**FACULTY OF ENGINEERING AND TECHNOLOGY**
**DEPARTMENT OF APPLIED SCIENCE AND HUMANITIES**
**4th SEMESTER B.TECH PROGRAMME**
**PROBABILITY, STATISTICS AND NUMERICAL METHODS (203191254)**
**ACADEMIC YEAR 2022-2023**

# Assignment 1

1. The sale and expenditure of 10 companies are given below. Find the coefficient of correlation between sales and expenditure.

| Sales | 50 | 55 | 55 | 60 | 65 | 65 | 65 | 60 | 60 | 50 |
|---|---|---|---|---|---|---|---|---|---|---|
| Expenditure | 11 | 13 | 14 | 16 | 16 | 15 | 15 | 14 | 13 | 13 |

2. Two ladies were asked to rank 7 different types of bags. The rank given by them are as follows. Find the Spearman's Rank Correlation Coefficient.

| Bags | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| Neelu | 2 | 1 | 4 | 3 | 5 | 7 | 6 |
| Neena | 1 | 3 | 2 | 4 | 5 | 6 | 7 |

3. The following table gives the scores obtained by 11 students in English and Hindi. Find the rank correlation coefficient.

| Scores in English | 40 | 46 | 54 | 60 | 70 | 80 | 82 | 85 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Scores in Hindi | 45 | 45 | 50 | 43 | 40 | 75 | 55 | 72 | 65 | 42 | 70 |

4. Find the equation of regression lines from the following data and also estimate y for x=1 and x for y=4.

| x | 3 | 2 | -1 | 6 | 4 | -2 | 5 | 7 |
|---|---|---|---|---|---|---|---|---|
| y | 5 | 13 | 12 | -1 | 2 | 20 | 0 | -3 |

5. Fit a line of best fit to the following data:

| x | 2 | -1 | 4 | 0 | -2 | -4 | -3 | -2 |
|---|---|---|---|---|---|---|---|---|
| y | 2 | 5 | 3 | 3 | 1 | 0 | 1 | -3 |

6. By the method of least squares, fit a second-degree curve to the following data:

| x | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| y | 5 | 12 | 26 | 60 | 97 |

Also, estimate $y$ at $x = 6$.

7. Fit a curve of the form $y = ae^{bx}$ to the following data:

| x | 1 | 3 | 5 | 7 | 9 |
|---|---|---|---|---|---|
| y | 115 | 105 | 95 | 85 | 80 |

| | |
|---|---|
| 8. | A card is drawn from a well-shuffled pack of 52 cards. Find the probability of getting (i) a king, (ii) a face card, (iii) a red card, (iv) a queen or a club, (v) a card between 2 and 7, both inclusive. |
| 9. | The probability that a student passes a Physics test is $\frac{2}{3}$ and the probability that he passes both Physics and English tests is $\frac{14}{45}$. The probability that he passes at least one test is $\frac{4}{5}$. What is the probability that the students passes the English test? |
| 10. | A husband and wife appeared in an interview for two vacancies in an office. The probability of the husband's selection is $\frac{1}{7}$ and that of the wife's selection is $\frac{1}{5}$. Find the probability that (i) both of them are selected, (ii) only one of them is selected, (iii) none of them is selected, and (iv) at least one of them is selected. |
| 11. | A factory has two machines, $A$ and $B$. Past records show that the machine $A$ produces $30\%$ of the total output and the machine $B$, the remaining $70\%$. Machine $A$ produces $5\%$ defective articles and Machine $B$ produces $1\%$ defective articles. An article is drawn at random and found to be defective. What is the probability that it was produced by (i) Machine $A$, (ii) Machine $B$. |
| 12 | Two cards are drawn from the pack of 52 cards. Find the probability that both are diamonds or both are kings. |
| 13 | Two dice are thrown together. What is the probability that the number obtained on one of the dice is multiple of number obtained on the other dice? |
| 14 | Three bags contain 3 red, 7 black; 8 red, 2 black, and 4 red & 6 black balls respectively. 1 of the bags is selected at random and a ball is drawn from it. If the ball drawn is red, find the probability that it is drawn from the third bag. |
| 15 | In a lottery, there are 10 prizes and 25 blanks. A lottery is drawn at random. What is the probability of getting a prize? |