# JAIN COLLEGE, J C Road Bangalore
## Mock Paper -1, January - 2020
## II PUC – Statistics (31)

**SECTION-A**

**I. *Answer ALL the questions each carry one mark.***

1. Define life table
2. Which index number is an ideal index number?
3. Name the index number which satisfies TRT but does not satisfy FRT.
4. Define time series.
5. Mention the parameter of t distribution.
6. Name the distribution in which mean and SD are equal.
7. Define LOS.
8. Define alternative hypothesis.
9. Define size of a test.
10. Name the control chart for variables.
11. In a game theory problem if saddle point exists and maximin is -4 then what is the value of minimax?
12. Mention one advantage of maintaining inventory.

**SECTION-B**

**II. Answer ALL the questions each carry two marks.**

13. In a town in a year 2000 live births occurred and of these live births there were 150 neonatal deaths, compute NMR.
14. Comment on the statement "Index numbers are economic barometer's."
15. If $\sum p_0q = 1400$ and $\sum p_1q = 1650$. Compute suitable index number.
16. Mention the disadvantages of moving averages method.
17. Define interpolation and extrapolation.
18. If the parameter of t-distribution is 12, then find its variance?
19. Write two features of Chi-square distribution.
20. Write down two utilities of standard error.
21. Define size and power of a test.
22. What is process control and product control?
23. Mention two method of obtaining initial basic feasible solution for a transportation problem.
24. Given R = 1000 units/month, C3 = Rs 350 and C1= Rs 0.20/unit/month find $Q_0$.

**SECTION-C**

**III. *Answer ALL the* questions each carry five marks.**

25. Compute NRR.

| AGE GROUP | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 |
|---|---|---|---|---|---|---|---|
| FEMALE POPULATION | 16000 | 16800 | 17000 | 17300 | 17200 | 16200 | 15000 |
| FEMALE BIRTHS | 192 | 252 | 850 | 692 | 344 | 162 | 15 |

26. Explain the uses and limitations of index number.
27. Compute weighted geometric mean index number from the following data & comment

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

28. Compute 3 yearly moving average for the following data.

| 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. There are 20 fruits in a basket, out of which 8 are mangoes and the rest are oranges. A girl picks 5 fruits at random from the basket. Find the probability that she gets 3 mangoes.
31. Explain the properties of normal distribution.
32. A broker claims that he can predict with 80% accuracy whether a stock market value will rise or fall during the coming month. In a sample of 40 predictions, 28 are correct. Does this evidence shows brokers claim at 1% LOS.
33. A sample of 100 students is taken from a college. If the mean and standard deviation of their weights are 51kg and 5kg respectively. Test at 1%LOS that the average weight of college students is 50 kg?
34. 10 samples were inspected and the number of defects in each of them where as follows. Obtain control limits.

| Sample No | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Number of defects | 1 | 3 | 4 | 2 | 3 | 4 | 1 | 2 | 3 | 2 |

35. Solve the following LPP graphically.
    Minimise Z =50x+30y
    S.t 5x+4y≥40
    2x+5y≥10 and x≥0,y≥0
36. For the following transportation problem obtain the initial basic feasible solution by North west corner rule

| | | D1 | D2 | D3 | Availability |
|---|---|---|---|---|---|
| Factories | 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 ALL the* questions each carry ten marks:**

37. From the following data calculate standardised 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 find all the price index numbers.

| Commodity | 1989 | | 1990 | |
|---|---|---|---|---|
| | Price | quantity | Price | quantity |
| 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 exponential 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 ALL the* questions each carry five marks:**

41. The daily wages of workers in a factory are normally distributed with mean Rs.700 and SD Rs.40. Find the probability of workers whose wages will be (i) more than Rs 800 (ii) between Rs.690 and Rs.720
42. 70 accidents that have occurred in a state in a week are tabulated as follows, test whether accidents occur uniformly throughout the week

| Days | Sun | mon | tue | wed | thu | fri | Sat |
|---|---|---|---|---|---|---|---|
| Accidents | 7 | 8 | 11 | 12 | 5 | 13 | 14 |

43. Following is the data regarding I.Q. of five students before and after performing yoga.

| I.Q. before | 125 | 115 | 116 | 120 | 118 |
|---|---|---|---|---|---|
| I.Q. after | 130 | 120 | 125 | 118 | 125 |

Is training effective?

44. a firm is considered of replacing a machine whose purchase cost is Rs.5000. suggest a suitable period to replace the equipment.

| Years | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Running cost | 1500 | 1600 | 1800 | 2100 | 2500 | 2900 | 3400 | 4000 |
| Resale value | 3500 | 2500 | 1700 | 1200 | 800 | 500 | 500 | 500 |

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**JAIN COLLEGE, J C Road Bangalore**
**Mock Paper -2, January - 2020**
**II PUC – Statistics (31)**

**SECTION-A**

**I. Answer ALL the questions each carry one mark:**

1. Define cohort.
2. Which index number shows downward bias?
3. Which system of weights is used in the construction of Marshall Edgeworth quantity index number?
4. What is Historigram?
5. What is the mean of hypergeometric distribution?
6. Write down the pmf of Bernoulli distribution when p=2/5.
7. Define interval estimation.
8. Define critical value.
9. Write down the formula of SE ($\bar{x}$ ).
10. What is test statistics?
11. What do you mean by non degenerate solution?
12. Define stratergy.

**SECTION-B**

**II. *Answer ALL the questions each carry two marks*:**

13. Mention any two methods of obtaining vital statistics.
14. State two limitations of index number.
15. If Laspeyre's price index number is 124 and Paasche's price index number is 126, find Fisher's price index number.
16. Which components of a time series are associated with the following sentences?
    a. Fall in death rate due to advance in science
    b. An increase in employment during harvest season.
17. Write down the assumptions of interpolation and extrapolation.
18. Write down the area property of normal distribution.
19. If $X_1$, $X_2$ .....$X_n$ are independently identically distributed Bernoulli variates with common parameter p, what is the distribution of $X= X_1+ X_2+....+X_n$?
20. In paired t test, if n=5, $\bar{d}$= 3 and $s_d$=1.5, then what would be the value of test statistic t?
21. What is statistical hypothesis? give an example.
22. What are defect and defectives?
23. In a T.P define the terms (i) a feasible solution (ii) optimal solution.
24. Define (i) holding cost (ii) set up cost.

**SECTION – C**

**III. *Answer ALL the* questions each carry five marks:**

25. Explain any five components of life table.
26. A family budget enquiry revealed that the average expenditure of the families on food , clothing, house rent, fuel and misc.are 30%, 10%,20%,20%and 20% respectively. If the respective group indices are 130, 170,160,200 and 180. Find the consumer price index number.
27. Construct Dorbish Bowley's price index number for the following data.

| Item | 2006 | | 2008 | |
|---|---|---|---|---|
| | Quantity | Price | Quantity | Price |
| A | 25 | 75 | 30 | 96 |
| B | 30 | 45 | 25 | 55 |
| C | 5 | 25 | 6 | 36 |
| D | 6 | 9 | 7 | 21 |
| E | 10 | 14 | 10 | 19 |

| | | | | |
|---|---|---|---|---|
| F | 4 | 48 | 5 | 65 |

28. Calculate trend values for the following data by 4 yearly moving averages.

| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|
| Profit(in crores) | 80 | 85 | 82 | 90 | 100 | 95 | 85 | 84 | 98 |

29. For the following data interpolate and extrapolate the sales for the year 2007 and 2011.

| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| sales | 13 | - | 25 | 38 | 65 | - |

30. On an average, one in every 50 valves manufactured by a firm is substandard. If valves are supplied in packets of 100 each ,in how many of a lot of 2000 packets would you expect substandard valves?
31. If the chance that a ship arrives safely at a port is 9/10, find the chance that out of 6 ships which are expected to arrive at the port ,at least 5 will arrive safely.
32. It is required to test whether those who practice yoga have average blood sugar less than 120 mg/dl. A sample consisting of 36 people who practice yoga is observed. If their mean sugar is 118.5mg/dl and variance is $9mg^2$/dl. At 1% level of significance what would you conclude?
33. The length of 10 samples of cotton taken from a population has mean length of 48cm and SD 3cm.Test whether the mean length of the population can be taken as 50cm? Use 5% level of significance.
34. In order to test whether a process of molding of bronze bearing casting, 6 samples of size 5 each are taken. The variations in weights (mg) of casting are recorded as below; obtain control limits.

| Sample number | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Range | 2 | 7 | 6 | 5 | 8 | 9 |

35. Solve the following game by dominance principle. Is the game fair?

$$\begin{matrix} 4 & 2 & 0 \\ -1 & -2 & 0 \\ -3 & 1 & -3 \end{matrix}$$

36. 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 setup cost is Rs.150. suggest an inventory policy which is most economical.

**SECTION – D**

**IV. *Answer ALL the* questions each carry ten marks:**

37. Calculate NRR and GRR from the following data given below.

| Age group | Female population | Female births | Survival rates |
|---|---|---|---|
| 15-19 | 1600 | 20 | 0.969 |
| 20-24 | 1700 | 30 | 0.966 |
| 25-29 | 1800 | 100 | 0.963 |
| 30-34 | 1750 | 80 | 0.958 |
| 35-39 | 1720 | 35 | 0.942 |
| 40-44 | 1650 | 10 | 0.942 |
| 45-49 | 1500 | 2 | 0.927 |

38. Verify whether Marshall Edgeworth's index number satisfies TRT and FRT using the following data.

| Items | Base year | | Current year | |
|---|---|---|---|---|
| | price | quantity | price | Quantity |
| A | 40 | 2 | 50 | 3 |
| B | 20 | 3 | 30 | 3 |
| C | 30 | 6 | 30 | 8 |
| D | 80 | 5 | 100 | 6 |

39. The following figures give the annual production of a commodity. Estimate the output in 2011.fit a parabolic trend.

| Year | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|
| production | 14 | 16 | 20 | 28 | 42 | 61 | 81 |

40. Fit a binomial distribution and obtain the expected frequencies from the following data.

| X | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| f | 1 | 16 | 48 | 68 | 51 | 16 |

**SECTION – E**

**V. *Answer ALL the* questions each carry five marks.**

41. The mean and variance of a normal distribution are 173 and 36 respectively. Find the probability that the value of the variable selected at random will be i) below 158 ii)between 173 and 185 iii) above 175.
42. A random sample of size 25 taken from a population gives the sample standard deviation 8.5. Test the hypothesis that the population standard deviation is 10.
43. In a random sample of 100 people from a city in the year 2011 revealed that 65 are cricket match viewers. In another random sample of 100 people from same city in the year 2013 revealed that 75 are cricket match viewers. Examine whether there is a significant increase in the proportion of cricket match viewers. Use 1% level of significance.
44. An equipment costs Rs 5000 the running cost is Rs 500 for the first two years and increased by Rs 2000 from third year onwards. The scarp cost of the machine at all times is Rs300. Find the optimal replacement age.

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