M – 2019

1383037

Subject Code : 31 (NS)

STATISTICS

(Kannada and English Versions)

Time : 3 Hours 15 Minutes] [Total No. of questions : 44] [Max. Marks : 100

(English Version)

Instructions : 1. *Statistical table and Graph sheets will be supplied on request.*

2. *Scientific calculators may be used.*

3. *All working steps should be clearly shown.*

SECTION – A

I. Answer **any ten** of the following questions : **(10 × 1 = 10)**

1) Define 'Survival ratio'.

2) Which weights are used in the construction of Paasche's quantity index number?

3) State the condition required to satisfy factor reversal test.

4) Mention a cause for Irregular Variation.

5) Write the variance of a Bernoulli distribution.

6) What is the probability that a normal variate takes a value less than its mean?

7) Define 'Standard error'.

8) What is 'Point estimation'?

9) Define 'Type II error'.

10) Name one control chart for variables.

11) What do you mean by degenerate solution in a transportation problem?

12) Write down the formula for Re-order time in an inventory problem.

SECTION – B

II. Answer **any ten** of the following questions : **(10 × 2 = 20)**

13) In a given year, the crude birth rate for a population of 2 lakhs is 20. Find the number of live births.

14) State two norms for the selection of base year.

15) If $\Sigma p_1 q = 500$ and $\Sigma p_0 q = 400$ then, find suitable price index number.

16) State two conditions of least squares method of measuring trend.

17) Write down two conditions for applying binomial expansion method of interpolation and extrapolation.

18) If X is a normal variate with mean 10 and variance 4, what are the distributions of $\left(\frac{X-10}{2}\right)$ and $\left(\frac{X-10}{2}\right)^2$?

19) If $n = 4$ for a t-distribution, find its median and variance.

20) Define Statistical hypothesis. Give an example.

21) In a paired 't' test if $n = 5$, $\bar{d} = 2.4$ and $S_d = 1.2$, what would be the value of test statistic?

22) Write two disadvantages of acceptance sampling.

23) Mention two methods of obtaining initial basic feasible solution for a transportation problem.

24) Given $Q^0 = 363$, $C_1 = 10$ and $C_2 = 12$, find maximum inventory level.

SECTION – C

II. Answer **any eight** of the following questions : **(8 × 5 = 40)**

25) Calculate standardized death rate for the following data.

Age group (in years)	Population	Deaths	Standard population
Below 5	4,000	144	4,500
5 – 14	10,500	63	10,000
15 – 64	13,500	81	12,500
65 and above	2,000	102	3,000

26) Calculate Simple Geometric Mean price index number for the following data.

Items	Price (in ₹)	
	2016	2018
A	4	7
B	5	10
C	15	21
D	10	25

27) Define Consumer Price Index Number. Mention four steps involved in the construction of consumer price index number.

28) For the following data, find three yearly moving averages. Write your conclusion.

Year :	2012	2013	2014	2015	2016	2017	2018
Sales (in '000 ₹) :	30	36	39	33	39	45	42

29) For the following data interpolate the value of Y when $X = 34$.

X	30	40	50	60
Y	73	198	573	1198

30) On an average the number of defective items in a box is 2. If there are 100 such boxes, in how many of them would you expect atleast two defective items?

31) A pond has 12 fishes among which 5 are marked ones. 4 fishes are caught from the pond. Find the probability that three of them are marked. Also find the mean of marked fishes.

32) From the following data, test whether there is any significant difference between mean weight of boys and mean weight of girls at $\alpha = 1\%$.

	Boys	Girls
Mean weight	50	54
Standard deviation	8	12
Sample size	64	48

33) It is required to test whether those who practice yoga have average blood sugar less than 120. A sample consisting of 17 persons who practice yoga is observed. If their mean blood sugar is 108 and standard deviation is 8, what would you conclude? (Use 5% L.O.S)

34) Twenty rolls of different types of cloth contained the following number of defects in each roll :

8, 3, 1, 2, 5, 4, 7, 6, 2, 5, 3, 2, 7, 6, 5, 4, 3, 2, 1, 4.

Calculate the control limits for C-chart.

35) Solve the following LPP graphically.

Minimize $Z = 3X + 2Y$

Subject to : $5X + 4Y \leq 50$

$X + 2Y \geq 10$

and $X, Y \geq 0$.

(For Visually Challenged Students only)

Write down the steps in the graphical method of solving L.P.P.

36) Solve the following game by the principle of dominance.

		Player-*B*			
		B_1	B_2	B_3	B_4
Player-*A*	A_1	8	10	12	9
	A_2	9	13	12	10
	A_3	6	8	8	7
	A_4	7	9	11	9

SECTION – D

IV. Answer **any two** of the following questions : **(2 × 10 = 20)**

37) Calculate gross reproduction rate and net reproduction rate for the following data and comment on the result.

Age group (in years)	Female Population	Female Births	Survival Ratio
15 – 19	16000	480	0.91
20 – 24	14500	812	0.90
25 – 29	13000	650	0.90
30 – 34	11500	460	0.88
35 – 39	10000	300	0.87
40 – 44	8700	87	0.86
45 – 49	7500	30	0.85

38) For the following data, find Laspeyre's, Paasche's and Dorbish-Bowley's price index numbers.

Items	2016		2018	
	Price (₹)	Expenditure (₹)	Price (₹)	Expenditure (₹)
A	10	50	12	48
B	15	120	18	126
C	6	18	4	20
D	3	12	3	15

39) Fit a second degree trend by the method of least squares to the following time series.

Year	2010	2012	2014	2016	2018
Value	460	550	680	840	1020

40) a) Four unbiased coins are tossed 128 times. Find expected frequencies of number of heads obtained. **(5)**

b) In 120 throws of a single die, the following distribution of faces were obtained. **(5)**

Faces	1	2	3	4	5	6
Frequency	30	25	18	10	22	15

Test whether the die is unbiased. [Given : $K_2 = 11.1$]

SECTION – E

V. Answer **any two** of the following questions : $(2 \times 5 = 10)$

41) Weights of students are found to be normally distributed with mean 50 kg and standard deviation 5 kg. Find the probability that a student with weight

a) more than 45 kg

b) between 42 kg and 58 kg.

42) In a village, out of 400 men 250 are smokers. Does this data support the argument that majority of men in the village are smokers? (Take $\alpha = 0.05$)

43) To test the effectiveness of inoculation against cholera. The following information was obtained.

	Attacked	Not attacked
Inoculated	10	15
Not inoculated	15	10

Test at 1% level of significance that inoculation and attack of cholera are independent.

44) The purchase price of a machine is ₹ 5,000. Its resale value and maintenance costs are as follows :

Year	1	2	3	4	5
Resale value (in ₹)	3000	2500	2000	1500	1000
Maintenance cost (in ₹)	100	200	330	510	860

What would be the optimum replacement period?