22 Sts 12/17 (I)

2017

STATISTICS

Full Marks : 100

Pass Marks : 33

Time : Three Hours and *Fifteen Minutes

(*15 minutes are given as extra time for reading questions)

Attempt all questions.

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

*For Question Nos. **4, 8, 11, 14, 23 and 27** choose the correct answer and rewrite.*

1. Define equally likely events and mutually exclusive events with examples. 4

2. When are *two* events said to be independent ? 1

3. Define Sample Space. 1

4. Classical definition of probability is measured in terms of 1

   A. an absolute value

   B. a ratio

   C. absolute value and ratio both

   D. none of the above.

5. If *two* dice are thrown at random, what is the probability that the sum of the points shown is greater than 9 ? 6

6. Find the expected value of the number of heads shown when two unbiased coins are tossed once. 3

7. It is given that $P(A \cup B) = \frac{5}{6}$, $P(A \cap B) = \frac{1}{3}$, $P(\overline{B}) = \frac{1}{2}$, where $P(\overline{B})$ stands for the probability that B does not happen. Show that A and B are independent. 3

8. A company predicts, "the probability that the stock price will remain the same is $\frac{1}{4}$." Then the odds in favour of the price remaining the same are 1

A. 4:1

B. 1:4

C. 1:3

D. 3:1.

9. Derive Newton's backward interpolation formula. 6

10. Write Newton's forward interpolation formula and its uses. 3

11. Interpolation means estimating the value of entry for which the argument lies 1

A. within the given range of the values of the argument.

B. outside the given range of the values of the argument.

C. within or outside the range of the values of the argument.

D. none of the above.

12. Evaluate $\Delta^3\left(3x^2+2x+5\right)$, the interval of differencing being unity. 3

13. Prove that $f(4)=f(3)+\Delta f(2)+\Delta^2 f(2)$. 1

14. If the interval of differencing being 2, then $E^2\,e^{2x}$ is equal to 1

A. e^{2x+2}

B. e^{2x+4}

C. e^{2x+6}

D. e^{2x+8}

15. Deduce Trapezoidal's rule of numerical integration from the General Quadrature Formula. 4

16. Which differences are neglected from General Quadrature Formula in deducing Simpson's three-eighth rule of numerical integration ? 1

17. Using Simpson's three-eighth rule, find an approximate value $\int_{-3}^{3} x^4\,dx$ by taking seven equidistant ordinates. 4

18. In finding the value of $\int_{1}^{6} f(x)dx$ by using Simpson's $\frac{1}{3}$ rd rule of numerical integration, write *one* possible value of *h*, the class interval. 1

19. If X is a Poisson variate such that 6

$$P(X=2)=9P(X=4)+90P(X=6)$$

Find the variance of X.

20. The parameters of a binomial distribution are 10 and $\frac{3}{4}$. Find the variance of the distribution. 1

21. The random variable X is normally distributed with mean μ and variance σ^2. Draw the rough sketch to identify *(i)* $P(\mu-\sigma \le X \le \mu+\sigma)$ *(ii)* $P(\mu-2\sigma \le X \le \mu+2\sigma)$ *(iii)* $P(\mu-3\sigma \le X \le \mu+3\sigma)$. 3

22. Define positive, negative and contrary classes. Show that in dichotomy classification the total number of class frequencies of all orders for n attributes is 3^n. 6

23. Measures of association usually deals with 1

A. variables

B. quantitative factors

C. attributes

D. numbers

24. Given the following frequencies of the positive classes, find $(A\beta\gamma)$, $(\alpha B\gamma)$, $(\alpha\beta C)$ and $(\alpha\beta\gamma)$: 4

$(A)=1021,\ (AB)=470,\ (ABC)=196,$

$(B)=1245,\ (AC)=310,\ (C)=615,\ (BC)=296$

$N=12{,}500.$

25. In a series of houses actually invaded by smallpox. 65% of the inhabitants are attacked and 75% have been vaccinated. Find the minimum percentage of the vaccinated and attacked by smallpox. 4

26. Define the following : 6

(i) unbiased estimator *(ii)* null hypothesis and *(iii)* alternative hypothesis.

27. A random sample of 17 items from a heap of machine parts gives the mean 42 and standard deviation 8. The value of the statistic 't' to test the hypothesis that population mean = 38 is 1

A. 2

B. greater than 2

C. less than 2 but greater than unity

D. less than unity.

28. The nicotine content (in milligrams) of two samples of tobacco drawn from two normal populations were found to be as follows : 6

Sample I	25	25	28	23	24	
Sample II	28	29	29	30	24	34

Test wether the populations have same variances (Given $F_{5\%}$ for $(5,4)df=6{\cdot}25$, $F_{5\%}$ for $(4,5)df=5{\cdot}19$.

29. Draw a rought sketch of t-distribution in relation to standard normal curve. 1

30. Draw a rough sketch of F–distribution. 1

31. Given the following table for x and lx, the age and the number of rabbits living at the age x. If qx be the probability of all rabbit of exact age x will die within one year, find $q_0, q_1, q_2, q_3, q_4, q_5$ 6

x :	0	1	2	3	4	5	6
lx :	100	95	85	70	62	28	0

32. Compute the Crude Death Rates of the two populations A and B from the following data : 4

	A		B	
Age Group	Population	Deaths	Population	Deaths
Under 10	20,500	700	15,000	370
10-20	15,500	350	25,000	530
20-60	40,000	1,450	35,000	1,600
above 60	10,000	600	8,000	200

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

Age x	lx	dx	P_x	Lx
25	4,95,245	?	?	?
26	4,91,862	-	-	-

34. The Total Fertility Rate from a given data of vital statistics is 2150. Find Gross Reproduction Rate if the proportion of female births is 50 per cent. 1

35. The Crude Death Rate for the population A and adjusted factor for vital Statistics data are 28·5 and 0·75 . Find the Standardised Death Rate. 1