



M - 2017

Subject Code : 31 (NS)

3265400

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 fertility.

2) Does Marshall-Edgeworth's index number satisfy factor reversal test?

3) Which price of the commodities is used in the construction of cost of living index number?

4) Give an example for seasonal variation.

5) In which distribution mean and variance are equal?

6) Write the mean of t -distribution.

7) What is point estimation?

8) What is power of a test?

9) When is the pooling of the frequencies done in testing of goodness of fit?

10) What is defect?

11) Mention a need of replacement of an item.

12) What is meant by inventory?

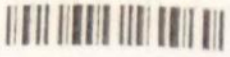


SECTION – B

(10 × 2 = 20)

II. Answer **any ten** of the following questions :

- 13) Mention two uses of life table.
- 14) Why is Fisher's index number called as an 'Ideal index number'?
- 15) If $\sum p_1q = 600$ and $\sum p_0q = 500$ then, find suitable price index number.
- 16) What are the different phases in a business cycle?
- 17) Write down the assumptions of interpolation and extrapolation.
- 18) Write down the p.m.f. of Bernoulli distribution with parameter $p = 0.4$.
- 19) If Z_1 and Z_2 are two independent SNV's, then name the distribution of $Z_1^2 + Z_2^2$ and find its mean.
- 20) Define type-I and type-II errors.
- 21) If $n = 10$, $s^2 = 20$ and $\sigma^2 = 25$, find chi-square test statistic.
- 22) What do you mean by process control and product control?
- 23) If the depreciation and the cumulative maintenance costs of an equipment for the third year are Rs. 10,000 and Rs. 10,400 respectively, find the annual average cost.
- 24) Given $R = 3600$ units/year, $C_3 = \text{Rs. } 50$ and $C_1 = \text{Rs. } 4/\text{unit/year}$, find Q^0 .



SECTION – C

III. Answer any eight of the following questions :

(8 × 5 = 40)

25) Find standardized death rate for the following data.

Age group (in years)	Population	Deaths	Standard population
0 – 20	4,000	68	6,000
20 – 40	9,000	54	12,000
40 – 60	7,000	91	8,000
60 and above	3,000	129	4,000

26) Mention any five steps involved in the construction of index number.

27) Find cost of living index number for the following data.

Group		Food	Clothing	Rent	Fuel	Others
Price (in Rs.)	2010	2000	1200	4000	1000	1500
	2015	3000	900	5000	800	1800
Weights		30	8	12	15	25

28) Find five yearly moving averages for the following data.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sales	60	180	120	80	60	120	150	180	135

29) Following is the data regarding annual net life insurance premium. Using binomial expansion method estimate the premium at the age 30 and 45.

Age (in years)	20	25	30	35	40	45
Premium (in Rs.)	1426	1581	–	1996	2256	–

30) On an average a typist makes 2 mistakes per page. Find the probability that a page typed by him has (i) 2 mistakes (ii) at most 1 mistake.



31) A box contains 8 red and 4 white balls. From this box 5 balls are drawn at random. What is the probability that the sample contains 3 red balls?

32) Following is the data regarding mean weights of randomly selected boys and girls of PUC students. Test whether, mean weight of boys is less than mean weight of girls. [Use 5% l.o.s.]

Sample	Boys	Girls
Size	64	48
Mean	50 kg	54 kg
S.D.	8 kg	12 kg

33) A specified brand of automobile tyre is known to have average life of 40000 km. A random sample of 10 tyres of this brand, when tested resulted in the average life 39000 km and S.D. 1200 km. At 1% l.o.s. what is your conclusion regarding average life of tyres?

34) For the following data find control limits of \bar{X} -chart. [Given $A_2 = 0.729$]

Subgroup No.	1	2	3	4	5	6
Mean	52	49	53	48	51	47
Range	4	6	5	7	3	5

35) Solve the following LPP graphically.

$$\text{Maximize } Z = 100X + 170Y$$

$$\text{s.t. } 2X + 3Y \leq 36$$

$$X + 2Y \leq 20$$

$$\text{and } X, Y \geq 0.$$

(For visually challenged students only)

A tailor gets a profit of Rs. 100 from a shirt and Rs. 170 from a pant. In a week of 56 hours, he uses 36 hours for cutting and 20 hours for stitching. For cutting he requires two hours for a shirt and three hours for a pant. He, requires one hour to stitch a shirt and two hours to stitch a pant. Formulate L.P.P.

36) Solve the following game by dominance rule.

		Player-B		
		B_1	B_2	B_3
Player-A	A_1	6	12	7
	A_2	7	9	8
	A_3	5	8	9
	A_4	3	6	10

SECTION – D

IV. Answer **any two** of the following questions :

(2 × 10 = 20)

37) Calculate GRR and NRR for the following data and comment on the result.

Age group (in years)	Female Population	Female Births	Survival Rates
15–19	10000	200	0.91
20–24	9000	360	0.90
25–29	8000	480	0.89
30–34	7000	280	0.88
35–39	6000	180	0.87
40–44	5000	100	0.86
45–49	4000	40	0.85



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

Item	Base year		Current year	
	Price (Rs.)	Quantity	Price (Rs.)	Quantity
A	10	5	12	4
B	15	8	18	7
C	6	3	4	5
D	3	4	3	5

- 39) For the following data fit a straight line trend and find trend values also estimate the production of 2017.

Year	2010	2011	2012	2013	2014	2015	2016
Production (in tons)	79	83	90	94	90	95	99

- 40) a) Five unbiased coins are tossed 128 times. Calculate the expected frequencies for the number of heads obtained.
- b) Seventy accidents that have occurred in a state in a week are tabulated as follows :

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Accidents	7	8	11	12	5	13	14

Test whether accidents occurs uniformly throughout the week.
 [Given $K_2 = 16.81$]



SECTION – E

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

41) X is a normal variate with mean 100 and standard deviation 5. Find the probability that (i) $X \geq 105$ (ii) $90 \leq X \leq 110$.

42) In a sample of 400 people in Kerala 220 are tea drinkers and the rest are coffee drinkers. Can we assume that both tea and coffee are equally popular in this state? Use 5% level of significance.

43) For the following data test whether the attributes 'smoking' and 'literacy' are independent. Use 1% level of significance.

	Smokers	Non-smokers	Total
Literates	20	30	50
Illiterates	30	20	50
Total	50	50	100

44) For the following transportation problem find initial basic feasible solution by NWCR method. Compute transportation cost. Is the solution degenerate?

		Destination			a_i
		D_1	D_2	D_3	
Origin	O_1	8	4	12	500
	O_2	10	5	6	200
	O_3	7	5	3	100
b_j		400	200	200	800