GOVERNMENT OF KARNATAKA
KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD
II PUC MODEL QUESTION PAPER – 1 (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 births occurring to women of child bearing age is called
a) Fertility b) Fecundity c) Mortality d) Longevity

2) Factor reversal test is satisfied by
a) Laspeyre's index number b) Marshall- Edgeworth's index number
c) Fisher's index number d) Kelly's index number

3) In a Bernoulli distribution, if q = 0.8, the standard deviation is
a) 0.16 b) 0.8 c) 0.2 d) 0.4

4) Which of the following statements are correct?
i) P(Type – I error) = α (ii) P(Type – I error) = $1 - \alpha$
iii) P(Type – II error) = β (iv) P(Type – II error) = $1 - \beta$

a) i and iv b) i and iii c) ii and iv d) ii and iii

5) The cost associated with the maintenance of inventory until they are sold or used is
a) Holding cost b) Shortage cost c) Setup cost d) Capital cost

II. Fill in the blanks by choosing the appropriate answers given in the brackets: **(5 X 1 = 5)**
(0, Strategy, 100, Point, Interval, np)

6) The value of the index number for the base year is _____.

7) The mean of a student's t - distribution with parameter 'n' is _____ .

8) If a single value is proposed as an estimate of the unknown parameter, it is _____ estimation.

9) In statistical quality control, _____ chart is used for number of defectives.

10) In a game, the pre-determined rule by which a player determines his course of action is called _____.

III. Match the following: **(5 X 1 = 5)**

11)

A	**B**
a. Size of the cohort	i. Leptokurtic ($\beta_2 > 3$)
b. Paasche's index number	ii. A function of sample values
c. Chi-square distribution curve	iii. Downward bias
d. Statistic	iv. Replacement problem
e. Matrix minima method	v. Radix
	vi. Transportation problem

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

12) Mention a method of obtaining vital statistics.

13) Which component of the time series is unpredictable?

14) Under what condition Poisson distribution tends to Normal distribution?

15) Define statistical hypothesis.

16) When is transportation problem said to be balanced?

SECTION – B

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

17) Mention two uses of time series.

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

19) Find the mean of a hyper-geometric distribution whose parameters are a = 3, b = 9 and n = 4.

20) If $X \sim N(\mu, \sigma^2)$, then write the distribution of $\left(\frac{x-\mu}{\sigma}\right)$ and $\left(\frac{x-\mu}{\sigma}\right)^2$.

21) A random sample of size 36 is drawn from a population whose standard deviation is 3. Compute standard error of the sample mean.

22) Given: n = 10, $s^2 = 14.4$ and $\sigma^2 = 16$, compute the chi – square test statistic.

23) In statistical quality control, if $\lambda' = 4$, determine the upper control limit for the c - chart.

24) If R = 3000 units/year, C_1 = Rs 4/unit/year and C_3 = Rs 60/order, then calculate the minimum average inventory cost.

SECTION – C

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

25) Calculate the consumer price index number by using family budget method for the following data.

Group	Price (in Rs)		Weight
	Base year	Current year	
Food	3000	4200	30
Fuel	2500	3280	20
Clothing	2000	2160	10
Housing	3200	4000	30
Entertainment	1600	2000	10
Other	3000	3600	20

26) Interpolate the value of Y when X = 26 by using Newton's advancing difference method.

X	20	30	40	50
Y	72	202	557	1137

27) The probability that a team winning the game is 2/5. If this team plays in 6 games, then find the probability that it wins in i) all the games ii) one or more games.

28) Obtain the theoretical frequencies by fitting Poisson distribution for the number of mistakes per page from the following distribution.

Number of mistakes per page	0	1	2	3	4
Number of pages	92	79	50	15	4

29) From a random sample of 64 students of PUC, 16 students were found wearing spectacles. Can we conclude at 5% level of significance that the proportion of students wearing spectacles is 20%?

30) Solve the following game by using dominance principle. Is the game fair?

		Player – B		
		B_1	B_2	B_3
Player – A	A_1	-1	5	6
	A_2	0	4	3
	A_3	-4	2	7
	A_4	-5	0	8

31) The purchase price of a machine is Rs 5000. Its maintenance costs and resale values are as follows:

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

What would be the optimum replacement period for the machine?

VII. Answer any TWO of the following questions: (2 X 5 = 10)

32) In an institution, the weights of students follow normal distribution with mean 60 kg. and standard deviation 4.5 kg. If committee decides to consider the students with minimum weight of 62 kg., show that only 33% of the students got selected.

33) The following data represents the blood pressure of 5 persons before and after performing dhyana.

B.P. before dhyana	100	97	92	94	95
B.P. after dhyana	96	98	90	91	93

Can we conclude at 5% level of significance that dhyana reduces blood pressure?

34) Given $D_3 = 0$ and $D_4 = 2.115$, write the control limits for R – chart.

Sub-group number	1	2	3	4	5	6
Range	2	5	2	4	2	3

35) Solve the following linear programming problem graphically:

Maximize $Z = 6x + 10y$

Subject to constraints: $x + y \leq 8$

$x + 3y \leq 18$

and $x, y \geq 0$

SECTION – D

VIII. Answer any TWO of the following questions: (2 X 10 = 20)

36) 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	899	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

37) Calculate the Marshall-Edgeworth's and Dorbish-Bowley's price index numbers from the following data.

Items	Base year		Current year	
	Price (in Rs)	Quantity	Price (in Rs)	Quantity
A	17	10	25	14
B	22	12	29	17
C	30	13	24	22
D	41	12	47	15

38) **a)** Estimate the trend values by four yearly moving averages for the following time series data.

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023
Value	16	18	16	24	20	30	26	34	40

b) Fit a straight line trend equation of the form y = a + bx to the data given below.

Year	2010	2012	2014	2016	2018	2020	2022
Production (in '000 quintals)	80	90	92	83	94	99	92

SECTION - E
(For Visually challenged students only)

35) A tailor gets a profit of Rs.100 from a shirt and Rs. 170 from a pant. In a week from available 56 hours, he uses 36 hours for cutting and 20 hours for stitching. For cutting he requires 2 hours for a shirt and 3 hours for a pant. He requires 1 hour for stitching a shirt and 2 hours for stitching a pant. Formulate an L.P.P.

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