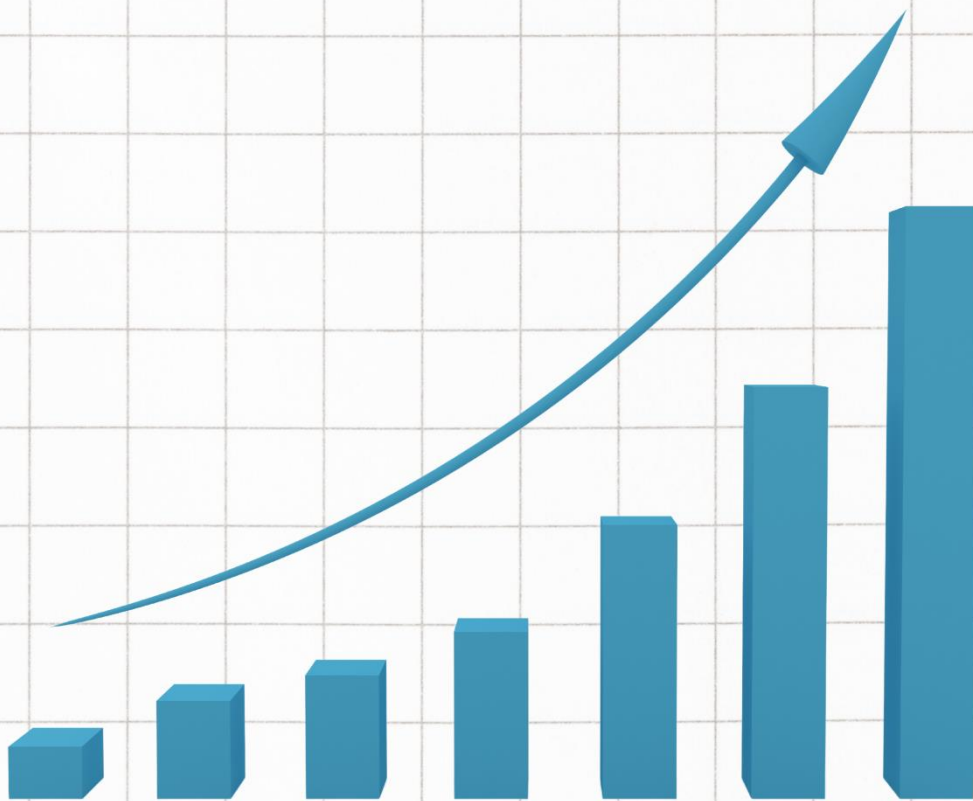


ISBN: 978-93-91768-41-6

# TUTORIAL BOOK ON MATHEMATICAL AND STATISTICAL TECHNIQUES - I

**Dr. Shailesh Shashikant Jadhav**



**First Edition: 2022**

**TUTORIAL BOOK ON  
MATHEMATICAL AND STATISTICAL TECHNIQUES - I**

**(ISBN: 978-93-91768-41-6)**

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*Bhumi Publishing*

**2022**

***First Edition: 2022***

**ISBN: 978-93-91768-41-6**



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Published by:

Bhumi Publishing,

Nigave Khalasa, Kolhapur 416207, Maharashtra, India

Website: [www.bhumipublishing.com](http://www.bhumipublishing.com)

E-mail: [bhumipublishing@gmail.com](mailto:bhumipublishing@gmail.com)

Book Available online at:

<https://www.bhumipublishing.com/books/>



## **PREFACE**

*It gives me a great pleasure to present this book on Mathematics & Statistical Technique for the students of F. Y. B. Com. This book is written as per revised syllabus of University of Mumbai from the academic year 2016-2017.*

*The book is consisted of plenty of practice examples which are beneficial for tutorial course for the students. Each chapter of this book is divided into subtopics for better understanding of problems. I hope that the students will find this book of great help. In spite of this, suggestion from students and readers are always welcome.*

*I express my gratitude to honorable Secretary, Shivai Shikshan Prasark Mandal, Adv. Kale S.S and Vice secretary, Shivai Shikshan Prasark Mandal, Adv. Deshmukh V.S. for encouragement to carry out this work. I also express my sincere thanks to Principle, Sundarrao More College of Arts, Commerce & Science, Dr. Raverkar D.P. for his valuable guidance. I am also thankful to Bhumi Publication for their efforts that they have taken to publish this book in time.*

- **Dr. Shailesh Shashikant Jadhav**

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## **STUDENT PROFILE**

- 1. Name of the Student** :
- 2. Contact number** :
- 3. Address** :
- 4. Email** :
- 5. Blood group** :
- 6. Remark of Teacher** :

**Signature of the Student**

**Signature of the Teacher**

## **1. SHARES**

### **1.1 Share**

**Ex. 1. Ram purchased 230 shares at market value of ₹ 300 each and brokerage 0.6%.**

**Calculate the amount he paid for the transaction.**

**Ans.**

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**Ex. 2. How many shares of market value ₹ 200 each can be bought for ₹ 60, 000, brokerage on the transaction is 0.4%?**

**Ans.**



**Ex. 3. Find the number of shares of market value ₹ 1000 was sold for the sum of ₹ 50,000, the brokerage being 0.6%?**

**Ans.**

**Ex. 4. Rajani purchased 300 shares at market value of ₹ 90 each. How much amount is required for the transaction, if the brokerage was 1%?**

**Ans.**

**Ex. 5. Sandip decided to buy 400 shares at market value of ₹ 150 per share, with the brokerage as 0.2 %. Calculate the amount he will need to pay.**

**Ans.**

**Ex. 6. Anita sold her shares of SCI, whose market value was ₹ 200 per share and received the amount ₹ 59, 850. If her broker Parag Parikh charged 0.25% brokerage, find the number of shares sold by her.**

**Ans.**

## **1.2 Dividend**

**Ex. 1. Ramesh bought 400 shares of SBI, whose face value was ₹ 15 per share. The company declared 75% dividend on the shares. However, if his rate of return on dividend is only 2 %, find the purchase price of shares.**

**Ans.**

**Ex. 2. An investor bought 300 shares of HDFC bank with face value 1, at the market price of ₹ 500. If the company declared 150 % dividend, what dividend will he get per share and on his total investment? Also find his rate of return.**

**Ans.**

**Ex. 3. Shradha bought shares of a company at the market value of ₹ 50 per share, the face value of the share being ₹ 10. If his rate of return is 25%, find the dividend declared by the company.**

**Ans.**

**Ex. 4. The companies C and D have shares with face value of ₹ 150 each and the market price of their shares are ₹ 110 and ₹ 120 respectively. If the dividends declared by the company C is 16 % and the company D is 20%, which company is better to buy?**

**Ans.**



**Ex. 5 Sunil bought 4000 shares with market value 230 of each share. If the dividend declare is 20 % on face value ₹ 100. Find the sum he gain on dividend.**

### **1.3 Splitting of Shares**

**Ex. 1. Nanda purchased 160 shares of a company at market value of ₹ 300 per share. If the company declared 6 bonus shares for every 8 shares held. Determine the number of shares held by Nanda, after the bonus issue. Also, if the market value of each share after bonus is ₹ 400, find Nanda assets and his gain after the bonus.**

**Ans.**

## **2. MUTUAL FUNDS**

### **2.1 Entry / Exit load**

**Ex. 1. Ritesh paid ₹ 30, 000 in a mutual fund with NAV = ₹ 20. Find the number of units purchased by him if:**

- a) Entry load is zero,**
- b) Entry load is 1 % only.**

**Ans.**

**Ex. 2. Ganesh sold his 120 units of a Mutual Fund when the NAV was ₹ 10.5. Find the amount gained by him if:**

- a) The exit load was 2%,**
- b) Exit load is zero.**

**Ans.**

**Ex. 3. Ganesh invested ₹ 10, 000 in Ambuja cement and received 50 units. If the entry load is 2%. Find the NAV at the time of deal.**

**Ex. 4. Sangita sold 50 units of HDFC Mutual Fund and received ₹ 36293.4. If the exit load is 1%, find the NAV of the units on the day of sale.**

**Ans.**

**Ex. 5. 35 units of mutual fund were brought when the NAV was ₹ 50. Before receiving any dividend, these were sold at NAV of ₹ 50. If the entry load and exit load are 2% and 2.5 % respectively. Find the amount invested, and the amount received on sale. Also find the gain/or loss in this transaction.**

**Ans.**

**Ex. 6. Sandhya invested ₹ 20, 000 in a Mutual Fund when NAV was ₹ 140. After receiving a dividend of 25%, he sold the units at the NAV of ₹ 136. If the entry load is 1.5% and the exit load is 0.5%, find his gain or loss in this deal.**

**Ans.**



## **2.2 The systematic investment plan (S.I.P)**

**Ex. 1. An investor joined the S.I.P. scheme for a M.F. under which he would invest ₹ 750 for 4 months. If the N.A.V. for each month are ₹ 75, ₹ 60, ₹ 25 and ₹ 50. Find the average unit cost occurred to him using the Rupee Cost Averaging Method. Also find the Arithmetic mean of the prices of the units and comment.**

**Ans.**

### 3. PERMUTATION AND COMBINATION

#### 3.1 Permutation

**Ex. 1. Find n, if**

a)  $3({}^n P_4) = {}^n P_5$

b)  $2{}^n P_5 = 60 ({}^n P_3)$

c)  ${}^n C_4 = {}^n C_5$

**Ans.**

**Ex. 2. Find the value of  $^{1000}C_{998}$ ,  $^{10000}C_{9997}$ ,  $^{10000}C_{9999}$ .**

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**Ex. 3. How many seating arrangement can be made for 6 students on 3 chairs?**

**Ans.**

**Ex. 4. Team of Seven persons including four students and three professors, sit in a line for photograph. How many different arrangements can be done, if following hold**

- i) Anybody can sit anywhere,**
- ii) Students occupy the end seats,**
- iii) Professors occupy the end and the middle seat.**

**Ans.**

### **3.2 Permutation with reputation**

**1. Find the number of words that can be formed from “ABBRACADABRRRAAAA.”**

**Ans.**

**Ex. 2. How many different arrangements can be made using the letter of word MATHEMATICS? How many of these will begin with H and end with vowel?**

### **3.3 Combination**

**Ex. 1. Among 6 professors and 10 students, a committee of 3 professors and 4 students is to be formed. Find the number of ways this can be accomplished if:**

- i) A particular professor is selected,**
- ii) A particular student is selected,**
- iii) A particular student is excluded,**
- iv) There is no restriction on selection.**

**Ans.**



**Ex. 2. The value of  $\frac{7!}{5!} - \frac{8!}{5!}$  is .....**

**Ans.**

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**Ex. 3. Evaluate the value of  ${}^{50}C_0 + {}^{50}C_{49} + {}^{51}C_{51}$**

**Ans.**

**Ex. 4. 5 books on Algebra, 4 on Analysis, 3 on Number theory , 1 on Calculus are to be arranged in such a way that the books on same subject are together. Find the number of arrangement.**

**Ans.**

**Ex. 5. Find the total number of three digits that can be formed by using from 6 to 9 in such a way that no digit is repeated.**

**Ans.**

#### **4. LINEAR PROGRAMMING**

##### **4.1 Formulation of Linear Programming Problem**

**Ex. 1.** A XYZ dealers' deals in two items, keypad and pen drive. He has ₹ 40, 000 to invest and space to store 50 pieces. One keypad costs him ₹ 1000 and one pen drive costs ₹ 400. Construct the problem to maximize the profit, if the profit per keypad is ₹ 200 and per pen drive is ₹ 400.

**Ans.**

#### **4.2. Solution set**

**Ex. 1. Shade the convex region represented by each inequality given below**

**a)  $4x+y \geq 8$ ,  $2x+3y \geq 6$ ,  $x+y \geq 8$ ,  $x \geq 0$ ,  $y \geq 0$**

**b)  $x+2y \leq 6$ ,  $2x+y \leq 6$ ,  $x \geq 0$ ,  $y \geq 0$**

**Ans.**

### **4.3 Graphical Method**

**Ex. 1. Solve the following linear programming problem.**

**Maximise  $z = 6x + 7y$  subject to constraints**

**$2x + 4y \leq 8$ ,  $3x + 2y \leq 12$ ,  $x \geq 0$ ,  $y \geq 0$ .**

**Ans.**

**Ex. 2. Solve the following linear programming problem.**

**Maximise  $z = 6x + 7y$  subject to constraints**

**$2x + 4y \leq 8, 3x + 2y \leq 12, x \geq 0, y \geq 0.$**

**Ans.**



**Ex. 3. Solve the linear programming problem**

**Maximise  $z = 21x + 32y$  subject to constraints**

**$x + y \leq 3$ ,  $x + 2y \leq 12$ ,  $3x + y \leq 21$ ,  $x \geq 0$ ,  $y \geq 0$ .**

**Ans.**

**Ex. 4. Which among following is true?**

- a) Every L.P.P always have a solution**
- b) Every L.P.P always have a unique solution**
- c) L.P.P can never have a unique solution**
- d) L.P.P has a solution, it may or may not be unique**

**Ans.**

**Ex. 5. A solution of L.P.P. whenever exist, is**

- a) Anywhere in XY plane      b) within the feasible region**  
**c) In every convex region      d) in every concave region**

**Ans.**

## **5. INTRODUCTORY LECTURE**

### **5.1 Basic concepts**

**Ex. 1. Define the Statistics.**

**Ans.**

**Ex. 2. Each object of the population is called as a**

**a) Sample b) attribute c) member d) variate**

**Ans.**

**Ex. 3. Qualitative characteristics of an individual is called as**

- a) Sample b) attribute c) member d) variate**

**Ans.**

**Ex. 4. Construct cumulative frequency table less than type for the marks gained by 100 students.**

<b>Marks</b>	<b>0-20</b>	<b>20-40</b>	<b>40-60</b>	<b>60-80</b>	<b>80-100</b>
<b>Number of students</b>	<b>10</b>	<b>20</b>	<b>60</b>	<b>8</b>	<b>2</b>

**Ans.**

## **5.2 Diagrams and Graphs in Statistics**

**Ex. 1. Strength of students in XYZ College for three consecutive years is given below.**

**Represent this data by percentage bar diagram.**

<b>Year</b>	<b>First</b>	<b>Second</b>	<b>Third year</b>
<b>2021</b>	<b>123</b>	<b>110</b>	<b>100</b>
<b>2020</b>	<b>135</b>	<b>130</b>	<b>110</b>
<b>2019</b>	<b>137</b>	<b>108</b>	<b>102</b>
<b>2018</b>	<b>120</b>	<b>108</b>	<b>132</b>

**Ans.**



**Ex. 2. Draw histogram and frequency polygon from the following data**

<b>Weight</b>	<b>40-50</b>	<b>50-60</b>	<b>60-70</b>	<b>70-80</b>	<b>80-90</b>	<b>90-100</b>
<b>No of person</b>	<b>30</b>	<b>40</b>	<b>60</b>	<b>53</b>	<b>25</b>	<b>10</b>

**Ans.**

**Ex. 3. Draw the frequency curve for the following data of annual income of families in XYZ village.**

<b>Income in lakh</b>	<b>0 -5</b>	<b>5-10</b>	<b>10-15</b>	<b>15-20</b>	<b>20-25</b>	<b>25-30</b>
<b>Families</b>	<b>40</b>	<b>30</b>	<b>10</b>	<b>7</b>	<b>4</b>	<b>1</b>

**Ans.**

## 6. MEASURE OF CENTRAL TENDENCY

### 6.1 Arithmetic Mean (A.M)

**Ex. 1. Find the Arithmetic Mean for the following frequency distribution.**

<b>y</b>	<b>2</b>	<b>7</b>	<b>21</b>	<b>32</b>	<b>54</b>	<b>11</b>
<b>f</b>	<b>10</b>	<b>12</b>	<b>11</b>	<b>21</b>	<b>32</b>	<b>18</b>

**Ans.**

**2. If the mean of marks of 30 boys of a class is 50 % and the mean of marks of 54 girls is 28 %, then find the mean of the whole class.**

**Ans.**

## 6.2 Weighted Arithmetic Mean

1. Calculate the Arithmetic Mean and the Weighed Mean for the following data.

<b>x</b>	<b>10</b>	<b>32</b>	<b>14</b>	<b>13</b>	<b>21</b>
<b>w</b>	<b>5</b>	<b>6</b>	<b>3</b>	<b>4</b>	<b>6</b>

**Ans.**

### **6.3 The Median, mode and quartiles**

**Ex. 1. Find the mode for the data given below**

<b>X</b>	<b>5</b>	<b>6</b>	<b>16</b>	<b>13</b>	<b>21</b>
<b>F</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>5</b>

**Ans.**

**Ex. 2. A well-known automobile company took survey of their own customers with respect to positive feedback about service of company. The results of the survey are tabulated below. Find the mode of the data**

<b>Age group of employees</b>	<b>Number of customers</b>
<b>20-30</b>	<b>28</b>
<b>30-40</b>	<b>30</b>
<b>40-50</b>	<b>20</b>
<b>50-60</b>	<b>16</b>

**Ans.**

**Ex. 3. Find median, mode, arithmetic mean and quartiles for the following data**

**a) 5, 6, 11, 8, 9, 14, 11, 6, 8**

**b) 23, 45, 12, 11, 56, 44, 23, 11, 44**

**Ans.**



**Ex. 4. Find the median for each of the following observation**

<b>Class Interval</b>	<b>Frequency</b>
<b>0-25</b>	<b>15</b>
<b>25-50</b>	<b>17</b>
<b>50-75</b>	<b>11</b>
<b>75-100</b>	<b>9</b>

**Ans.**

**Ex. 5. Find the quartiles for following data**

<b>Percentage of students</b>	<b>0-40</b>	<b>40-50</b>	<b>50-60</b>	<b>60-70</b>	<b>70-80</b>	<b>80-90</b>	<b>90-100</b>
<b>No. of students</b>	<b>30</b>	<b>45</b>	<b>60</b>	<b>55</b>	<b>23</b>	<b>6</b>	<b>4</b>

**Ans.**

**Ex. 6. Calculate the quartile deviation and coefficient of quartile deviation for the following**

**a) 32, 12, 45, 32, 22, 55, 32, 45**

**b) 22, 20, 23, 25, 22, 23, 23, 22, 27, 28, 23**

**Ans.**

**Ex. 7. Calculate the quartile deviation and coefficient of quartile deviation for the following**

<b>Marks</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>1</b>
<b>No of students</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>1</b>	<b>4</b>	<b>3</b>

**Ans.**

**Ex. 8. Deciles and Percentiles**

**1. Find  $D_1$ ,  $D_2$ ,  $D_3$  for the following data.**

**25, 11, 23, 36, 29, 35, 21, 33, 7, 4, 2, 5**

**Ans.**

**Ex. 2. The income of 100 employees are given below. Find  $P_{15}$  and  $P_{20}$ . Above what, we have the highest 20% persons?**

<b>Salary in thousand</b>	<b>10-20</b>	<b>20-30</b>	<b>30-40</b>	<b>40-50</b>	<b>50-60</b>	<b>60-70</b>	<b>70-80</b>
<b>No. of employees</b>	<b>16</b>	<b>20</b>	<b>21</b>	<b>28</b>	<b>10</b>	<b>3</b>	<b>2</b>

**Ans.**

## **7. MEASURE OF DISPERSION**

### **7.1 Range**

**Ex. 1. Find range and coefficients for the following**

**a) 23, 20, 12, 34, 65, 70, 4, 12**

**b) 11, 21, 34, 11, 21, 11, 32, 11**

**Ans.**

**Ex. 2. Find the range and its coefficients for the following data**

<b>Marks</b>	<b>40-50</b>	<b>50-60</b>	<b>60-70</b>	<b>70-80</b>	<b>80-90</b>	<b>90-100</b>
<b>No. of students</b>	<b>15</b>	<b>20</b>	<b>25</b>	<b>10</b>	<b>5</b>	<b>2</b>

**Ans.**



## **7.2 Mean deviation**

**Ex. 1. Find mean deviation from mean for the following**

**a) 13, 9, 11, 12, 7, 15, 9, 31, 12**

**b) 213, 121, 111, 121, 213, 109**

**Ans.**

**Ex. 2. Find mean deviation from mean for the following**

<b>y</b>	<b>2</b>	<b>4</b>	<b>6</b>	<b>8</b>	<b>10</b>	<b>12</b>
<b>f</b>	<b>11</b>	<b>9</b>	<b>13</b>	<b>18</b>	<b>8</b>	<b>3</b>

**Ans.**

### 7.3 Variance and standard deviation

**Ex. 1. Calculate the variance and the standard deviation for the following**

<b>y</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>7</b>	<b>9</b>	<b>11</b>
<b>f</b>	<b>3</b>	<b>5</b>	<b>8</b>	<b>6</b>	<b>2</b>	<b>3</b>

**Ans.**

**Ex. 2. Calculate the variance and the standard deviation for the following grouped frequency distribution.**

<b>Class interval</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>7</b>	<b>9</b>	<b>11</b>
<b>Frequency</b>	<b>3</b>	<b>5</b>	<b>8</b>	<b>6</b>	<b>2</b>	<b>3</b>

**Ans.**

**Ex. 3. The standard deviation and mean for the 15 values are 22 and 45 respectively. Similarly the standard deviation and mean for the 20 values are 40 and 35 respectively. Find the mean and standard deviation for the combined set of 35 values.**

**Ans.**

**Ex. 4. Following is a wicket by two ballers on 6 different matches**

<b>Match</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>Batsman C</b>	2	4	4	4	3	1
<b>Batsman D</b>	4	2	4	1	4	3

**Which among two baller are best wicket takers? Which of them is more consistent?**

**Ans.**

**Ex. 5. The set of observations is 1, 2, 3, 4, 5. Since values are equally spread around the mean zero, the mean deviation around its mean is**

- a) 0            b) 1            c) 1.2            d) none of these**

**Ans.**

**Ex. 6. The standard deviation of the above data is**

**a) 2**

**b) 3**

**c) none of these**

**d)  $\sqrt{2}$**

**Ans.**



**Ex. 7. If the mean and coefficient of variation are 10 and 5 respectively. Then the standard deviation is**

- a) 10      b) 50      c) 5      d) none**

**Ans.**

## **8. ELEMENTARY PROBABILITY THEORY**

### **8.1 Examples on random experiment**

**Ex. 1. A perfect cubic die is thrown. Find the probability that:**

- i) An odd number comes up**
- ii) A perfect cube comes up**

**Ans.**

**Ex. 2. Three coins are tossed. Find the probability that:**

**i) Two Tails**

**ii) at least two tails**

**iii) at most two tails**

**Ans.**

**Ex. 3. One card is drawn from pack of cards. Find the probability of getting:**

**i) a queen**

**ii) a Joker**

**iii) a spade or a queen**

**Ans.**

**Ex. 4. Seven men and 6 women are to be seated at random in row for a photograph. Find the probability that no two women are together.**

**Ans.**

**Ex. 5. A card is drawn at random from a well pack of cards. Find the probability that it is a black card or queen.**

**Ans.**

**Ex. 7. There are 35 lottery tickets, numbered from 1 to 35. One of them is drawn at random. What is the probability that the numbers on it is multiple of 5 or 7?**

**Ans.**

**Ex. 8. The probability that Vishal can solve the problem is 0.3 that Sangita can solve it is 0.7 and that Simron can solve it is 0.25. If all of them try independently, what is the probability that the problem is solved?**

**Ans.**



**Ex. 9. A fair coin is tossed thrice. Taking the number of occurrence of Head as a random variable, write down the probability mass function and probability distribution.**

**Ans.**

**8.2 Probability Distribution and Expected Value of random variable**

**Ex. 1. Find  $E(X)$  and  $V(X)$ , where  $X$ = number of teals where 4 coins are tossed.**

**Ans.**

**Ex. 2. For each of the random variable X, whose probability mass functions are given below, find k and hence cumulative distribution function.**

<b>x</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>7</b>
<b>P(x)</b>	<b>0.6</b>	<b>0.4</b>	<b>0.9</b>	<b>K</b>

**Ans.**

**Ex. 3. The probability mass function of a random variable X is given below**

<b>P(x)=</b>		<b>When x=-3, -2</b>
	$\frac{1}{5}$	<b>When x= -1, 0</b>
	$\frac{1}{8}$	
	$\frac{1}{2}$	<b>When x= 0, 1</b>
	$\frac{1}{3}$	<b>otherwise</b>

**Ans.**

**Ex. 4. If for a random variable,  $V(X) = 4$ ,  $E(X^2) = 13$ , find  $E(X)$**

**Ans.**

**Ex. 5. A box contains 4 green chalk, and 5 white chalks. 3 chalks are drawn at random. Find the probability distribution of green chalks drawn.**

**Ans.**

**Ex. 6. Three fair coins are tossed, then the probability of at least one tail is**

- a) 2            b) 3            c)  $\frac{7}{8}$             d)  $\frac{1}{9}$

**Ans.**

**Ex. 7. Six Algebra books and three Analysis books are randomly placed in a row.**

**Then the probability that, no two Analysis books are together is**

a)  $\frac{3}{4}$

b)  $\frac{1}{87}$

c)  $\frac{5}{12}$

d) 3

**Ans.**



**Ex. 8. The XYZ project requires to purchase 5 five machines from Alpha company. The Alpha company has stock of 6 machines of type A and 3 machines of type B. Then the probability that exactly one machine of type B selected is**

a)  $\frac{5}{14}$

b)  $\frac{1}{5}$

c) 2

d)  $\frac{1}{3}$

**Ans.**

## 9. DECISION THEORY

### 9.1 Decision making under uncertainty

Ex. 1. Find the best decision for the payoff matrix, using following criteria

- i) Minimax regret criteria
- ii) Optimistic (Maximin) criteria
- iii) Pessimistic (Maximin) criteria
- iv) Laplace (Equally Likelihood) criteria

States of Nature	Acts			
	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
S <sub>1</sub>	50	60	43	55
S <sub>2</sub>	77	98	120	31
S <sub>3</sub>	33	45	100	134

Ans.

## 9.2 Decision making under uncertainty

Ex. 1. Find the best decision for the payoff matrix, using following criteria

i) Maximum EMV

ii) Minimum EOL

States of Nature	Probability	Acts			
		B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>
S <sub>1</sub>	0.5	50	60	43	55
S <sub>2</sub>	0.3	77	98	120	31
S <sub>3</sub>	0.2	33	45	100	134

Ans.

### 9.3 Decision Tree

1. A manufacturing company has to select one of the two products C or D. Market survey shows the following situation

Demand	Probability		Return from sales in 1000 rupees	
	C	D	C	D
S <sub>1</sub>	0.5	0.2	20	60
S <sub>2</sub>	0.3	0.3	30	50
S <sub>3</sub>	0.2	0.5	79	80

Ans.

### **REFERENCES**

1. Desai R. (2008). Share Bazar, Rajhans Publications
2. Giri, P. K. and Banerjee, J. (2021). Statistical Tools and Techniques, Academic Publishers, 7<sup>th</sup> edition.
3. Joshi, N. A., Chitale, S. G., Rege, S. R., Venket, G. and Pandey, N. N. (2015). Mathematical and Statistical Techniques, 4<sup>th</sup> edition, Sheth Publication.
4. Kapoor, V. K. and Gupta, S. C. (2014). Mathematical Statistics, Sultan Chand and Sons Publications.
5. Sharma, J. K. (2017). Operation Esearch: Theory and Applications, 6<sup>th</sup> edition, Trinity publications.
6. Taha, H. A. (2014). Operation Research: An Introduction, 9<sup>th</sup> edition, Pearson publication
7. Vishwa Nath Maurya, Ram Bilas Misra, Peter K Anderson, Kamlesh Kumar Shukla (2015). Profit Optimization Using Linear Programming Model: A Case Study of Ethiopian Chemical Company, American Journal of Biological and Environmental Statistics. Vol. 1 (2): 51-57. doi: 10.11648/j.ajbes.20150102.12

## NOTES

**TUTORIAL BOOK ON  
MATHEMATICAL AND STATISTICAL TECHNIQUES - I  
ISBN: 978-93-91768-41-6**

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