JAIN COLLEGE, J C Road Bangalore
Mock Paper -1, January - 2016
II PUC – Statistics (31)

Time: 3 Hours 15 Minutes **Max. Marks:100**

SECTION-A

I. Answer any TEN the following questions. **10 × 1 = 10**

1. What do you mean by vital statistics?
2. What is the relation between Laspeyre's, Paasche's and Fisher's Indices ?
3. Write down the formula for Dorbish - Bowley Quantity Index Number.
4. Which component of time series is observed in decrease in travel by Bullock carts?
5. Give the range of Poisson variable.
6. If Z is a SNV, what is the distribution of Z^2 ?
7. Define Rejection region.
8. Define sampling distribution.
9. What is Test Statistic used in testing of hypothesis?
10. In a T.P, when do you say that a solution is degenerate?
11. What is value of Fair game?
12. Define chance cause of variation in statistical quality control.

SECTION-B

II. Answer any TEN of the following questions. **10 × 2 = 20**

13. During 2002, there were 426 deaths in a town, which has mid -year population of 34080. Find CDR.
14. Name any two methods of obtaining price quotation of items included in the construction of Index Numbers.'
15. If the price Index for the year 2005 is 128, the price of a commodity was Rs.100, in the base year 2000. Then, what is the price of same commodity in 2005?
16. What are Moving Averages ? Mention its disadvantage.
17. What is meant by Interpolation and extrapolation?
18. Write down the p.d.f. of a Normal distrbution whose mean is 60 and variance. 25.
19. Write down Mean and Variance of x^2 – variate with n = 4 d.f.
20. What are confidence intervals?
21. If S .E($\bar{X}$) = 0.5 ; and S.E($\bar{x}_1 - \bar{x}_2$) = 3.2, then what would you conclude at α = 5%.
22. Feasible region can only exists in (x, y) plane, elucidate.
23. Write down the formula for EOQ model II with usual notations.
24. If on an average 0.8 defects are expected per length of cloth, write down the control limits for c-chart.

SECTION-C

III. Answer any EIGHT questions. **8 × 5 = 40**

25. Write down the components of life table.
26. Calculate Laspeyre's and Paasche's Price Index numbers from the following data.

	Base year		Current Year	
Item	Price	Quantity	Price	Quantity
A	50	2	60	3
B	40	3	40	5
C	100	1	120	1
D	200	4	25	4

27. Compute the cost of living Index Number by Aggregative Expenditure method.

	Base Year		Current Year
Commodity	Price(Rs.)	Expenditure (Rs.)	Price (Rs.)
Rice	210	1010	910
Sugar	330	330	1650
Soap	23	69	46
Kerosene	155	155	465
Rent	60	720	500
Miscellaneous	65	780	520

28. Find 4 yearly centered moving averages to the following data. What is your conclusion.

Year	: 1996	1997	1998	1999	2000	2001	2002
Production (Tons):	46	39	38	53	54	53	50

29. Estimate the production for the years 2000 and 2010 with the help of following table

Year	1975	1980	1985	1990	1995	2000	2005
Production (tons)	10	11	13	15	18	----	33

30. In a factory of manufacturing electric lamps, 5% of the lamps are defective. A random sample of 10 lamps are taken for inspection. What is the probability that it has (i) Zero defective lamp (ii) One or more defective lamps.
31. On an average a box contains 2 defective items. Calculate the probability of finding
(i) 3 defective items (ii) 4 defective items in a randomly selected box. (e^{-2} = 0.1353)
32. A random sample of 80 students gave mean weight of 55 kgs with S.D of 5 kgs. Test the hypothesis that the mean weight in the populations is 58 kg.
33. A political party claims that men and women voters support equally. In a sample survey out of 360 men voters 120 favoured the party, while 170 out of 490 women preferred it. Do the survey result support the claim?
34. Write the pay off matrix of player B and then solve the game using Maximin – Minimax principle.

	Player A			
playerB		B_1	B_2	B_3
	A_1	3	1	2
	A_2	1	0	3
	A_3	4	2	3

35. A company has an annual demand of 2500 units of raw material for a firm per year. The setup cost is Rs. 40 per order and holding cost is Rs. 1.10 per unit/year. Determine
(*a*) Optimal lot size
(*b*) Optional number of orders
(*c*) Minimum average cost.
36. Write short notes on single and double sampling plans.

SECTION-D

IV. Answer any TWO of the following. **2 × 10 = 20**

37. Calculate standardised death rates from the following data by taking town A as standard comment on findings.

Age Group	Town A		Town B	
	No. of Persons Living	Deaths	No. of Persons Living	Deaths
0 – 10	5000	100	10000	250
10 – 20	3500	150	6000	380
20 - 30	7000	200	9000	220
30 - 40	10000	300	15000	400

38. (*a*) Find a quadratic trend of the type $y = a + bx + cx^2$ by the method of least squares to the following time series and estimate the production for 2002.

Year	1997	1998	1999	2000	2001
Production (000 tons)	21	23	25	24	25

(*b*) Construct the cost of living Index number from the following data.

Group	Food	Clothing	Fuel	House Rent	Misc
Index Number	650	315	320	250	375
Expenditure	46%	10%	7%	12%	25%

39. The demand for mixer-grinders in a certain town found vary from day to day. In a survey, the following data was obtained. Test at 5% level of siginificance whether the demand for mixer grinders depends on the days of the week.

Days	Mon	Tue	Wed	Thu	Fri	Sat
No. of mixer grider sold	120	131	125	115	130	129

40. *(a)* If heights of 1000 soldiers are found to be Normally distributed with mean 75" and SD 2". Then find the number soldiers whose height is
(*i*) below 70" (*ii*) and between 70" and 75".

(*b*) The first two frequency terms in a P.D. are 180 and 210 respectively. Find the next frequency terms

SECTION-E

V. Answer any TWO of the following. **2 × 5 = 10**

41. It is found that 10% of the boys in a certain class have short sight. What is the probability that a random sample 5 boys will have none with short sight.
42. A sample of 100 female students is chosen from the large group of female students. The average height of these students is 61" and S.D. 3". Can we reasonably assume that average height of the large group of females is 63"?
43. To test the effectiveness of inoculation against cholera the following table was obtained:

	Attacked	Not attacked	Total
Inoculated	30	160	190
Not inoculated	140	460	600
Total	170	620	790

44. Solve the following game using minimax – maximum principle. Is the game fair?

		Company Y		
		A	B	C
Company X	P	1	-1	3
	Q	2	-1	2
	R	-1	0	0
	S	2	0	4

JAIN COLLEGE, J C Road Bangalore
Mock Paper -2, January - 2016
II PUC – Statistics (31)

Time: 3 Hours 15 Minutes **Max. Marks:100**

SECTION-A

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

1. Define fecundity.
2. Mention one limitation of index numbers.
3. If the cost of living index for a current period is 90, then what would you conclude?
4. Which variation is unpredictable?
5. Define a binomial variate.
6. If $X_1, X_2, \ldots X_n$ are independent identically distributed Bernoulli variate with parameter p, what is the distribution of $X=X_1+X_2+\ldots+X_n$?
7. What is the type I error?
8. Define critical region.
9. Define linear programming problem.
10. What do you mean by a non degenerate solution in TP?
11. What is meant by leading time?
12. SQC helps in detecting which type of variation?

SECTION-B

II. Answer any ten of the following questions. **2 × 10 = 20**

13. Mention any two methods of obtaining vital statistics.
14. In a life table, if $l_0=100000$ and $T_0=6500000$ years then, find longevity.
15. If $\sum p_0q_0=1100$ and $\sum p_1q_1=1400$, compute suitable index number.
16. Diagrammatically represent 'Business Cycle' with stages.
17. Differentiate between interpolation and extrapolation.
18. In a Normal distribution. If SD =12, then find QD and MD.
19. The first two frequency terms of a Poisson distribution are 150 and 180 find the find the next frequency term,
20. Define Null and Alternative hypothesis.
21. The graphical solution to the LPP lies in the first quadrant. Give reason.
22. Mention two situations when replacement is carried out.
23. Write the formula for minimum average cost in EOQ model with shortage, giving meaning of notations.
24. Give one example each for controlled variables and uncontrolled variables.

SECTION – C

III. Answer any eight of the following questions. **5 × 8 = 40**

25. Compute the gross reproduction rate from the following data.

Age group	Female population	Female births
15-19	1600	20
20-24	1100	70
25-29	1700	100
30-34	1600	70
35-39	1600	30
40-44	1500	10
45-49	1400	0

26. Explain briefly the steps involved in the construction of index number.

27. Compute suitable quantity index number from the following data.

Commodity	Quantity consumed		Price in 1990
A	150	160	10
B	90	100	12
C	60	60	15
D	50	40	9

28. Population figures for a place are as given below. Fit a curve of the type $Y= ab^x$ and estimate the population for the year 2021.

Year	1971	1981	1991	2001	2011
Population('000)	10	13	17	23	30

29. Using Newton's forward difference method find the value of 'y' when x = 25.

X	15	19	23	27	31
Y	17	18	22	28	35

30. Bangalore corporation authorities have installed 2000 electric lamps in M.G. 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
    i. What number of lamps might be expected to fail in the first 800 burning hours?
    ii. After what period of burning hours would we expect 10% of the lamps would be still burning?
31. In a village 1/3 of the people are literates. If 100 investigators meet 5 persons each to see if they are literate, then how many investigators would you expect to report that 2 or more were literates.
32. Nine patients, to whom a certain drug was administrated, registered the following increments in blood pressure:
    7,3, -1, 4, -3, 5, 6, -4, 1
    Show that the data do not indicate that the drug was responsible for these increments.
33. The standard deviation of production of paddy is assumed to be 10.6. A sample of 20 acres showed that the S.D. is 8.3. Test at 1% LOS whether the S.D. of production of paddy is less than 10.6.
34. The following data relates to the number of knitting defects ina unit length of cloth manufactured by a textile mill.

Sample no.	1	2	3	4	5	6	7	8	9	10
No. Of defects	4	5	6	6	3	2	6	7	3	4

    i. Develop control chart with $\lambda^1=3$.
    ii. Is the process in control?
35. A company sell two different products A and B. The company makes a profit of Rs 40 & Rs 30 per unit of products A and B respectively. The two products are produced in a common production process. The production process has a capacity of 30,000, man-hours. It takes 3 hours to produce one unit of A and one hour to produce one unit of B. The company officials feel that the maximum number of units of A that can be sold is 8000 units and the maximum number of units of B that can be sold is 12,000 units. Formulate the L.P.P
36. Find an allocation of available sources by MMM and compute the transportation cost. Is the solution degenerate?

		To			
		x	Y	z	Availability
	A	8	7	3	60
From	B	3	8	9	70
	C	11	3	5	80
	Requirement	50	80	80	

SECTION-D

IV. Answer any two of the following questions. 2 × 10 = 20

37. Compute crude death rate and standardised death rates for towns X and Y. State which town is healthier.

Age(years)	Town X		Town Y		Standard population
	Population	Death rates	Population	Death rates	
0-9	13500	10	8700	12	35000
10-29	8900	18	5500	20	15000
30-59	5000	20	3700	24	20000
60 & above	12000	15	6900	18	30000

38. From the following data compute.
    i. Fisher's Price Index number
    ii. Marshall-Edgeworth's Price Index number. Also show that Fisher's Price Index number satisfies TRT.

Item	Base year		Current year	
	Price	Quantity	Price	Quantity
A	38	3	50	4
B	42	5	28	2
C	25	8	20	6
D	15	4	25	6
E	10	6	40	8
F	20	2	30	2

39. Fit a first degree trend equation for the following time series and estimate the trend value for 2010.

Year	2004	2005	2006	2007	2008	2009
Sales	79	87	106	111	117	130

40. The following data shows the suicides of 1096 women in 8 Punjab cities during 14 years.

No. Suicides in a state per year	0	1	2	3	4	5	6	7
Frequency	364	376	218	89	33	13	2	1

Fit a Poisson distribution to the data and show that the distribution is not a good fit.

SECTION-E

V. Answer any two of the following questions. 2 × 5 = 10

41. A student preparing for an examination studies only 20 out of 25 sections prescribed. If the teacher selects 10 sections at random, what is the probability that the student will have studied 9 of these sections?
42. Mean and SD of heights of persons of two localities gave the following results.

	Locality A	**Locality B**
Sample	12	8
Mean(cm)	175.3	177.7
S.D.(cm)	4.2	3.7

Can we conclude at 5% L.O.S. that the population of locality A on an average is shorter than locality B?

43. Of the 500 workers in a factory exposed to an epidemic 350 in all were attacked, 200 had been inoculated and of these 100 were attacked. Test whether inoculation and attack are independent.
44. A stockist has to supply 400 units of a product every Monday to his customers. He gets the product at Rs.50 per unit from the manufacturer. The cost of ordering and transportation from the

manufacturer is Rs.75 per order. The cost of carrying inventory is 7.5% per year of the cost of the product. Find

i. Economic lot size.
ii. The minimum average cost.