2020

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. A card is drawn from a well shuffled pack of 52 cards. The probability that the card drawn is either spade or king or queen is 1

   A. $\frac{21}{52}$

   B. $\frac{20}{52}$

   C. $\frac{19}{52}$

   D. none of the above

2. The probability of containing 5 Saturdays in December of any particular year selected at random is 1

   A. $\frac{3}{7}$

   B. $\frac{4}{7}$

   C. $\frac{1}{7}$

   D. $\frac{6}{7}$

3. Simpson's three-eighth rule of numerical integration is given by 1

A. $\frac{3h}{8}\left[(Yo+Yn)+2\left(Y_1+Y_2+Y_4+Y_5+\ldots+Y_{n-1}\right)+3\left(Y_3+Y_6+\ldots+Y_{n-3}\right)\right]$

B. $\frac{3h}{8}\left[(Yo+Yn)+3\left(Y_1+Y_2+Y_4+Y_5+\ldots+Y_{n-1}\right)+2\left(Y_3+Y_6+\ldots+Y_{n-3}\right)\right]$

C. $\frac{3h}{8}\left[(Yo+Yn)+4\left(Y_1+Y_2+Y_4+Y_5+\ldots+Y_{n-1}\right)+2\left(Y_3+Y_6+\ldots+Y_{n-3}\right)\right]$

D. $\frac{3h}{8}\left[(Yo+Yn)+2\left(Y_1+Y_2+Y_4+Y_5+\ldots+Y_{n-1}\right)+4\left(Y_3+Y_6+\ldots+Y_{n-3}\right)\right]$.

4. The variance of the bionomial distribution with parameters 6 and $\frac{2}{3}$ is 1

A. 4

B. 2

C. $\frac{2}{9}$

D. none of the above

5. Define the operator E. 1

6. In deducig Simpson's one-third rule of numerical integration, we neglected all the differences above the third.

   Is the statement true, if not, rewrite the correct statement. 1

7. What is meant by Bernoulli trial? 1

8. The mean and the variance of a binomial variates are 4 and 2. Find the value of a parameter. 1

9. Draw the shape of binomial probability curve for $n = 6$, $p = 0.5$. 1

10. Draw the probability curve of Poisson distribution with $m=2$ where m is the parameter. 1

11. Define a simple hypothesis. 1

12. What is the sex ratio if the male and female population of a country are 24,00,000 and 18,00,000 ? 1

13. The number of male deaths and male populaion in a given region during the given period are 245 and 2200000. Find the crude death rate for males. 1

14. When Net Reproduction Rate and Gross Reproduction Rate are equal, what can you infer? 1

15. Find the Sample Space in tossing a coin and a die together once. 2

16. Find the mathematical expectation of a random variable when a die is thrown once. 2

17. A curve is drawn to pass through the points given by the following data : 2

x :	1	1.5	2	2.5	3
y :	2	2.4	2.8	3.2	3.6

Estimate the area bounded by the curve, the X-axis and line $x = 1$ and $x = 3$ by using Trapezoidal's rule.

18. A student obtained the following answer to a certain problem given to him. Mean = 3.2 variance = 4 for a binomial distribution. Comment the result. 2

19. Define positive and negative classes in the theory of attributes. 2

20. Test the consistency of the data : 2

$(A) = 100,\ (B) = 130,\ (AB) = 80,\ N = 200,\ (\alpha\beta) = 50$

21. Two independent samples have been drawn from the same normal population and the following results are obtained :

$$n_1 = 10, n_2 = 12, \sum_{i=1}^{10}(x_i - \bar{x})^2 = 108, \quad \sum_{j=1}^{12}(y_j - \bar{y})^2 = 110$$

Calculate F statistic for testing the equality of variances. 2

22. Draw the diagram of critical and non-critical regions in two dimensional space lying in the 1st quadrant when a sample of size 2 is drawn. Identify the region when Ho is rejected if the sample point falls in the region. 2

23. The population and number of deaths of a District A are 12,000 and 250 and that of the District B are 8000 and 100 respectively. Calculate the crude death rates for Districts A and B and compare the two crude death rates. 2

24. A random variable X has the following probability distribution : 4

X :	3	4	6
P(X) :	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$

Find E(X), E(X/3), $E(X^2)$ and $E(2X+1)^2$.

25. The odds in favour of a certain event are 4 to 3 and odds againsts an another event are 5 to 4. Find the chance that at least one of the events will happen. 4

26. Show that for a third degree polynomial in x, the third order difference is a constant. 4

32. State and prove addition theorem of expectation. 6

33. The population of a country in a decennial census were as under : 6

Year	:	1961	1971	1981	1991	2001
Population	:	44	62	78	91	104

Estimate the population for the year 1975 using Newton's interpolation formula.

34. The mean and the variance of a binomial distribution are 6 and 4. Find $P(x)$, the probability of x successes and calculate $P(x = 0)$. 6

35. Investigate the association between darkness of eye-colour in father and son from the following data : 6

Fathers with dark eyes and sons with dark eyes : 51

Fathers with dark eyes and sons with no dark eyes : 78

Fathers with no dark eyes and sons with dark eyes : 90

Fathers with no dark eyes and sons with no dark eyes : 780

36. Samples of two independent groups of 10 children were tested to find how many digits they can repeat from memory after hearing them. The results are as follows :

Group I :	8	6	8	7	6	8	7	6	8	6
Group II :	11	7	7	9	7	10	7	6	8	8

Is the difference between the mean scores of the two groups significant? [Given $t_{0.05}$ for 18 *d.f.*=2.10] 6

37. Fill in the blanks in a portion of life table given below : 6

Age in years	lx	dx	px	qx	Lx	Tx	e_x^0
7	45,000	640	?	?	?	24,45,200	?
8	?	500	?	?	?	23,78,020	?
