## Question Bank(Unit III,IV,V)

**1** Find Spearman's Rank Correlation coefficient:

| Income (in thousands) | 40 | 80 | 50 | 70 | 60 | 30 | 20 |
|---|---|---|---|---|---|---|---|
| Expenditure(in thousands) | 30 | 40 | 30 | 60 | 40 | 20 | 10 |

**2** Describe Scatter diagram method to find correlation.

The two lines of regression are 2y+4x=80 and 6x+5y=160.
Find (i) Mean values of x and y
    (ii) Identify the regression equation of x on y

**3** For the following data calculate:
   (i)    Laspeyre's    (ii) Paasche's  and    (iii) Fischer's Index number.

| Commodity | Base Year | | Current Year | |
|---|---|---|---|---|
| | Price | Quantity | Price | Quantity |
| A | 3 | 9 | 5 | 8 |
| B | 6 | 11 | 7 | 5 |
| C | 5 | 15 | 6 | 11 |
| D | 3 | 20 | 3 | 14 |

**4** Explain the components of Time Series.

**5** Calculate cost of living Index Number from the following data:

| Commodity | Weight | Price in Rupees | |
|---|---|---|---|
| | | Base Year | Current Year |
| Food | 7 | 10 | 12 |
| Clothing | 4 | 6 | 10 |
| Housing Rent | 3 | 4 | 6 |
| Fuel and lighting | 1 | 2 | 2 |
| Miscellaneous | 5 | 8 | 12 |

**6** Obtain the five yearly moving averages for the following data representing exports(in lakhs of rupees) of a company during 1996-2005.Plot the given data and five yearly moving averages(trend values) on a graph paper.

| Year | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|---|---|---|---|
| Exports | 46 | 50 | 56 | 63 | 70 | 74 | 82 | 90 | 95 | 102 |

**7** Find Karl Pearson's correlation coefficient for the following:

| Income | 5 | 7 | 6 | 8 |
|---|---|---|---|---|
| Expenditure | 1 | 3 | 4 | 2 |

| 8 | Calculate Karl Pearson's coefficient of correlation for the following data | | | | | | |
|---|---|---|---|---|---|---|---|
| | X | 10 | 12 | 14 | 18 | 20 | 16 |
| | y | 20 | 25 | 30 | 35 | 25 | 21 |

| 9 | Calculate Spearman's Rank Correlation coefficient for the following data. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | X | 67 | 42 | 53 | 66 | 62 | 60 | 54 | 68 |
| | Y | 78 | 80 | 77 | 73 | 75 | 68 | 63 | 74 |

| 10 | From the following data: |
|---|---|

| | x | y |
|---|---|---|
| Arithmetic Mean | 35 | 84 |
| Standard Deviation | 11 | 8 |

Correlation coefficient is 0.66.
Find (i) The two regression coefficients $b_{yx}$ & $b_{xy}$ (ii) The two regression equations
(iii) Estimate the value of y when x=38

| 11 | Using three yearly moving averages method draw the trend line and actual line | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
| | Income(in thousand) | 8 | 10 | 15 | 12 | 16 | 17 | 19 | 18 | 17 |

| 12 | Find cost of living index number by aggregate method for the following data: | | | |
|---|---|---|---|---|
| | Commodity | Price 2019 | Price 2020 | Quantity |
| | A | 3 | 8 | 1 |
| | B | 4 | 6 | 2 |
| | C | 5 | 9 | 4 |
| | D | 7 | 10 | 5 |

| 13 | An unbiased coin is tossed 6 times. Find the probability of getting (i) exactly 3 heads (ii) zero head |
|---|---|

| 14 | For the following data construct the index number using |
|---|---|

    (i)    Simple Aggregative Method
    (ii)    Simple Average of Price relatives Method

| Commodity | Unit | Price in Rupees | |
|---|---|---|---|
| | | Base year | Current Year |
| A | Kgs | 12 | 16 |
| B | Litres | 7 | 10 |
| C | Kgs | 8 | 11 |
| D | Dozens | 30 | 40 |

| 15 | The mean and variance of a binomial distribution are 3 and 2 respectively. Find 'p', 'q' and 'n'. |
|---|---|

| 16 | Construct the 3 yearly moving averages of students studying in a self financing course in a college is shown below. |
|---|---|

| Year | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of Students | 33 | 31 | 35 | 39 | 40 | 41 | 42 | 40 | 38 | 38 |

Also represent the original time series and the moving averages on a graph paper.

| 17 | Find weighted aggregate index number for the following data: |
|---|---|

| Commodity | Price 2019 | Price 2020 | Weight |
|---|---|---|---|
| A | 3 | 8 | 1 |
| B | 4 | 6 | 2 |
| C | 5 | 9 | 4 |

| 18 | A variate X follows Poisson distribution with mean 0.2. Find (i) $P(X = 0)$ (ii) $P(X > 1)$. [Given : $e^{-0.2} = 0.8187$) |
|---|---|
| 19 | If a Poisson variate X is such that $P[X = 1] = P[X = 2]$, find $P[X = 4]$. [Given $e^{-2} = 0.1353$] |
| 20 | In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 3. Assuming the distribution to be normal, find how many candidates score between 5 and 20? [Given : Area between $z = 0$ and $z = 3$ is 0.4986 Area between $z = 0$ and $z = 2$ is 0.4772] |
| 21 | The distribution of marks of 3000 students is normally distributed with mean 600 and standard deviation 100. Find the number of students having marks more than 775.(Area between z=0 and z = 1.75 is 0.4599) |
| 22 | X is a normal variate with mean 30 and variance 25. Find the probabilities that (i) $x > 42 (ii) x < 28$ [Given : Area between $z = 0$ and $z = 2.4 = 0.4918$ Area between $z = 0$ and $z = 0.4 = 0.1554$] |
| 23 | The number students passing in an exam is normally distributed with mean 60 and standard deviation is 10. What is the probability of getting more than 70? (area between Z=0 and Z=1 is 0.3441) |
| 24 | It is observed that 50% of the students are swimmer. If 3 students are selected at random from 5, what is the probability that only one is a swimmer? |
| 25 | Number of road accidents on a highway during a month follows a Poisson Distribution with mean 5. Find the probability that in a a certain month number of accidents in the highway will be less than 3. $e^{-5} = 0.006738$ |
| 26 | The weight of a packet of biscuits are normally distributed with mean 0.172 gm and standard deviation 5gm. If 1000 packets are observed, how many packets have weight greater than 180gm. (Area between Z=0 and Z=1.6 is 0.4452) |

| 27 | If mean and variance is a binomial distribution are 3 and 3/2 respectively, find the probability of 4 successes? |
|---|---|
| 28 | Explain Poisson distribution with an example. |
| 29 | Five coins are tossed simultaneously. What is the probability of getting 2 heads ? |
| 30 | Find the regression equation of y on x from the following data. $$\sum x = 28, \sum y = 630, \sum x^2 = 140, \sum xy = 2576, n = 7.$$ Also estimate y when x =10. |

**31** Find Spearman Rank Correlation coefficient for the following:

| Marks in English | 35 | 65 | 85 | 45 | 37 | 48 | 40 |
|---|---|---|---|---|---|---|---|
| Marks in Maths | 20 | 70 | 60 | 60 | 45 | 36 | 40 |

**32** Using three yearly moving averages method draw the trend line and actual line

| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|
| Income(in thousand) | 8 | 10 | 15 | 12 | 16 | 17 | 19 | 18 | 17 |

**33** Find the regression of y on x by method of least squares and find y when x =5

| X | 8 | 3 | 6 | 7 | 9 |
|---|---|---|---|---|---|
| Y | 4 | 3 | 8 | 5 | 10 |

**34** Find regression of y on x and find y when x =3

| x | 2 | 8 | 4 | 6 | 1 | 5 |
|---|---|---|---|---|---|---|
| Y | 3 | 4 | 8 | 4 | 6 | 7 |

**35** Find trend value by least square method

| Year | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Profit | 4 | 5 | 7 | 6 | 8 |

**36** Find Laspeyre's and Paasch's index Numbers

| Commodity | Price 2015 | Quantity 2015 | Price 2020 | Quantity 2020 |
|---|---|---|---|---|
| A | 5 | 3 | 8 | 5 |
| B | 6 | 4 | 14 | 8 |
| C | 7 | 6 | 12 | 10 |

**37** Find cost of living index number by aggregate method for the following data:

| Commodity | Price 2019 | Price 2020 | Quantity |
|---|---|---|---|
| A | 3 | 8 | 1 |
| B | 4 | 6 | 2 |
| C | 5 | 9 | 4 |
| D | 7 | 10 | 5 |

| 38 | Find weighted aggregate index number for the following data: |
|----|---|

| Commodity | Price 2019 | Price 2020 | Weight |
|---|---|---|---|
| A | 3 | 8 | 1 |
| B | 4 | 6 | 2 |
| C | 5 | 9 | 4 |

| 39 | Compute the Correlation Coefficient between the variables x and y for each of the following: |
|----|---|

| x | -3 | -2 | -1 | 0 | 1 | 2 |
|---|---|---|---|---|---|---|
| y | -2 | -1 | 0 | 1 | 2 | 3 |

| x | 1 | 2 | 3 | 5 | 4 | 3 |
|---|---|---|---|---|---|---|
| y | 2 | 4 | 5 | 5 | 3 | 1 |

| x | 3 | 2 | 3 | 4 | 1 | 2 |
|---|---|---|---|---|---|---|
| y | 4 | 4 | 5 | 3 | 8 | 6 |

**40** Compute the correlation coefficient between the following marks (out of 10) in Statistics(x) and Mathematics (y) of 5 students:

| Students | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| x | 4 | 7 | 8 | 3 | 4 |
| y | 5 | 8 | 6 | 3 | 5 |

**41** The following table represents the marks (out of 10) of 5 students in sports and academics. Find the correlation coefficient and comment.

| Students | A | B | C | D | E |
|---|---|---|---|---|---|
| Marks in Sports(x) | 7 | 3 | 6 | 4 | 5 |
| Marks in Academics (y) | 0 | 9 | 2 | 6 | 3 |

**42** Calculate the coefficient of correlation between the price and the demand from the following data, and comment.

| Price(Rs./unit) | 4 | 2 | 3 | 5 | 6 | 2 |
|---|---|---|---|---|---|---|
| Demand(in thousands) | 5 | 7 | 7 | 3 | 2 | 6 |

**43** Calculate the Spearman's rank correlation coefficient for the following:

| Marks 1 | 10 | 3 | 5 | 8 | 9 | |
|---|---|---|---|---|---|---|
| Marks 2 | 7 | 6 | 2 | 3 | 4 | |

44 Calculate the Spearman's rank correlation coefficient for the following:

| Marks1 | 30 | 40 | 50 | 10 | 40 | 70 | |
|---|---|---|---|---|---|---|---|
| Marks2 | 75 | 32 | 45 | 15 | 20 | 45 | |