**Exercises :-- Unit - I**

**1). What do mean by Correlation? Point out the significance of its study to the students of Commerce.**

**2). What is meant by correlation ? Distinguish between positive, negative and zero correlation.**

**3). What is meant by correlation ? Give the general rules for interpreting its coefficient.**

**4). Explain the meaning and significance of the concept of correlation. How will you calculate its from a statistical point of view?**

**5) Define Karl Pearson’s coefficient of correlation. What is it intended to measure? How would you interpret the sign and magnitude of a correlation coefficient?**

**6) What is Rank correlation. Write down Spearman’s formula for rank correlation coefficient.**

**7) What is Probable error? Explain the uses of Probable error.**

**8) What is rank correlation? Explain its method.**

**9) What do mean by rank correlation? Explain its Merits and Demerits**

**10)Define Karl Pearson’s coefficient of correlation and explain the various formulas.**

**11) The following table shows the marks obtained by students in accountancy and statistics. Find Karl Person’s Coefficient of correlation.**

**Accountancy : 45, 70, 65, 30, 90, 40, 50, 75, 85, 60**

**Statistics : 35, 90, 70, 40, 95, 40, 60, 80, 80, 50**

**12) Calculate coefficient of correlation from the following.**

 **X : 42, 44, 58, 55, 89, 98, 66.**

 **Y : 56, 49, 53, 58, 65, 76, 58.**

**13) Calculate coefficient of correlation between the birth rate and the death rate :-**

 **Country : A, B, C, D, E, F, G, H, I, J**

 **Birth rate : 22, 12, 10, 16, 15, 8, 9, 10, 8, 20.**

 **Death rate : 14, 6, 7, 12, 10, 6, 8, 7, 6, 9**

**14) The following marks are obtained by 12 students in Mathematics and Statistics. Calculate coefficient of correlation and P.E.**

**Students: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12**

**Marks in Maths: 50, 54, 56, 59, 60, 62, 61, 65, 67, 71, 71, 74**

**Marks in Stata: 22, 25, 34, 28, 26, 30, 32, 30, 28, 34, 36, 40.**

**15) Calculate the coefficient of correlation between supply and price.**

**Year : 2012, 2013, 2014, 2015, 2016, 2017**

**Supply: 10, 12, 16, 21, 23, 25**

**Price : 24, 33, 27, 20, 16, 10**

**16) Calculate Karl Pearson’s coefficient of correlation from the following data, using 20 as the working mean for price and 70 as the working mean for demand.**

 **Price: 14, 16, 17, 18, 19, 20, 21, 22, 23**

 **Demand: 84, 78, 70, 75, 66, 67, 62, 58, 60.**

**17) Find the coefficient of correlation between price and Sales(in unit) from the following data and state the significance of coefficient of correlation:**

 **Price: 103, 85, 90, 88, 93, 95.**

 **Sales: 500, 650, 670, 700, 500, 68**

**18) The table below shows the number of Vehicles with licences and the number of Motor Vehicles accidents in a city. Calculate coefficient of correlation and P.E.**

 **Years ; 2011, 2012, 2013, 2014, 2015, 2016, 2017 2018**

 **No. of Vehicles(‘000): 2.6, 2.8, 2.9, 3.1, 3.2, 2.3, 2.5, 1.8**

 **No. of accidents(‘000) 5.9, 6.0, 6.2, 6.2, 7.6, 7.0, 7.4, 5.5**

**19) Calculate Karl Pearson’s coefficient of correlation from the value of X and Y And determine the limit of coefficient of correlation.**

 **X: 100, 103, 105, 113, 122, 133, 137, 140, 15O.**

 **Y: 95, 98, 114, 117, 188, 124, 102, 115, 131.**

**20) Calculate Coefficient of correlation from the following data taking deviation from 48 in case of X series and 20 in case of Y series.**

 **X : 40, 42, 46, 48, 50, 56.**

 **Y: 10, 12, 15, 23, 27, 30**

 **21) Calculate Karl Pearson’s coefficient of correlation.**

 **Price of Share A: 160, 164, 172, 182, 166, 170, 178.**

 **Price of Share B: 292, 280, 260, 234, 266, 254, 230.**

**22) From the following data calculate coefficient of correlation between age and Percentage of students playing in an educational institution.**

 **Age : 16, 17, 18, 19, 20.**

 **No. of Students: 400, 300, 200, 150, 100.**

**No. of Players : 120, 105, 80, 75, 60**

**21) The following table gives the value of X and Y in 12 month.**

 **X : 57, 42, 40, 38, 42, 45, 42, 44, 40, 46, 44, 43.**

 **Y : 10, 26, 30, 41, 29, 27, 27, 19, 18, 19, 31, 29.**

**22) Calculate coefficient of correlation and P.E.**

 **Year: 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018**

 **Production: 100, 102, 103, 105, 106, 104, 103, 98**

 **Profit ( in’000): 10.5, 11.4, 13.0, 11.5, 12.0, 12.5, 15.6 20.8**

**23) Calculate Karl Pearson’s coefficient of correlation by direct method ( using actual mean):**

 **Area(Million Acres): 74.1, 77.3, 76.1, 77.9, 79.3, 79.1.**

 **Production (Million Tonnes): 22.5, 27.8, 24.8, 27.2, 28.3, 24.8.**

**24) From the following data determine the Karl Pearson’s coefficient of correlation taking 79 and 132 as the average X and X variable respectively.**

**X : 61, 68, 79, 59, 69, 96, 89, 78.**

**Y : 108, 123, 136, 107, 112, 156, 137, 125.**

**25) From the following data find out the Spearman’s Rank correlation and comment on the result.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Roll No.****Marks in Commerce:****Marks in Economics** | **1****60****42** | **2****56****34** | **3****25****56** | **4****90****35** | **5****35****40** | **6****14****50** | **7****52****45** | **8****27****60** | **9****54****58** | **10****72****36** |

**26) Find out the Spearman’s coefficient of rank correlation from the following data relating to the rank assigned by the two Judges on a certain competition.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Candidates:****Marks by Judge A****Marks by Judge by B** | **A****26****52** | **B****25****25** | **C****38****30** | **D****37****35** | **E****41****48** | **F****45****77** | **G****60****38** | **H****42****43** | **I****53****68** | **J****57****64** |

**27) from the following data relating to the marks secured by a batch of candidates ascertain the rank coefficient of correlation and interprete the results.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Candidates****Marks in Eng****Marks in Eco****Marks in Comm** | **A****50****58****70** | **B****40****60****68** | **C****50****48****75** | **D****35****50****40** | **E****37****30****80** | **F****18****32****50** | **G****30****45****30** | **H****22****37****85** | **I****15****42****25** | **J****5****52****90** |

**28)From the following data relating to the Sales and net profit of a firm find the rank correlation coefficient.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  **Sales in Rs****Profit in Rs** | **60****30** | **80****40** | **90****50** | **60****40** | **100****60** | **130****70** | **120****40** | **110****75** |

**29) From the following data relating to the cost and profits of a concern find out the rank coefficient of correlation and interpret results.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year****Cost****Profit** | **1****50****10** | **2****60****20** | **3****65****25** | **4****50****15** | **5****55****20** | **6****60****30** | **7****60****35** | **8****30****5** | **9****40****7** |

**Unit II**

**EXERCISES**

**1) .What is regression? Analysis.**

**2) .Denote in brief the various types of regression analysis.**

**3). What is a regression line ? Why there are two regression lines ?**

 **4) .State the characteristics of a straight line of regression.**

 **5). Describe in detail the various limitations of regression analysis.**

**6) .Explain in brief the various methods of studying regression between any two variables.**

 **7). From the following data obtain the two regression equation :**

**X : 6, 2, 10, 4, 8**

**Y : 9, 11, 5, 8, 7.**

**Ans:- X = - 1.3y + 16.4, Y = - 0.65x + 11.**

**8.) The following table gives aptitude test scores and productivity indices of 8 randomly selected workers. Find the equation to the line which can be used to predict the productivity index from the aptitude score. Estimate the productivity index of a worker whose test score is 66. (Ans: Y = 0.67x + 29, Y = 73)**

 **Aptitude Score (X) : 57, 58, 59, 59, 60, 61, 62, 64.**

 **Productivity (Y ) : 67, 68, 65, 68, 72, 72, 69, 71.**

**9) From the following data find the two regression equation**

 **X : 6, 2, 10, 4, 8**

 **Y : 9, 11, 5, 8, 7.**

 **(Ans- X + 1.3Y = 16.4 , Y + 0.65X =11.9)**

**10) From the data given below find**

 **i) The two regression equation,**

 **ii)The coefficient of correlation between marks in Economics and Statistics.**

 **iii) The most likely marks in Statistics when the marks in Economics are 30.**

 **Marks in Economics: 25, 28, 35, 32, 31, 36, 29, 38, 34, 32.**

 **Marks in Statistics ; 43, 46, 49, 41, 36, 32, 31, 30, 33, 39**

 **(Ans;- X = 40.892 – 0.234Y, y= 59.248 – 0.664 X, r = - 0.394, Marks in stat =39.328 or 39)**

**11) The height of father and Sons are given in the following table.**

 **Height of father( inches): 65, 56, 67, 67, 68, 69, 71, 73.**

**Height of Sons :(inches): 67, 68, 64, 68, 72, 70, 69, 70,**

**From the two lines of regression and calculate the expected average height of the son when the height of the father is 67.5 inches**

**(Ans: Y = 0.424x + 39.56, Y = 68.18)**

**12) From the following data, obtain the two regression equation:**

 **Sales: 91, 97, 108, 121, 67, 124, 51, 73, 111, 57**

**Purchase: 71, 75, 69, 97, 70, 91, 39, 61, 80, 47.**

**Otherwise find correlation coefficient between sales and purchases.**

 **( Ans: X = 1.36Y – 5 .2 , Y = 0.61X + 15.1 , r = 0.91)**

**13) A panel of two Judges P and Q graded 7 dramatic performances in by independently awarding marks as follows.**

**Performance: 1, 2, 3, 4, 5, 6, 7**

**Marks by P:- 46, 42, 44, 40, 43, 41, 45**

**Marks by Q:- 40, 38, 36, 35, 39, 37, 41**

**The eight performance however, which Judge Q could not attend, was awarded 37 marks by Judge P. If Judge Q had also been present, how many marks would be expected to have been awarded to the eight performance? (Ans: 33.5 marks).**

**14) Following marks have been obtained by a batch of students in statistics(out of 100)**

**Sr.No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11.**

**Paper 1st: 80, 45, 55, 56, 58, 60, 65, 68, 70, 75, 85.**

**Paper 2nd : 82, 56, 50, 48, 60, 62, 64, 65, 70, 74, 90**

**Write down two regression equation and coefficient of correlation.**

**15) Following shows the mean and standard deviation of the prices of 2 shares on the Mumbai stock Exchange.**

 **Shares Mean Standard deviation**

 **A. Co. Ltd. 39.5 10.8**

 **B .Co. Ltd 47.5 16.8**

 **If the coefficient of correlation between the prices of the two shares is Rs.0.42. Find the most likely price of share A corresponding of Rs. 55 observed in the case of share B.**

**16) The following results were worked out from scores in Statistics and Mathematics in a certain examination:**

 **Scores in Statistics Scores in Mathematics**

 **Mean 39.5 47.5**

 **Standard deviation 10.8 17.8**

**Karl Pearson’s correlation coefficient between XY = + 0.42. Find both the regression lines. Use these regression and estimate the value of Y for X = 50 and also estimate the value of X and Y = 30 ( Ans- X = 0.255Y+27.388, Y = 0.692X +20.166, when X = 50, shall be 54.766, when Y =30, X shall be 35.038)**

**17) The following data relate to marks obtained by 250 students in Accountancy and statistics in the M. Com. Examination of a University.**

 **Subject Arithmetic mean Standard deviation**

**Accountancy 48 4**

**Statistics 55 5**

**Coefficient of correlation between marks in Accountancy and Statistics = +0.8. Draw the two lines of regression and estimate the marks obtained by a students who secured 50 marks in Accountancy. (Ans:- X =0.64Y + 12.8, Y =X +7, Stat =57)**

**18) From the following results obtain the two regression equations and estimate the yield of crops when the rainfall is 29 cms. And the rainfall when the yield is 600 kg. Yield (in kg) Y Rainfall( in cm) X**

**Mean 508.4 26.7**

**Standard deviation 36.8 4.6**

**Coefficient of correlation between yield and rainfall = 0.52.(Ans: X =32.654, Y =488.848.)**

**19) From the following data of rainfall and production of rice, find the most likely production corresponding to the rainfall 40 cms.**

 **Rainfall Production**

 **Mean 35 50**

 **Standard deviation 5 8**

 **Coefficient of correlation + 0. 8 (Ans: X =40, Y will be= 56.)**

**20) Following data based on 563 candidates are given for the marks in Financial Accounting and Statistical Analysis.**

 **Mean marks in Financial Accounting 50**

 **S.D.of marks in Financial Accounting 15**

 **Mean marks in Statistical Analysis 60**

 **S.D. of marks in Statistical Analysis 20**

 **Sum of the product of the deviation of marks from their respective mean are 105188.**

 **Find out i)Lines of regression**

 **ii) Marks in statistical analysis when the marks in financial accounting is 63. (Ans: X = 0.465Y + 22.1, Y = 0.827X + 18.65, Y = 70.751)**

**21) For certain X and Y series, which are correlated, the two lines of regression are:-**

 **5X – 6Y + 90 = 0**

 **15X – 8Y – 130 = 0**

 **Find which of that is X on Y. Find the means of the two series, and the coefficient of correlation between them.( Ans : Ax =30, Ay = 40, r = 0.667)**

**22) You are supplied with the following data:**

 **Variance of X = 36**

 **12X – 15Y + 90 = 0**

 **60X – 27Y = 321**

**Calculate i) The average value of X on Y.**

 **ii) The standard deviation Y on X.**

 **Iii) Coefficient of correlation between X and Y.**

 **(Ans ; Ax = 13, Ay =17, r = 0.6, S.D. of y =8)**

 **23) Given the 2x – 3y + 4 = 0**

 **4y – 5x – 8 = 0**

 **Calculate i) Ax and Ay**

 **Ii) Coefficient of correlation**

 **iii) If the S.D. of X is 3 find out S.D. of y.**

 **24) Following regression equation were obtained in a certain investigation.**

 **X = 19.13 – 0.87Y**

 **Y = 11.64 – 0.50x**

 **Find out i) Mean value of x & y**

 **Ii) Correlation.**

 **25) If regression equation of Y on X & X on Y are given as under respectively. From that Find out i) Mean value of X & Y ii) Correlation.**

 **5y + 8x – 65 = 0**

 **15y + 4x = 95**

**26) In a partially destroyed record the following data are available.**

 **Variance = 25**

 **Regression equation of x on y = 5x – y = 22**

 **Regression equation of y on x = 64x – 45y = 24**

 **Find i) Mean value of x & y**

 **ii) Coefficient of correlation between x & y.**

 **Standard deviation of y. (Ans: Ax 6, Ay = 8, S.D. of y 13.33)**

**27 ) For a bivarate data the mean value of x is 20 & the mean value of y is 45. The regression coefficient of y on x is 4 & that of x on y is 1/9**

 **Find out i) Coefficient of correlation**

 **ii) Standard deviation of x if the S.D. of y is12.**

 **Iii) Also write down the equation of regression lines.**

**28) Find the mean value of two random variable X and Y and correlation coefficient. If the variance of y is 15 . Find the Standard deviation of X.**

 **The two regression lines are ; 5x + 7y – 22 = 0 , and 6x + 2y – 20 = 0.**

**Unit III**

**EXERCISES;-**

1. **Define index number and bring out its essential characteristics.**
2. **Explain the various types of index number.**
3. **Explain the significance and limitation of index number.**
4. **What is a cost of living index number? Describe the points on which you would proceed to construct a cost of living index number.**
5. **What are index numbers? Discuss the various problem that faced in the construction of an index number.**