	?	?