



JAIN COLLEGE, J C Road Bangalore
Mock Paper -1, February - 2015

Time: 3 Hours 15 Minutes

II PUC- Statistics (31)

Max. Marks: 100

SECTION - A

I. Answer any ten of the following questions: 1 X 10 = 10

1. Mention the fertility rate used for the comparison of fertility of different populations.
2. Define Base year.
3. Write any one characteristics of Index number.
4. Name the mathematical method of measuring trend of the type $y = f(x)$.
5. If $a = 2$, $b = 5$ and $n = 3$ then write down the range for Hypergeometric distribution.
6. If np is an integer then what is the relation between mean and mode in Binomial distribution?
7. Define Confidence interval.
8. Write down the test statistic for testing equality of two means.
9. Given $H_1 : \mu_1 < \mu_2$. Write H_0 .
10. Give an example for defective item.
11. Define mixed strategy in game theory.
12. When the TP has non degenerate solution?

SECTION - B

II. Answer any ten of the following questions : 2 X 10 = 20

13. Mention any two uses of life table.
14. If $P_{01}^L = 92$ and $P_{01}^P = 95$ then find P_{01}^F .
15. Write down any two uses of CPI .
16. In a linear trend equation if $a = 25$, $b = 3.5$ find y when $x = 4$?
17. Using Binomial expansion of interpolation and extrapolation write down the two missing value equations for the given data.

x	5	10	15	20	25	30
y	13	20	?	33	38	?

18. Define chi- square distribution with its pdf.
19. If the parameter of 't' distribution is 5. Find its mean and variance.
20. If $Z_{cal} = 2.5$ and $Z_{tab} = 2.33$ then write down the decision on null hypothesis using graph.
21. Mention any two conditions of testing goodness of fit.
22. If $\bar{C} = 3$. Find UCL.
23. Given $R = 960$ units/year , $C_1 = 96$ /year. $C_3 = 4$ / year. Calculate EOQ.
24. If the depreciation cost and the cumulative maintenance cost for an equipment for the third year are Rs 6,000 and Rs 6,200 respectively. What is Annual Average Cost?

SECTION - C

III. Answer any 8 questions 5 X 8 = 40

25. Calculate GRR for the following data and comment.

Age group (in years)	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Female Population	1000	900	800	700	600	500	400
Female births	20	60	50	30	20	10	10

26. Define Index number. Mention any four limitations of Index number.
27. Find Simple arithmetic mean Index number for the following data and comment.

Item	A	B	C	D	E
Base year price	80	120	100	120	80
Current year price	120	150	80	90	100

28. Explain method of moving averages of obtaining the trend values with merits and demerits.
29. Explain the procedure of Binomial expansion method of Interpolation and Extrapolation.

30. The number of print mistakes per page in a text book follows P.D with mean =2. If there are 560 pages in a book, then in how many pages would you expect mistakes ?
31. There are 50 lecturers in a college. Out of them 23 belong to the science faculty. The college management builds 5 quarters and allots them to 5 randomly selected lecturers. Find the probability the all the quarters are allotted to science lecturers.
32. Among a random sample of 50 persons selected from district A. 10 are interested in viewing hockey match. Among another random sample of 60 persons selected from district B, 8 are interested in viewing hockey match. Test at 5% level of significance that the proportion of hockey viewers in district A and district B are same.
33. Following is the data regarding 5 students administered for an IQ test before and after treatment of yoga. Test whether yoga is effective.

IQ before	118	120	116	115	125
IQ after	125	118	125	120	130

34. By estimation of process average and SD are known to be 85.7 and 0.97 respectively and if sample of size 5 each are considered. Find the control limits for \bar{x} and R charts.
35. Solve the following game using dominance property.

	P	Q	R	S
A	-7	0	3	-4
B	6	-2	0	-3
C	-2	-1	-2	0
D	4	2	3	6

36. A machine costs Rs 5000. The expected maintenance costs and resale values in different years are as follows:

Year	1	2	3	4	5	6	7	8
Maintenance cost Rs	1500	1600	1800	2100	2500	2900	3400	4000
Resale value Rs	3500	2500	1700	1200	800	500	500	500

Determine the optimal age for the replacement of the machine.

Section -D

IV. Answer any 2 questions

2 X 10 = 20

37. From the following data calculate TFR and compare the fertility of the two cities.

Age	Female Population		Number of live births	
	City A (000's)	City B (000's)	City A	City B
15-19	50	14	1000	1204
20-24	60	15	7000	2295
25-29	45	14	8000	2590
30-34	40	12	5000	1236
35-39	30	13	900	936
40-44	25	12	100	288
45-49	20	11	50	33

38. Compute Fisher's Marshall –Edgeworth's and Dorbish Bowley's quantity index number for the following data .

Commodities	Base year		Current year	
	Price (Rs)	Quantity (kg)	Price (Rs)	Quantity (kg)
A	6	5	10	6
B	2	10	2	12
C	4	6	6	8
D	10	3	12	4
E	8	4	12	6

39. Fit a straight line for the following time series. Show the trend line on a graph thereby estimating the trend values.

Year	1989	1990	1991	1992	1993	1994	1995
Values	180	230	300	370	465	520	600

40. a) Bangalore corporation authorities have installed 2000 electric lamps in MG road. The lamps have an average life of 1000 burning hours with a S.D of 200 hours. If life of lamps follow normal distribution then after what period of burning hours would we expect 10% of the lamps would have failed?
- b) An opinion poll was conducted to find the reaction to a proposed civic reform in 100 members of each of the two political parties. The information is tabulated below

	Favourable	Unfavourable	Total
Party A	40	60	100
Party B	42	58	100

Test whether political parties and the reaction to a proposed civic reform are independent.

Section -E

V. Answer any 2 questions

5 X 2 = 10

41. Four unbiased coins are tossed 128 times. Find the expected frequencies of the number of heads obtained .
42. Test the hypothesis that $\mu = 5$. given that sample S.D is 8 for random sample of size 25 from a normal population. Use $\alpha = 0.05$
43. A binomial distribution is fitted after estimation of 'p' from the observed data.

X	0	1	2	3	4	5	6
Observed frequencies	19	22	39	13	6	4	2
Theoretical frequencies	12	32	34	20	6	1	0

Testy whether BD is a good fit.

44. A company manufactures two products X and Y. Due to deficit of raw materials not more than 100 units of X and 200 units of Y can be produced in a month. Total Labour available is 600 hours per month. Each unit of X requires 2 hours and each unit of Y requires 4 hours to be produced. If the profit obtained by selling one unit of X is Rs 50 and one unit of Y is Rs 100. Formulate LPP.



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Mock Paper -2, February - 2015

Time: 3 Hours 15 Minutes

II PUC- Statistics (31)

Max. Marks: 100

Section A

I. Answer any ten of the following questions. 10 X 1 = 10

1. What do you mean by survival ratio?
2. If the general price level has gone up by 50% between 1920 and 2004, what is the index number for 2004 with base 1920?
3. What is meant by chain base index number?
4. Which component of time series is observed in decrease in travel by bullock carts?
5. A Bernoulli Variate has parameter 0.3. What is the probability that the variable takes the value 0?
6. What is the probability that a normal variate takes the value greater than its mean?
7. Mention a use of standard error.
8. Write the formula for SE in case of test for mean.
9. What is the level of significance?
10. The annual minimum cost for machine A is Rs.3,470 and the annual minimum average cost for machine B is Rs.3,130. If both the machine are of equal capacity, which machine would you prefer to buy?
11. In an inventory, what do you mean by back logging.
12. Name the control chart used in case of defects in SQC.

Section-B

II. Answer any 10 of the following questions 10 X 2 = 20

13. Mention the methods of collection of vital statistics.
14. State two uses of index numbers.
15. If Laspeyre's index is 142.3 and Paasche's index is 144.1, find DorbishBowley's index.
16. Write down the normal equations to fit a straight line trend of the form $y=a+bx$.
17. Write two assumption of interpolation and extrapolation.
18. The proportion of vegetarian in village A is 0.42. The proportion of vegetarian in village B is 0.37. Among 70 randomly selected people from village A, if P1 is the proportion of vegetarian and among 60 randomly selected people from village B, if P2 is the proportion of vegetarian, find the SE of $(P1 - P2)$.
19. Write down the mean and variance of chi-square – variate with $n=2$ degrees of freedom.
20. Define critical region and test statistic.
21. Distinguish between point estimation and interval estimation.
22. What do you mean by degenerate solution in a transportation problem?
23. What are multiple and unbounded solution in a Linear Programming Problem?
24. If on an average 0.6 defects are exposed per length of cloth, write down the control limit for c-chart.

Section - C

III. Answer any eight questions: 8 X 5 = 40

25. Compute crude death rate and standardized death rate for the following data.

Age (in yrs)	Population	Death	Standard Population
Under 10	20,000	600	19,000
10-19	10,000	240	17,000
20-39	50,000	1,250	28,000
40-59	30,000	1,050	20,000
60 and above	10,000	500	11,000

26. Briefly explain steps involved in the construction of index number.
27. Compute weighted geometric mean index number from the following data.

Commodity	Price (in Rupees)	Weight
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	Base Year	Current Year	
A	4	3	8
B	5	10	5
C	15	20	2
D	10	25	5

28. Compute 4 yearly moving average for the following data and comment.

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Sales 000's	86	63	45	58	43	57	98	100	120	150

29. Use Newton's method to find the number of employees whose wages is Rs.500 per day.

Wages per day	200	400	600	800	1000
No of employees	72	62	48	44	36

30. The probability that a gunshot hitting a target is $\frac{1}{3}$. If five gun shots aimed at the target. Find the probability that (i) 2 shots miss the target (ii) at least 4 hits the target.

31. The average I Q of a group of 100 children is 98. The standard deviation is 5. Assuming normality, find (i) the child selected have I Q more than 95 (ii) expected number of children having I Q is between 90 and 110.

32. A random sample of 100 jack fruit weight on an average 10lbs with variance of 41lbs test at 1% level of significance that the expected average weight of jack fruit of that varieties is 41lbs.

33. Solve the following LPP graphically.

$$\text{Minimise } Z = 50x + 30y$$

$$\text{S.t } 5x + 4y \geq 40$$

$$2x + 5y \geq 10 \text{ and } x \geq 0, y \geq 0$$

34. For the following data test whether there is any significant difference in the population proportion at 5% level of significant.

	Size	Population
Sample I	100	0.02
Sample II	110	0.01

35. 10 sample each of size 50 product where inspected and the number of defective in each of them whereas follows.

Sample No	1	2	3	4	5	6	7	8	9	10
Number of defective	1	3	4	2	3	4	1	2	3	2

Draw the suitable control chart.

36. For the following transportation problem obtain the initial basic feasible solution by matrix minima method.

Factories		D1	D2	D3	Availability
	O1	2	17	27	5
O2	3	3	9	8	
O3	5	9	7	7	
O4	1	6	2	14	
Requirement	7	9	18	34	

Section D

IV. Answer any two of the following questions:

2 X 10 = 20

37. From the following data calculate standardized death rate for locality A and locality B.

Which locality is more healthier.

Age (in yrs)	Locality A		Locality B (Standard Population)	
	Population	Death	Population	Death
Under 5	4,000	130	4,300	135
5-14	9,000	30	9,500	50

15-64	12,000	60	13,500	80
65 and above	3,500	135	3,800	145

38. Using the following data show that fisher's index number satisfies time reversal test and factor reversal test.

Commodity	1989		1990	
	Price	Expenditure	Price	Expenditure
A	8	6	12	4
B	10	8	12	8
C	14	4	18	10
D	4	6	12	10
E	10	10	10	8

39. Fit a quadratic trend for the following time series. Estimate the population for the year 2011.

Year	1961	1971	1981	1991	2001
Population (in millions)	46	55	68	84	102

40. Fit a poisson distribution to the following data and test for goodness of fit at 5% level of significant.

Number of mistake	0	1	2	3	4	5
Number of pages	31	34	21	12	2	0

Section E

V. Answer any two of the following: 2 X 5 = 10

41. A group of 10 rabbits fed on diet A and another group of 8 rabbits fed on different diet B are recorded in the following. Test for increase in weight in grams at 5% LOS.

Diet A	6	7	9	2	13	5	4	10	7	11
Diet B	3	4	9	2	11	3	8	8	-	-

42. In an office 8 members are vegetarians and 7 members are non-vegetarians. A committee of 5 members is formed. Find the probability that among the member (i) exactly 2 are vegetarians (ii) at least 2 are vegetarians.
43. Find the solution of the game by the principal of dominance for the following pay off matrix A.

Player A	Player B			
	B1	B2	B3	B4
A1	-7	0	3	-5
A2	7	-2	0	-4
A3	-2	-1	-2	0
A4	4	2	3	6

44. Out of 75 patients admitted to a hospital with hepatitis symptom, 40 were administered a certain new drug. Of these 34 recovered and the remaining who were given the traditional drug, 19 recovered. Test at 5% level of significant that the new drug is an improvement over the traditional drug.