**Practical No.: 15**

**STATEMENT:**

THE ANNUAL ADVERTISING EXPENDITURE (IN LAKH Rs) AND THE CORRESPONDING ANNUAL SALES (IN CRORE Rs) FOR THE PAST 10 YEARS OF A COMPANY ARE PRESENTED IN THE FOLLOWING TABLE.

|  |  |  |
| --- | --- | --- |
| YEAR | ANNUAL ADVERTISING EXPENDITURE | ANNUAL SALES REVENUE |
| 1 | 10 | 20 |
| 2 | 12 | 30 |
| 3 | 14 | 37 |
| 4 | 16 | 50 |
| 5 | 18 | 56 |
| 6 | 20 | 78 |
| 7 | 22 | 89 |
| 8 | 24 | 100 |
| 9 | 26 | 120 |
| 10 | 28 | 110 |

1. FIND THE CORRELATION COEFFICIENT BETWEEN ANNUAL ADVERTISING EXPENDITURE AND ANNUAL SALES REVENUE AND COMMENT THE RESULT.
2. DEVELOP THE REGRESSION MODEL OF SALES AS A FUNCTION OF ADVERTISING EXPENDITURE.
3. PREDICT THE VALUE OF ANNUAL SALES WHILE ADVERTISING EXPENDITURE WAS 27 LAKH RUPEES.

**WORKING EXPRESSION:**

1. **Correlation Coefficient**: Correlation coefficients are used in statistics to measure how strong a relationship is between two variables. There are several types of correlation coefficient: Pearson’s correlation (also called Pearson’s R) is a correlation coefficient commonly used in linear regression. The formulas return a value between -1 and 1, where:

1 indicates a strong positive relationship.

-1 indicates a strong negative relationship.

A result of zero indicates no relationship at all.

r =

1. **Linear Regression:** Simple linear regression is a statistical method that allows us to summarize and study relationships between two continuous (quantitative) variables:

* One variable, denoted x, is regarded as the predictor, explanatory, or independent variable.
* The other variable, denoted y, is regarded as the response, outcome, or dependent variable.

Linear Regression equation of y on x is given by:

)

Where,

**CALCULATION:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year** | **Annual Advertising**  **Expenditure(X)** | **Annual Sales Revenue(Y)** | **X2** | **XY** | **Y2** |
| 1 | 10 | 20 | 100 | 200 | 400 |
| 2 | 12 | 30 | 144 | 360 | 900 |
| 3 | 14 | 37 | 196 | 518 | 1369 |
| 4 | 16 | 50 | 256 | 800 | 2500 |
| 5 | 18 | 56 | 324 | 1008 | 3136 |
| 6 | 20 | 78 | 400 | 1560 | 6084 |
| 7 | 22 | 89 | 484 | 1958 | 7921 |
| 8 | 24 | 100 | 576 | 2400 | 10000 |
| 9 | 26 | 120 | 676 | 3120 | 14400 |
| 10 | 28 | 110 | 784 | 3080 | 12100 |
|  |  |  |  |  |  |

1. **For the calculation of Correlation Coefficient ( r ):**

We have, n =10

r =

r =

r = 0.958

1. **For finding out Regression Equation of y on x:**

**Finding out byx:**

**For**

**For**

Linear Regression equation of y on x is given by:

)

Or,)

Or,

🡪

1. **When Advertising expenditure is 27(lakh) i.e when x = 27, then the value of annual sales revenue(y) is**

**RESULT:**

Therefore, the correlation coefficient is 0.985, the regression equation is. And, the value of annual sales when the advertising expenditure was 27 lakh rupees is Rs. 114.912 lakhs.

**CONCLUSION:**

In this way, correlation coefficient and linear regression were determined with the help of Microsoft Word and Microsoft Excel.