

GOVERNMENT OF KARNATAKA
KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD
II PUC MODEL QUESTION PAPER – 3 (2024-25)
STATISTICS (31)

Time: 3 Hours

(Total number of questions: 38)

Max. Marks: 80

Instructions:

1. Statistical table and graph sheets will be supplied on request.
2. Scientific calculators are allowed.
3. All working steps should be clearly shown.
4. For Section – A, only the first written answers will be considered for evaluation.
5. For questions having diagram, graph and map, alternative questions are given at the end of the question paper in a separate section for visually challenged students.

SECTION – A

I. Choose the most appropriate answer from the choices given:

(5 X 1 = 5)

- 1) The statistical study of human population is called
a) Biology b) Sociology c) Psychology d) Demography
- 2) If the price of an item in the current year is double the price in base year, then the price relative is
a) 200 b) 150 c) 100 d) 50
- 3) The relation between mean and variance of a Poisson distribution is
a) Mean \neq Variance b) Mean = Variance c) Mean < Variance d) Mean > Variance
- 4) There are four statements:
i) Size of the test = $P(\text{Type – I error})$ (ii) Size of the test = $1 - P(\text{Type – I error})$
iii) Power of a test = $P(\text{Type – II error})$ (iv) Power of a test = $1 - P(\text{Type – II error})$
The correct statements are:
a) i and iii b) ii and iii c) i and iv d) ii and iv
- 5) In replacement theory, the depreciation cost of the item is
a) $P - S_n$ b) $S_n - P$ c) $P + S_n$ d) ΣC_i

II. Fill in the blanks by choosing the appropriate answers given in the brackets:
(Defective, Less than 5, Basic, p, Retail, np)

(5 X 1 = 5)

- 6) The _____ price of the commodities used in the construction of cost of living index number.
- 7) The mean of a Bernoulli distribution is _____.
- 8) In chi-square test for goodness of fit, if any E_i is _____, it should be pooled with the adjacent frequency.
- 9) In statistical quality control, an item having one or more defects is a _____ item.
- 10) In a basic feasible solution of a transportation problem, $(m+n-1)$ variables are known as _____ variables.

III. Match the following:

(5 X 1 = 5)

- | 11) A | B |
|---|--------------------------------|
| a. 15 – 49 years | i. Parameter |
| b. Index numbers | ii. Mode = 0 |
| c. Student's t-distribution | iii. Minimax |
| d. Statistical constant of the population | iv. Child bearing age of women |
| e. Minimum of column maximums | v. Economic barometers |
| | vi. Maximin |

IV. Answer the following questions:**(5 X 1 = 5)**

- 12) Write one use of life table.
- 13) Give an example for secular trend.
- 14) Write the range of chi-square distribution.
- 15) Define interval estimation.
- 16) Mention one disadvantage of inventory.

SECTION – B**V. Answer any FIVE of the following questions:****(5 X 2 = 10)**

- 17) Mention two merits of moving averages method.
- 18) Write two assumptions of interpolation and extrapolation.
- 19) In a Poisson distribution, if $\lambda = 3$, find $P(X = 0)$.
- 20) If the standard deviation of a normal distribution is 9, then find its quartile deviation.
- 21) What is meant by null hypothesis and alternative hypothesis?
- 22) If $(p_1 - p_2) = 0.03$ and $S.E.(p_1 - p_2) = 0.02$, find the value of test statistic Z.
- 23) Compute the upper control limit for \bar{x} -chart when $\bar{x}' = 30$, $\sigma' = 5$ and $A = 1.342$.
- 24) The cumulative maintenance cost of a machine during 4th year is Rs 13,500. If purchase cost is Rs 8,500, find annual average cost assuming that machine has no resale value.

SECTION – C**VI. Answer any FOUR of the following questions:****(4 X 5 = 20)**

- 25) Calculate Kelly's price index number for the following data and write your conclusion on the result.

Items	Price (in Rs)		Quantity
	Base year	Current year	
A	06	10	05
B	25	20	06
C	25	30	04
D	06	15	08

- 26) Interpolate and extrapolate the sales for the years 2016 and 2024 by using binomial expansion method.

Year	2012	2014	2016	2018	2020	2022	2024
Sales (units)	87	108	-	127	141	172	-

- 27) Four unbiased coins are tossed 80 times. Find the theoretical frequencies for the number of tails obtained.
- 28) A basket has 12 mangoes, out of which 8 mangoes are ripe. 3 mangoes are randomly selected. Use hypergeometric distribution and find:
 - (i) the expected number of ripe mangoes among the picked ones
 - (ii) the probability that all the picked mangoes are ripe.
- 29) It is required 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 116 and standard deviation is 8, what would you conclude? Use 5% level of significance.

- 30) Solve the following game by using maximin-minimax principle. Is the game fair?

		Player – B		
		B ₁	B ₂	B ₃
Player – A	A ₁	1	-1	3
	A ₂	2	-1	2
	A ₃	-1	0	0
	A ₄	2	0	4

- 31) The annual demand for an item is 3000 units. Capital cost is Rs 7 per unit. Inventory carrying cost is 20% of capital cost per annum. If ordering cost is Rs 150, determine economic order quantity and minimum average inventory cost.

VII. Answer any TWO of the following questions:

(2 X 5 = 10)

- 32) The weights of students are normally distributed with mean 60 kg. and standard deviation 4 kg. Find the probability that a randomly selected student whose weight is:
(i) more than 52 kg. (ii) less than 64 kg.

- 33) A driving school examined the result of 90 men and 110 women who were taking their driving test for the first time gave the following results.

Result↓ Sex→	Men	Women
Pass	50	50
Fail	40	60

Use chi-square test at 1% level of significance to test whether sex and result are independent.

- 34) In a printing industry, at regular intervals, cloth is inspected for defects in printing. If on an average 0.6 defects are expected per square meter, obtain suitable control limits.

- 35) Solve the following linear programming problem graphically:

Minimize $Z = 50x + 60y$

Subject to constraints: $5x + 4y \leq 40$

$3x + 4y \geq 24$

and $x, y \geq 0$

SECTION – D

VIII. Answer any TWO of the following questions:

(2 X 10 = 20)

- 36) a) Calculate total fertility rate for the following data:

Age group (in years)	Female population	No. of live births
15 – 19	7000	140
20 – 24	10000	800
25 – 29	16000	1600
30 – 34	20000	2200
35 – 39	14000	980
40 – 44	5000	150
45 – 49	4000	40

- b) Calculate the standardized death rate from the data given below:

Age group (in years)	Locality – A		Standard population
	Population	Deaths	
Under 18	14000	266	15000
18 – 50	28000	252	30000
50 – 70	8000	120	10000
70 & above	4000	156	5000

- 37) Show that Fisher's index number satisfies time reversal test and factor reversal test for the following data:

Items	2018		2023	
	Price (in Rs)	Quantity	Price (in Rs)	Quantity
A	10	15	13	18
B	15	20	20	22
C	12	10	10	15
D	08	18	10	20

- 38) Fit a curve of the type $y = ab^x$ for the following data and estimate the value for the year 2024.

Year	2018	2019	2020	2021	2022	2023
Value	7	18	32	54	85	108

SECTION - E
(For Visually challenged students only)

- 35) Write the procedure of solving linear programming problem graphically.
