M – 2020

Register Number :

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 tables 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) Mention a use of life table.

2) Name the index number which satisfies both Time reversal and Factor reversal tests.

3) Write down the formula for Kell's fixed weight price index number.

4) Define Time series.

5) Write the probability function of normal distribution with mean = 5 and standard deviation = 3.

6) If variance of Chi-square variate is 20, what is its mean?

7) What is test statistic?

8) What is statistical hypothesis?

9) Mention a utility of standard error.

10) Give an example for 'defect' in a product.

11) Define Feasible solution in linear programming problem.

12) What is 'Maximin' in a game theory?

SECTION – B

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

13) In a locality out of 20,000 live births, 180 mothers died due to child birth complications. Calculate maternal mortality rate.

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

15) Calculate simple aggragative price index number for the data given below.

Items		A	B	C	D
Price	Base year	25	13	15	17
(Rs.)	Current year	30	15	17	28

16) Mention a merit and a demerit of least square method.

17) Write down the assumptions of interpolation and extrapolation.

18) Write the range and parameter of a Bernoulli distribution.

19) If the parameter of 't' distribution is 8, then find the standard deviation.

20) If $P=0.3$ and $n=81$, then find S.E. (p).

21) Mention two conditions for applicability of Chi-square test of independence of attributes.

22) Write two methods of Acceptance Sampling.

23) Give the general form of linear programming problem.

24) Does the game has saddle point?

$$\begin{array}{c} \\ A_1 \\ A_2 \end{array} \begin{array}{c} \begin{array}{cc} B_1 & B_2 \end{array} \\ \begin{bmatrix} 5 & 3 \\ -2 & 4 \end{bmatrix} \end{array}$$

SECTION – C

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

25) From the following data calculate total fertility rate:

Age (in year)	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Female Population	7,350	7,400	6,000	4,980	4,200	3,900	3,200
No. of live births	190	600	540	200	110	48	20

26) What is an index number? Mention four limitations of index number.

27) Construct consumer price index number by using Family Budget Method.

Group	Price (in Rs.)		Weight
	Base year	Current year	
Food	150	180	65
Clothing	70	90	20
Fuel	100	120	20
Entertainment	50	80	15
Medicine and education	60	75	10
Others	80	110	15

28) Calculate five yearly moving averages for the following time series.

Year	2007	2008	2009	2010	2011	2012	2013	2014
Value	30	26	36	44	52	46	53	62

29) For the following data interpolate the value of Y when $X = 35$.

X	10	20	30	40
Y	23	30	34	37

30) In a certain locality it is known that 25% of the taxis have defective meters. Assuming that 100 investigators take a sample of 6 taxis each to see, if their meters are defective. How many investigators will report that

a) exactly 3 taxis have defective meters?

b) at least 1 taxi have defective meters?

31) There are 30 marbles in a bag, out of which 18 are red and the rest are blue coloured. A child picks 5 marbles at random. Find the mean and variance of the number of red marbles.

32) Among randomly selected 100 students of college A, 66 were passed. Among randomly selected 200 students of college B, 114 were passed. Test whether passing proportion is same in both the colleges. Use $\alpha = 1\%$.

33) The following are the marks of 6 students obtained before and after attending special classes.

Student	1	2	3	4	5	6
Marks obtained before special class	80	95	92	68	96	60
Marks obtained after special class	92	90	97	74	92	55

Test whether marks of the students have improved after attending special classes. $(\alpha = 5\% \quad -k = -2.05)$

34) If $\overline{\overline{x}}=60.5$ and $\overline{R}=3.5$. Find the control limits of $\overline{x}$-chart, given $A_2=0.577$.

35) Obtain an initial basic feasible solution to the following transportation problem by matrix minima method. Also obtain transportation cost. Is the solution degenerate?

		To			Availability
		X	Y	Z	
From	P	10	6	7	20
	Q	5	4	6	30
	R	6	7	9	50
Requirement		40	10	50	

36) The annual demand for an item is 4,000 units. Capital cost is Rs. 8 per unit. Inventory carring cost is 15% of capital cost per annum. If set up cost is Rs. 150, determine

a) Economic order quantity,

b) Number of orders per year.

SECTION – D

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

37) For the following two towns, compute standardised death rates and comment.

Age (in years)	Standard Population	Town A		Town B	
		Population	Deaths	Population	Deaths
0-20	6,000	4,000	72	8,000	128
20-40	12,000	9,000	54	13,000	65
40-60	8,000	7,000	98	10,000	140
≥ 60	4,000	3,000	129	4,000	160

38) Compute Laspeyre's Paasche's and Dorbish-Bowley's price index numbers from the following data

Items	Base year		Current year	
	Price (Rs.)	Quantity (K.G.)	Price (Rs.)	Quantity (K.G.)
A	96	8	90	10
B	72	6	100	5
C	90	12	160	15
D	100	14	88	8

39) Fit a Straight line trend for the following Time series, obtain the trend values. And estimate the value for the year 2011.

Year	2005	2006	2007	2008	2009	2010
Value	25	15	20	18	13	14

40) Fit a Poisson distribution for the following data and test the goodness of fit at α=5% level of significance.

x	0	1	2	3	4	5	≥6
f	18	43	45	28	12	4	0

SECTION – E

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

41) The mean and standard deviation of a normal distribution are 170 and 6 respectively. Find the probability that the value of the variable selected at random will be

a) Below 155

b) Between 170 and 182.

42) Test at 1% level of significance, that average life of bulbs manufactured by Firm A is less than Firm B.

Firm	Sample Size	Average Life	Standard deviation
A	72	1450	12
B	50	1455	10

43) Marks of five students are given below:

Marks : 35, 48, 50, 42, 45

Can you conclude that variance of the distribution of marks is 30? (use $\alpha=5\%$)

44) The cost of a machine is Rs. 35,000, assuming that the machine has no resale value. The operating costs in different years are as follows:

Year	1	2	3	4	5	6
Operating cost	1500	4500	7500	10500	13500	16500

Determine the optimum period for replacement of the machine.