JAIN COLLEGE V V Puram **II PUC Mock Paper 2 – January 2025**	**Course:** II PUC **Subject:** Statistics **Max. Marks:** 80 **Duration:** 3 hour

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 capacity of a woman to bear children is called _____.
   a) Fertility b) Mortality c) Survival rate d) Fecundity
2. The weights used in construction of Marshall-Edgeworth's price index numbers
   a) q_0 b) q_1 c) $q_0+q_1 / 2$ d) q_0/q_1
3. In a Binomial distribution, if np =3, the relation between mean and mode is
   a) Mean = mode b) Mean> mode c) Mean < mode d) mean ≠ mode
4. There are four possible decisions under the testing of null hypothesis (H_0):
   i) Accept H_0 when it is true. ii) Reject H_0 when it is not true.
   iii) Accept H_0 when it is not true. iv) Reject H_0 when it is true.
   The correct decisions are:
   a) i and ii b) iii and iv c) i and iii d) ii and iii
5. The cost associated with the maintenance of an inventory until they are sold or used is called:
   a) Capital coat b) Setup cost c) Shortage cost d) Holding cost.

II. Fill in the blanks by choosing the appropriate answers given in the brackets: **(5 X 1 = 5)**

(Chi **square , assignable cause, consumer price, sample mean**, $\Sigma a_i = \Sigma b_j$, , **chance cause**)

6. The _____ price of the commodities used in the construction of cost of living index number.
7. If Z_1, Z_2 and Z_3 are three independent standard normal variates, the distribution of $(Z_1^2 + Z_2^2 + Z_3^2)$ is ____.
8. The best estimator of the population mean is _____.
9. Statistical quality control helps in detecting _____type of variation.
10. A Transportation problem is balanced if and only if _____.

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

11.

a. Maternal mortality	i. Upward bias
b. Laspeyre's index number	ii. 0
c. The mode of a t - distribution	iii. First quadrant
d. Power of a test	iv. Puerperal deaths
e. Graphical solution to L.P.P.	v. Downward bias
	vi. $1 – \beta$

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

12. Define expectation of life.
13. What is Historigram?
14. If Z is a SNV, write the value of P(Z < 0).
15. What is type II error?
16. What do you mean by pure strategy in a game?

SECTION – B

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

17. Which component of a time series is associated with the following sentences?
    (a) Fall in death rate due to advance in science. (b) An increase in employment during harvest season
18. Write down the conditions for applying Newton's advancing difference method of interpolation
19. Find the variance of a Bernoulli distribution with parameter p = 0.8
20. In a hyper geometric distribution if a = 6, b = 9 and n = 4, find P(X = 2).
21. A lot contains 2% defective items. 40 items chosen from it. Another lot contains 1% defective items. 60 items chosen from it. Find S.E.(p_1 - p_2).
22. In paired t-test, if n = 5, d= 3 and s_d = 2, then what would be the value of test statistic t?
23. Give an example for defect and defectives.
24. For the following pay-off matrix of player B, write down the pay-off matrix of player A.

Player A

$$\begin{array}{c} \\ B_1 \\ B_2 \end{array} \begin{array}{c} \begin{array}{ccc} A_1 & A_2 & A_3 \end{array} \\ \begin{pmatrix} 1 & -3 & 5 \\ 2 & -6 & -8 \end{pmatrix} \end{array}$$

SECTION – C

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

25. Find weighted G.M. price index number from the following data.

Item	Weight in %	Price	
		Base year	Current year
A	30	100	90
B	15	20	20
C	20	70	60
D	10	20	15
E	25	40	55

26. By binomial expansion method, estimate the number of persons at ages 24 and 30 years with the help of the following data.

Age (in years)	18	20	22	24	26	28	30
No. of persons	20	22	26	?	35	39	?

27. The probability of an arrow hitting a tree is 1/3. If 4 arrows are aimed at the tree, find the probability that i) 3 arrows miss the tree ii) at least two arrows hit the tree.

28. A bag contains 10 red and 5 black marbles. A random sample of 5 marbles is taken. Find the probability that the sample contains 3 red marbles. Also find the mean of red marbles.

29. A random sample of 64 children is taken from a school. The average weight of the children is 29 kg and standard deviation is 5 kg. Can we assume that the average weight of the school children is less than 30 kg? (Use $\alpha = 0.05$)

30. Determine an initial basic feasible solution to the following transportation problem by NWCR. Compute the transportation cost.

		To			
		X	Y	Z	Supply
From	A	10	11	2	27
	B	8	9	6	33
	C	1	7	5	28
	D	3	14	12	32
Demand		46	44	30	

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

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

Find the optimal age for the replacement of the machine.

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

32. Monthly income of employees follows normal distribution with mean Rs.18,000 and S.D. Rs.800. Compute the probability of employees with monthly income i) more than Rs.20,000 ii) between Rs.16,000 and Rs.17,000.

33. From the following data test whether the examination results depends on special coaching. Use 1% level of significance.

Examination Result			
	Pass	Fail	Supply
Taken	210	90	300
Not taken	60	40	100
Total	270	130	400

34. A company manufactures flooring tiles. Samples of 100 tiles each are drawn at regular intervals. The number of defective tiles is given below

Sample number	1	2	3	4	5	6	7	8	9	10
No. of defective tiles	2	3	1	0	4	2	4	2	6	4

Obtain the control limits for the above data.

35. Solve the following L.P.P graphically:

Max. $Z = 40x + 20y$

s.t. $2x + 3y \leq 12$

$x + y \geq 3$

and $x, y \geq 0$

SECTION – D

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

25. For the following data, compute the GRR and NRR. Comment on the population.

Age group [in years]	Female population	Female births	Survival ratio
15-19	15000	180	0.95
20-24	11000	715	0.92
25-29	16000	960	0.89
30-34	17000	680	0.87
35-39	16000	352	0.85
40-44	15000	120	0.83
45-49	10000	10	0.80

26. a) For the following data calculate the cost of living index number.

Group	Price (in Rs.)		q_0
	Base year	Current year	
Food	130	170	30
Clothing	50	60	12
Fuel	90	110	8
Entertainment	30	50	15
Medicine and Education	40	70	10
Others	50	90	15

b) For the following data verify whether Fisher's index number satisfies TRT.

Item	Price (Rs.)		Quantity	
	Base year	Current year	Base year	Current year
A	4	6	4	2
B	6	4	4	8
C	8	10	5	3

27. By the method of least squares fit a parabolic trend for the following time series.
Estimate the production for the year 2027.

Year	2020	2021	2022	2023	2024	2025
production (‘000 tons)	15	11	10	11	13	12

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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