3.3.2. NUMBER OF BOOKS AND CHAPTERS IN EDITED VOLUMES/BOOKS PUBLISHED AND PAPERS PUBLISHED IN NATIONAL/ INTERNATIONAL CONFERENCE PROCEEDINGS PER TEACHER DURING THE YEAR

NAMES OF THE AUTHORS
DR. MADHAVI JOSHI
DR. MADHAVI JOSHI
MS. SHIVANI VAID
MR. MANU MAHAJAN
DR. SHWETA THAKUR
DR. ANUPAMA TANDON
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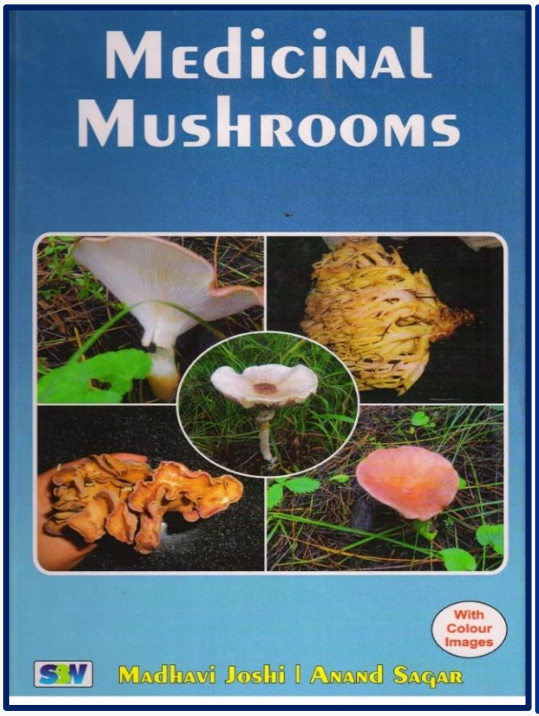
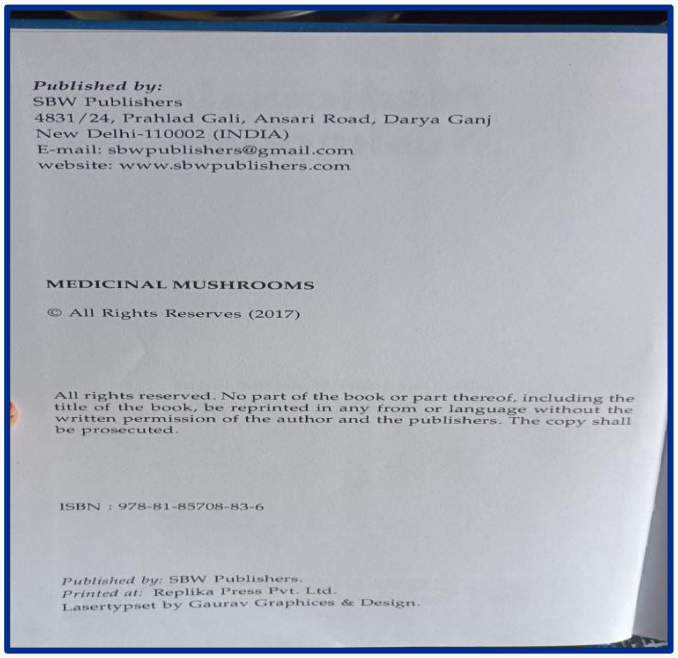
DR. ANUPAMA TANDON

St. Bede's College Shimla

1. Dr. Madhavi Joshi- Department of Botany
Title of Book: Medicinal Mushrooms
Year: 2017-18
ISBN: 976-61-85706-63-6

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SBW Publishers
4831/24, Prahlad Gali, Ansari Road, Darya Ganj
New Delhi-110002 (INDIA)
E-mail: sbwpublishers@gmail.com
website: www.sbwpublishers.com

MEDICINAL MUSHROOMS

ISBN : 978-81-85708-83-6

Published by: SBW Publishers.
Printed at: Replika Press Pvt. Ltd.
Lasertypset by Gaurav Graphices & Design.

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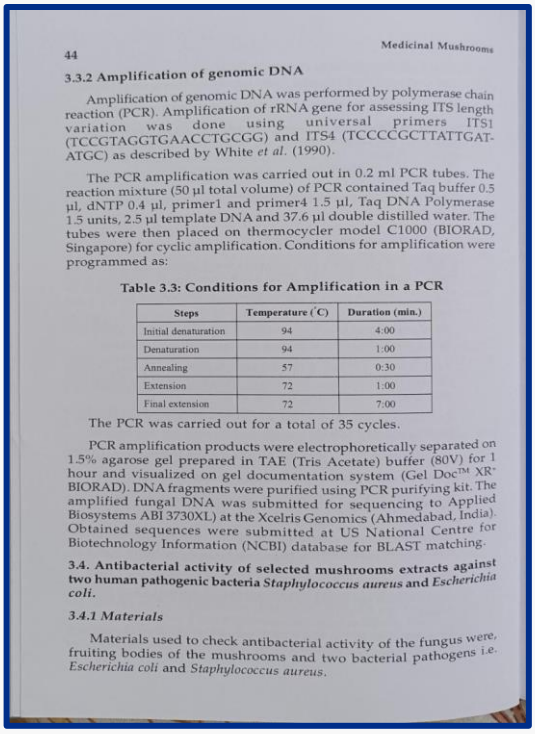


3.3.2 Amplification of genomic DNA

Amplification of genomic DNA was performed by polymerase chain reaction (PCR). Amplification of rRNA gene for assessing ITS length variation was done using universal primers ITS1 (TCCGTAGGTGAACCTGCGG) and ITS4 (TCCCCGCTTATTGATATGC) as described by White *et al.* (1990).

The PCR amplification was carried out in 0.2 ml PCR tubes. The reaction mixture (50 µl total volume) of PCR contained Taq buffer 0.5 µl, dNTP 0.4 µl, primer1 and primer4 1.5 µl, Taq DNA Polymerase 1.5 units, 2.5 µl template DNA and 37.6 µl double distilled water. The tubes were then placed on thermocycler model C1000 (BIORAD, Singapore) for cyclic amplification. Conditions for amplification were programmed as:

Table 3.3: Conditions for Amplification in a PCR

Steps	Temperature (°C)	Duration (min.)
Initial denaturation	94	4:00
Denaturation	94	1:00
Annealing	57	0:30
Extension	72	1:00
Final extension	72	7:00

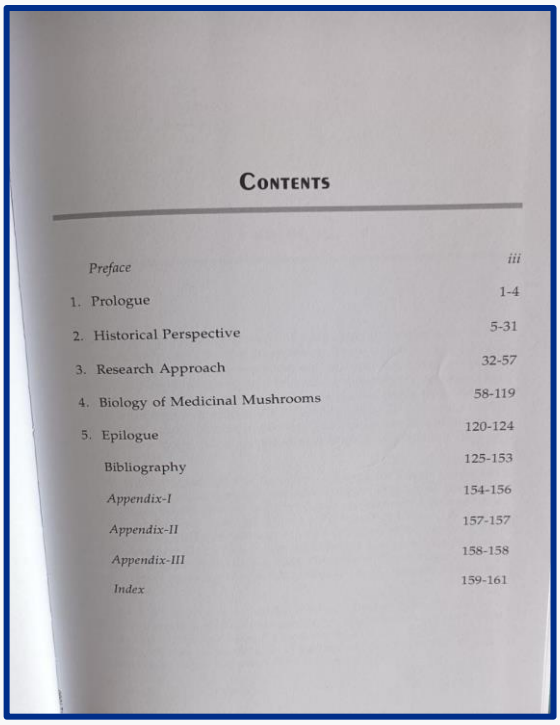
The PCR was carried out for a total of 35 cycles.

PCR amplification products were electrophoretically separated on 1.5% agarose gel prepared in TAE (Tris Acetate) buffer (80V) for 1 hour and visualized on gel documentation system (Gel Doc™ XR+ BIORAD). DNA fragments were purified using PCR purifying kit. The amplified fungal DNA was submitted for sequencing to Applied Biosystems ABI 3730XL) at the Xcelris Genomics (Ahmedabad, India). Obtained sequences were submitted at US National Centre for Biotechnology Information (NCBI) database for BLAST matching.

3.4. Antibacterial activity of selected mushrooms extracts against two human pathogenic bacteria *Staphylococcus aureus* and *Escherichia coli*.

3.4.1 Materials

Materials used to check antibacterial activity of the fungus were, fruiting bodies of the mushrooms and two bacterial pathogens i.e. *Escherichia coli* and *Staphylococcus aureus*.

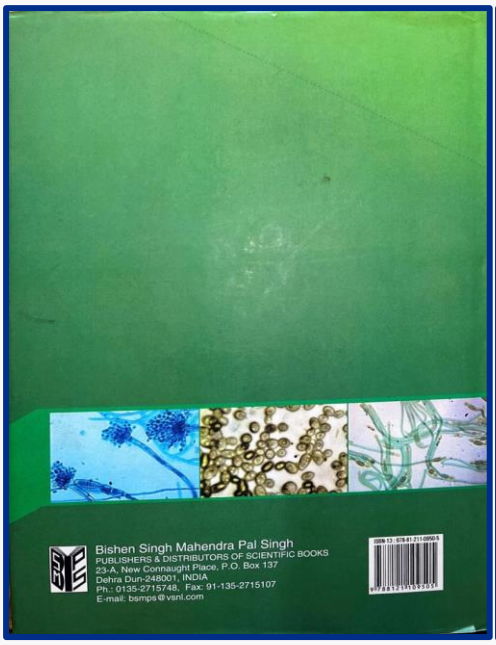


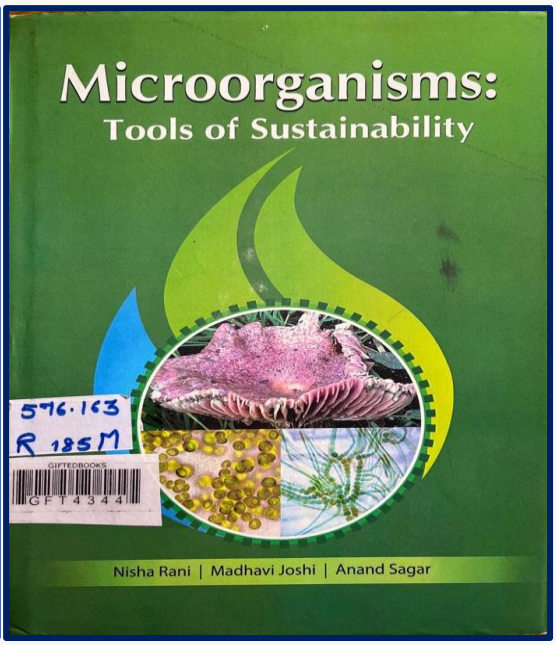
CONTENTS

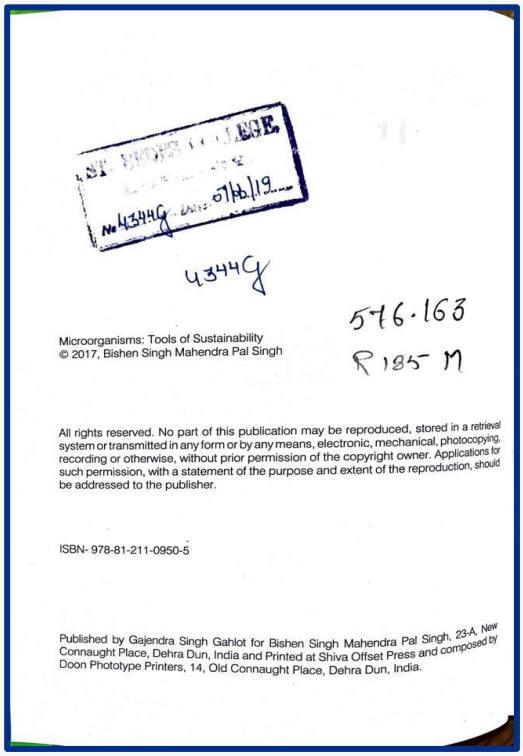
Book Published by Dr. Madhavi Joshi

BACK

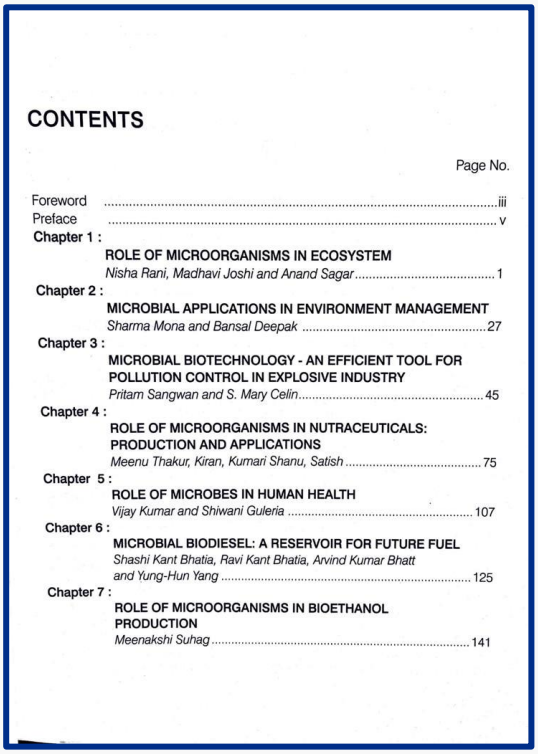
2. Dr. Madhavi Joshi- Department of Botany
Title of Book: Microorganisms: Tool of Sustainability
Year: 2017-18
ISBN: 978-81-211-0950-5







ISBN- 978-81-211-0950-5
Published by Gajendra Singh Gahlot for Bishen Singh Mahendra Pal Singh, 23-A, New Connaught Place, Dehra Dun, India and Printed at Shiva Offset Press and composed by Doon Phototype Printers, 14, Old Connaught Place, Dehra Dun, India.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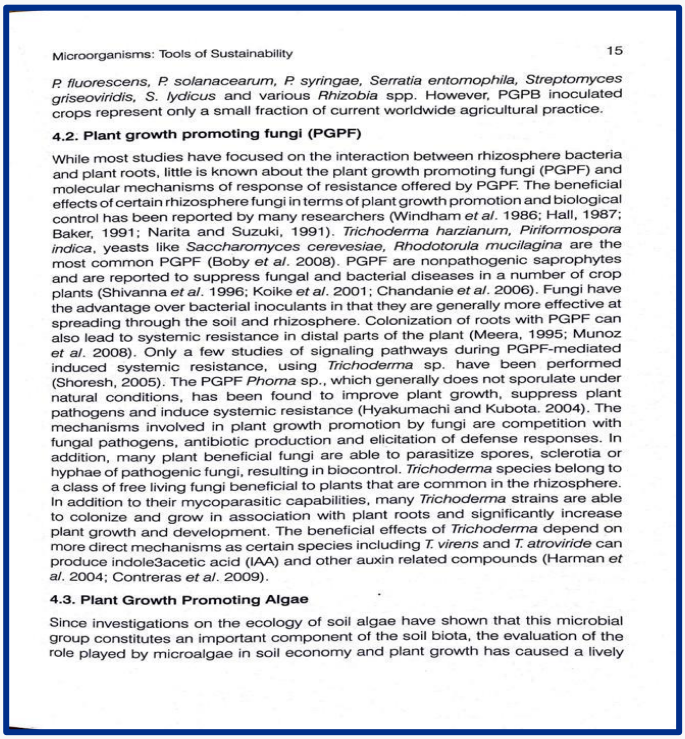

P. fluorescens, P. solanacearum, P. syringae, Serratia entomophila, Streptomyces griseoviridis, S. lydicus and various *Rhizobia* spp. However, PGPB inoculated crops represent only a small fraction of current worldwide agricultural practice.

4.2. Plant growth promoting fungi (PGPF)

While most studies have focused on the interaction between rhizosphere bacteria and plant roots, little is known about the plant growth promoting fungi (PGPF) and molecular mechanisms of response of resistance offered by PGPF. The beneficial effects of certain rhizosphere fungi in terms of plant growth promotion and biological control has been reported by many researchers (Windham *et al*. 1986; Hall, 1987; Baker, 1991; Narita and Suzuki, 1991). *Trichoderma harzianum, Piriformospora indica*, yeasts like *Saccharomyces cerevesiae, Rhodotorula mucilagina* are the most common PGPF (Boby *et al*. 2008). PGPF are nonpathogenic saprophytes and are reported to suppress fungal and bacterial diseases in a number of crop plants (Shivanna *et al*. 1996; Koike *et al*. 2001; Chandanie *et al*. 2006). Fungi have the advantage over bacterial inoculants in that they are generally more effective at spreading through the soil and rhizosphere. Colonization of roots with PGPF can also lead to systemic resistance in distal parts of the plant (Meera, 1995; Munoz *et al*. 2008). Only a few studies of signaling pathways during PGPF-mediated induced systemic resistance, using *Trichoderma* sp. have been performed (Shoresh, 2005). The PGPF *Phoma* sp., which generally does not sporulate under natural conditions, has been found to improve plant growth, suppress plant pathogens and induce systemic resistance (Hyakumachi and Kubota. 2004). The mechanisms involved in plant growth promotion by fungi are competition with fungal pathogens, antibiotic production and elicitation of defense responses. In addition, many plant beneficial fungi are able to parasitize spores, sclerotia or hyphae of pathogenic fungi, resulting in biocontrol. *Trichoderma* species belong to a class of free living fungi beneficial to plants that are common in the rhizosphere. In addition to their mycoparasitic capabilities, many *Trichoderma* strains are able to colonize and grow in association with plant roots and significantly increase plant growth and development. The beneficial effects of *Trichoderma* depend on more direct mechanisms as certain species including *T. virens* and *T. atroviride* can produce indole3acetic acid (IAA) and other auxin related compounds (Harman *et al*. 2004; Contreras *et al*. 2009).

4.3. Plant Growth Promoting Algae

Since investigations on the ecology of soil algae have shown that this microbial group constitutes an important component of the soil biota, the evaluation of the role played by microalgae in soil economy and plant growth has caused a lively

Book Published by Dr. Madhavi Joshi

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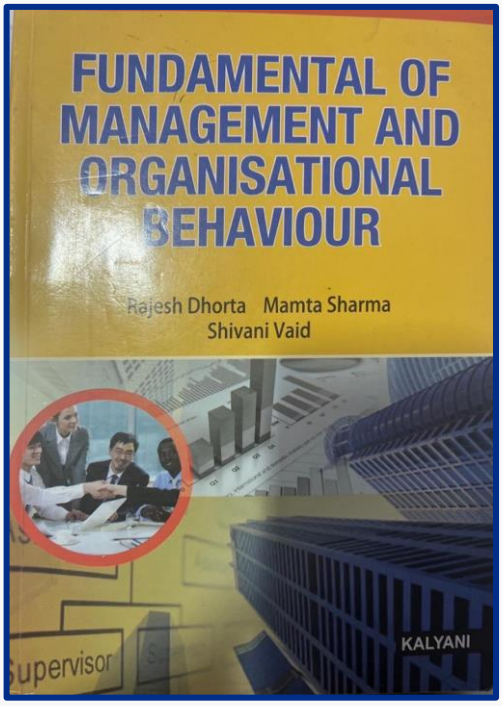

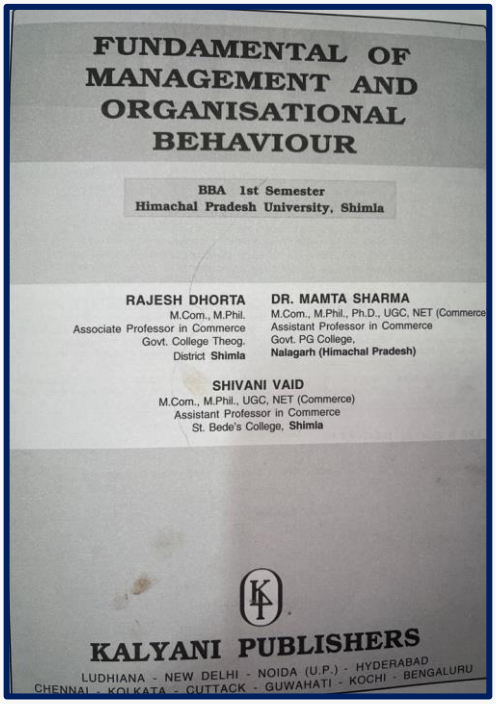

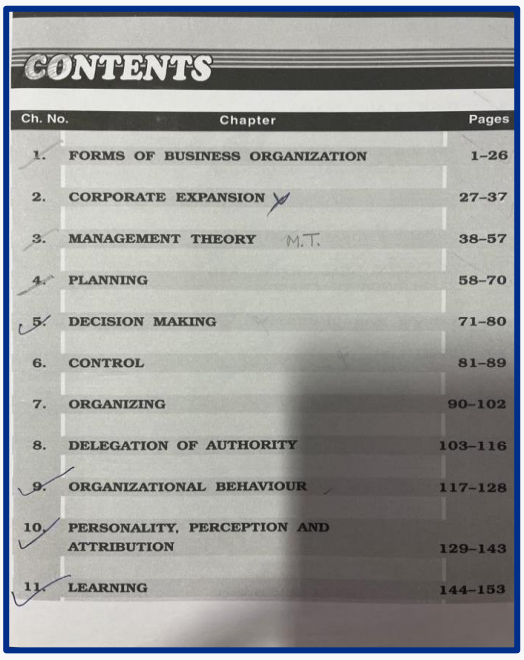

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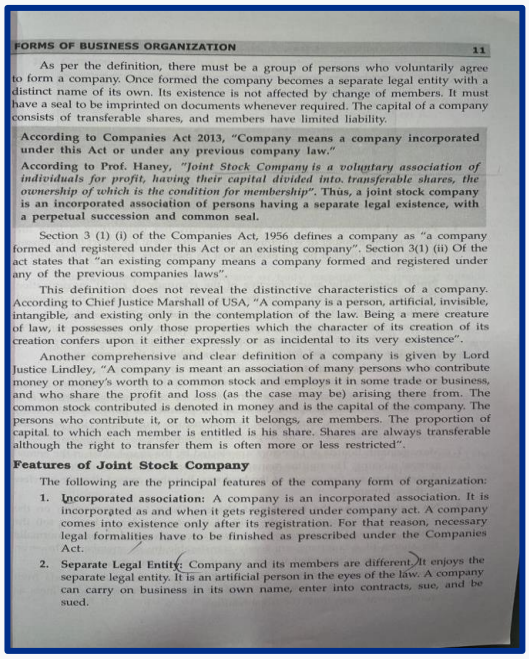


FORMS OF BUSINESS ORGANIZATION 11

As per the definition, there must be a group of persons who voluntarily agree to form a company. Once formed the company becomes a separate legal entity with a distinct name of its own. Its existence is not affected by change of members. It must have a seal to be imprinted on documents whenever required. The capital of a company consists of transferable shares, and members have limited liability.

According to Companies Act 2013, "Company means a company incorporated under this Act or under any previous company law."

According to Prof. Haney, *"Joint Stock Company is a voluntary association of individuals for profit, having their capital divided into. transferable shares, the ownership of which is the condition for membership".* Thus, a joint stock company is an incorporated association of persons having a separate legal existence, with a perpetual succession and common seal.

Section 3 (1) (i) of the Companies Act, 1956 defines a company as "a company formed and registered under this Act or an existing company". Section 3(1) (ii) Of the act states that "an existing company means a company formed and registered under any of the previous companies laws".

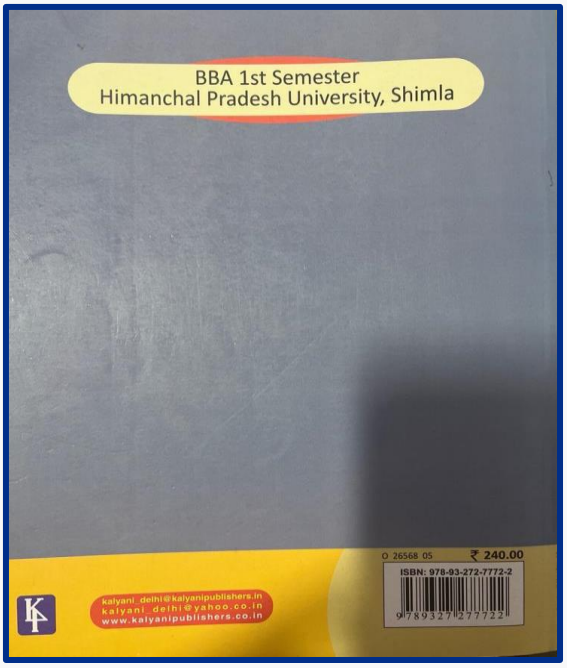
This definition does not reveal the distinctive characteristics of a company. According to Chief Justice Marshall of USA, "A company is a person, artificial, invisible, intangible, and existing only in the contemplation of the law. Being a mere creature of law, it possesses only those properties which the character of its creation of its creation confers upon it either expressly or as incidental to its very existence".

Another comprehensive and clear definition of a company is given by Lord Justice Lindley, "A company is meant an association of many persons who contribute money or money's worth to a common stock and employs it in some trade or business, and who share the profit and loss (as the case may be) arising there from. The common stock contributed is denoted in money and is the capital of the company. The persons who contribute it, or to whom it belongs, are members. The proportion of capital to which each member is entitled is his share. Shares are always transferable although the right to transfer them is often more or less restricted".

Features of Joint Stock Company

The following are the principal features of the company form of organization:

1. **Incorporated association:** A company is an incorporated association. It is incorporated as and when it gets registered under company act. A company comes into existence only after its registration. For that reason, necessary legal formalities have to be finished as prescribed under the Companies Act.
2. **Separate Legal Entity:** Company and its members are different. It enjoys the separate legal entity. It is an artificial person in the eyes of the law. A company can carry on business in its own name, enter into contracts, sue, and be sued.



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Title of Book: Entrepreneurship Development
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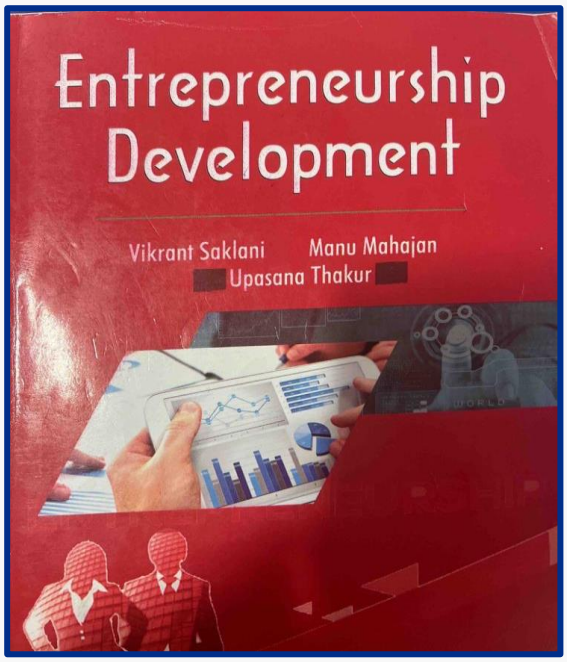

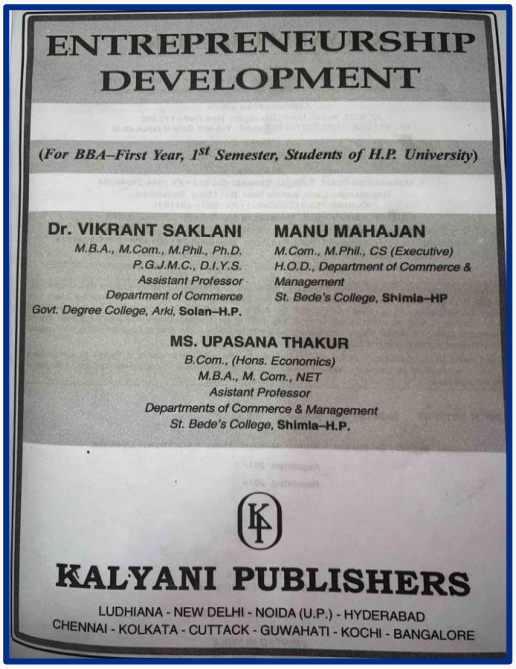
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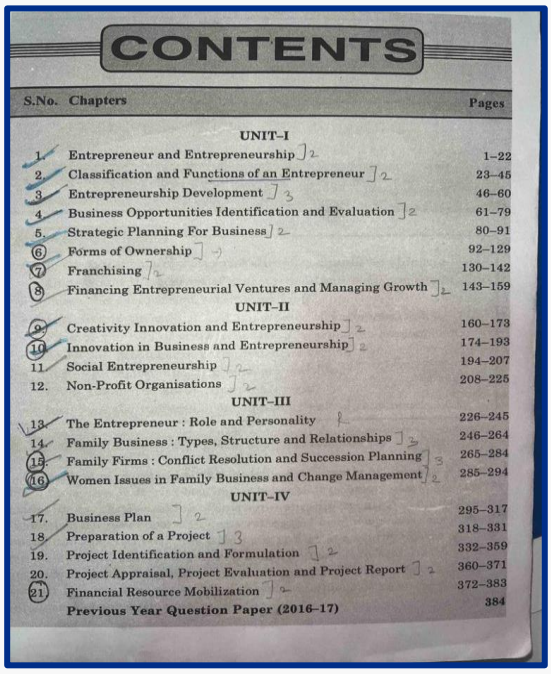
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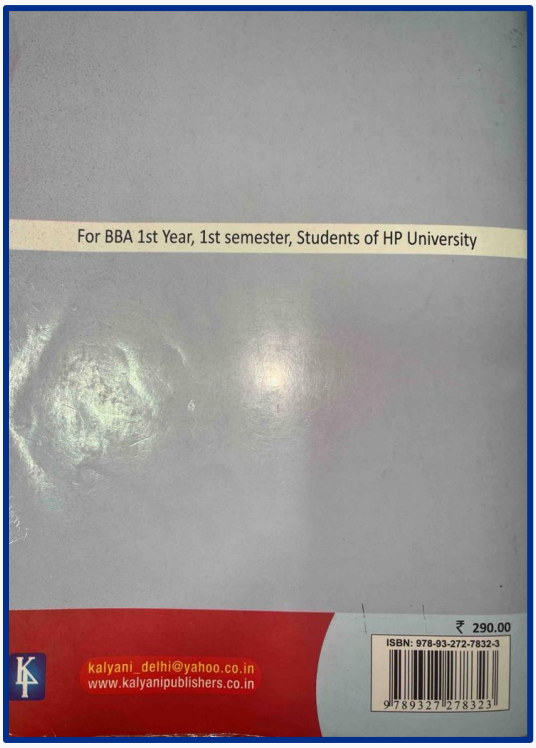

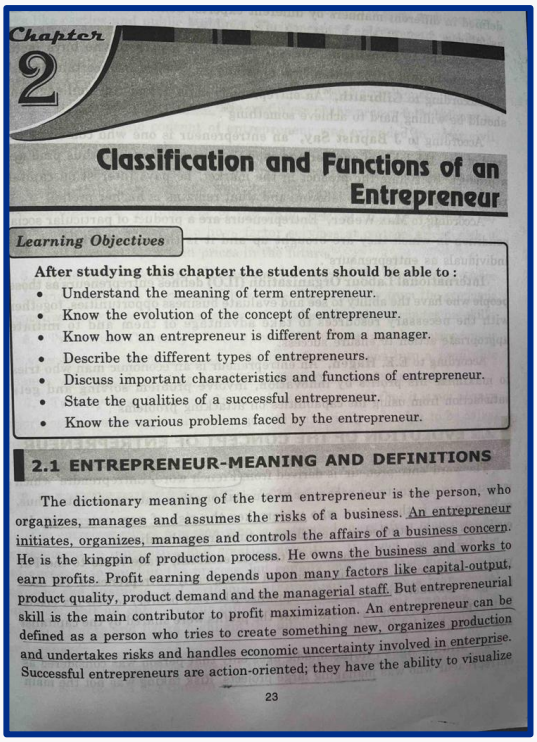

Chapter 2

Classification and Functions of an Entrepreneur

Learning Objectives

After studying this chapter the students should be able to :

- Understand the meaning of term entrepreneur.
- Know the evolution of the concept of entrepreneur.
- Know how an entrepreneur is different from a manager.
- Describe the different types of entrepreneurs.
- Discuss important characteristics and functions of entrepreneur.
- State the qualities of a successful entrepreneur.
- Know the various problems faced by the entrepreneur.

2.1 ENTREPRENEUR-MEANING AND DEFINITIONS

The dictionary meaning of the term entrepreneur is the person, who organizes, manages and assumes the risks of a business. An entrepreneur initiates, organizes, manages and controls the affairs of a business concern. He is the kingpin of production process. He owns the business and works to earn profits. Profit earning depends upon many factors like capital-output, product quality, product demand and the managerial staff. But entrepreneurial skill is the main contributor to profit maximization. An entrepreneur can be defined as a person who tries to create something new, organizes production and undertakes risks and handles economic uncertainty involved in enterprise. Successful entrepreneurs are action-oriented; they have the ability to visualize

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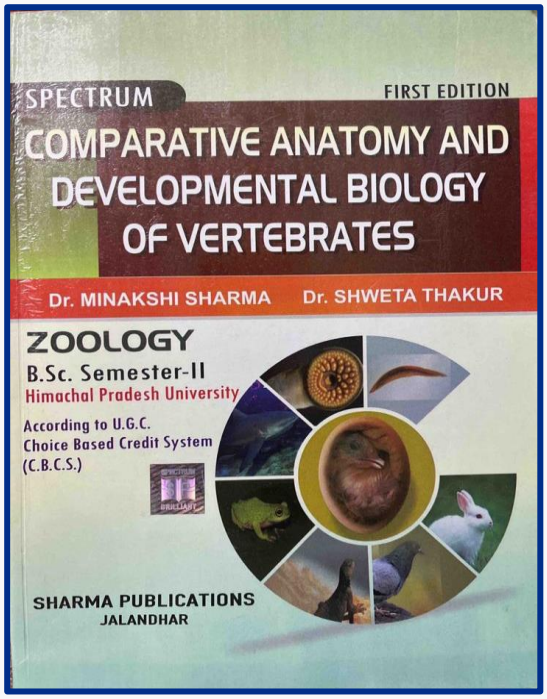
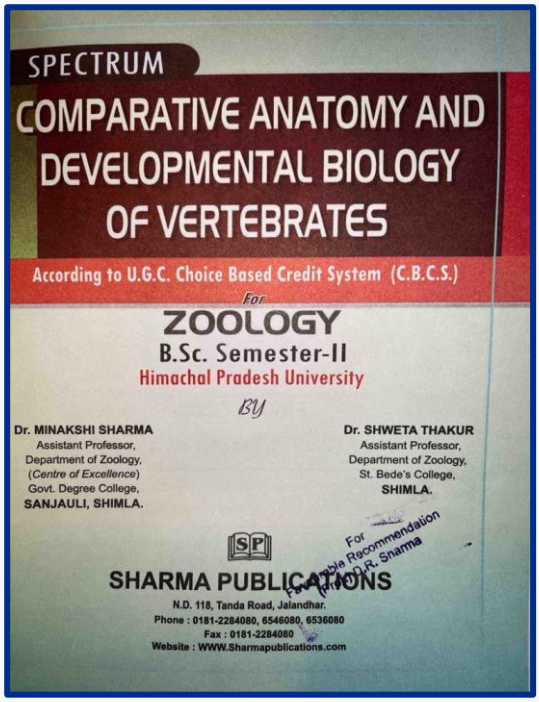
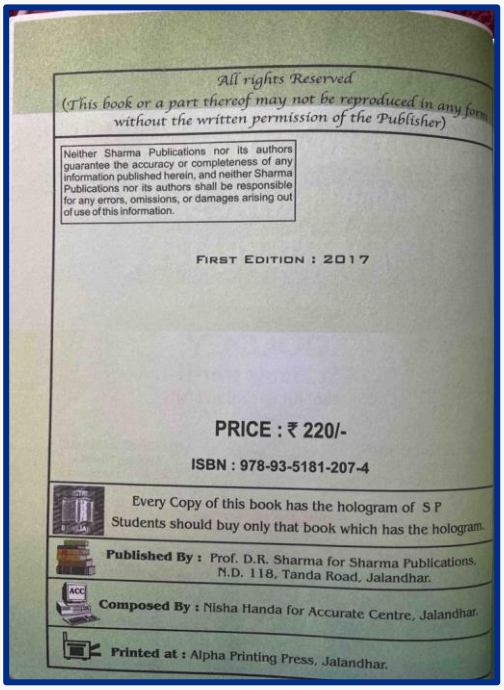
BACK

5. Dr. Shweta Thakur - Department of Zoology
Title of Book: Comparative Anatomy and Developmental Biology of Vertebrates
Year: 2017-18
ISBN: 978-93-5181-207-4







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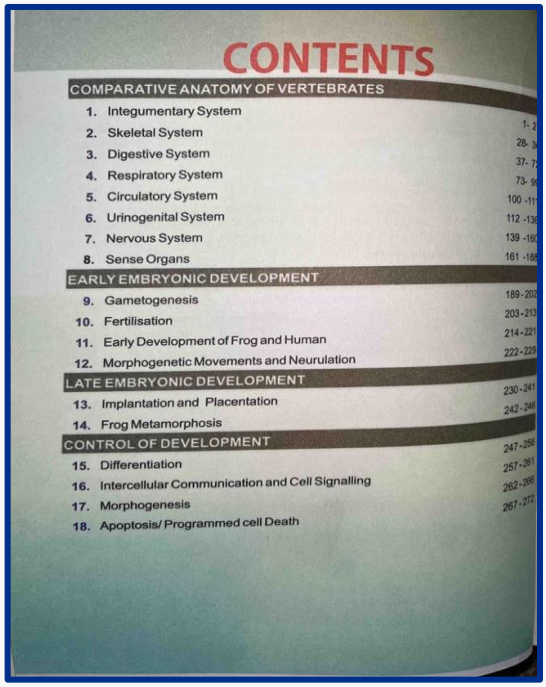


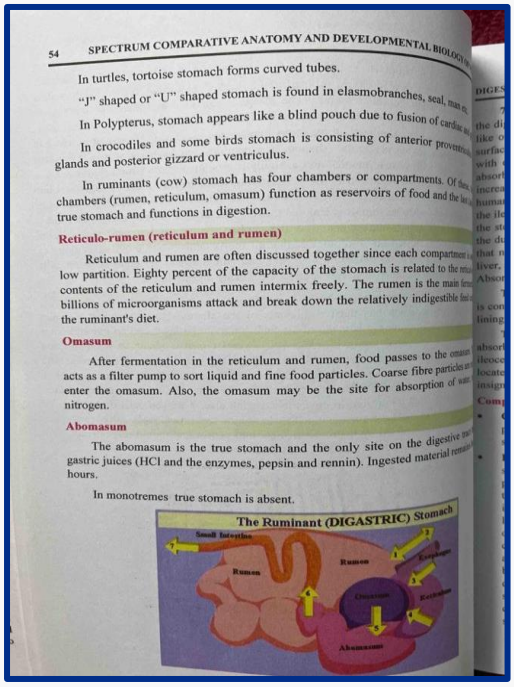
CONTENTS

COMPARATIVE ANATOMY OF VERTEBRATES

EARLY EMBRYONIC DEVELOPMENT

LATE EMBRYONIC DEVELOPMENT

CONTROL OF DEVELOPMENT



In turtles, tortoise stomach forms curved tubes.

"J" shaped or "U" shaped stomach is found in elasmobranches, seal, man etc.

In Polypterus, stomach appears like a blind pouch due to fusion of cardiac to

In crocodiles and some birds stomach is consisting of anterior proventri glands and posterior gizzard or ventriculus.

In ruminants (cow) stomach has four chambers or compartments. Of these chambers (rumen, reticulum, omasum) function as reservoirs of food and the last true stomach and functions in digestion.

Reticulo-rumen (reticulum and rumen)

Reticulum and rumen are often discussed together since each compartment low partition. Eighty percent of the capacity of the stomach is related to the rete contents of the reticulum and rumen intermix freely. The rumen is the main fer billions of microorganisms attack and break down the relatively indigestible fi the ruminant's diet.

Omasum

After fermentation in the reticulum and rumen, food passes to the omasum acts as a filter pump to sort liquid and fine food particles. Coarse fibre particles enter the omasum. Also, the omasum may be the site for absorption of nitrogen.

Abomasum

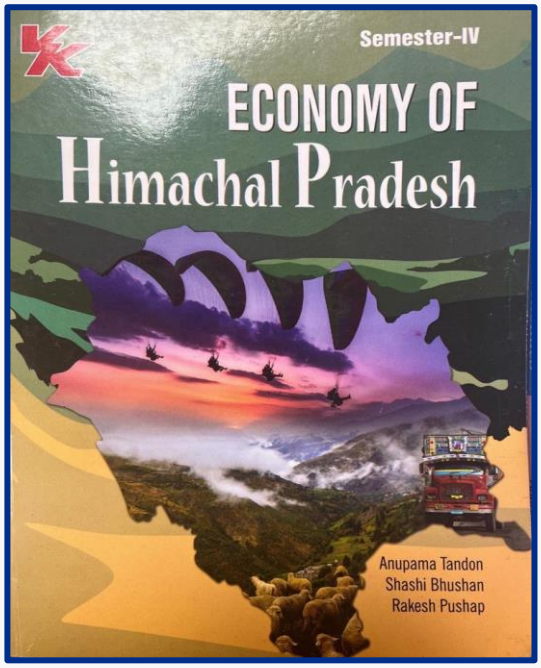
The abomasum is the true stomach and the only site on the digestive tra gastric juices (HCl and the enzymes, pepsin and rennin). Ingested material remains hours.

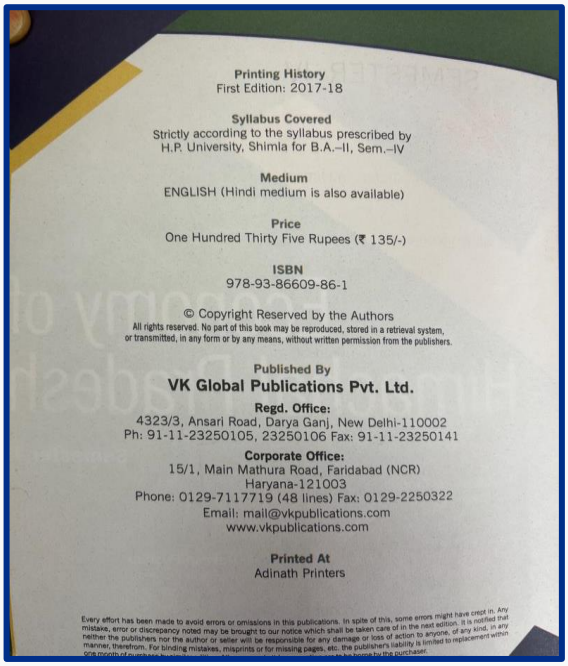
In monotremes true stomach is absent.

Book Published by Dr. Shweta Thakur

BACK

6. Dr. Anupama Tandon - Department of Economics
Title of Book: Economy of Himachal Pradesh
Year: 2017-18
ISBN: 978-93-86609-86-1




Printing History
First Edition: 2017-18
Syllabus Covered
Strictly according to the syllabus prescribed by H.P. University, Shimla for B.A.–II, Sem.–IV
Medium
ENGLISH (Hindi medium is also available)
Price
One Hundred Thirty Five Rupees (₹ 135/-)
ISBN
978-93-86609-86-1

Published By
VK Global Publications Pvt. Ltd.
Regd. Office:
4323/3, Ansari Road, Darya Ganj, New Delhi-110002
Ph: 91-11-23250105, 23250106 Fax: 91-11-23250141
Corporate Office:
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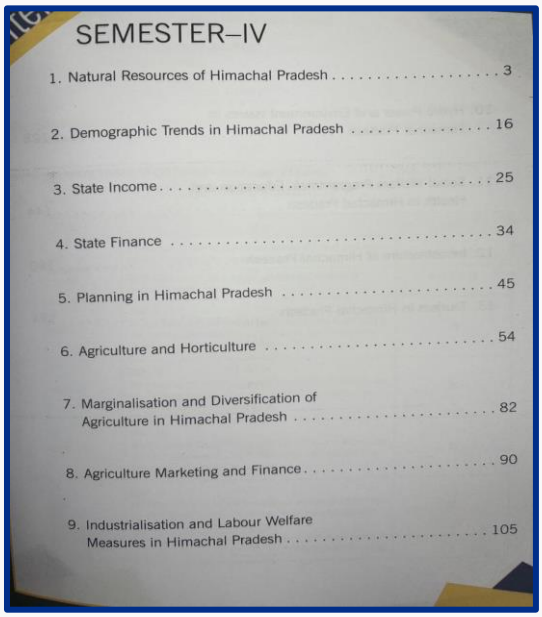
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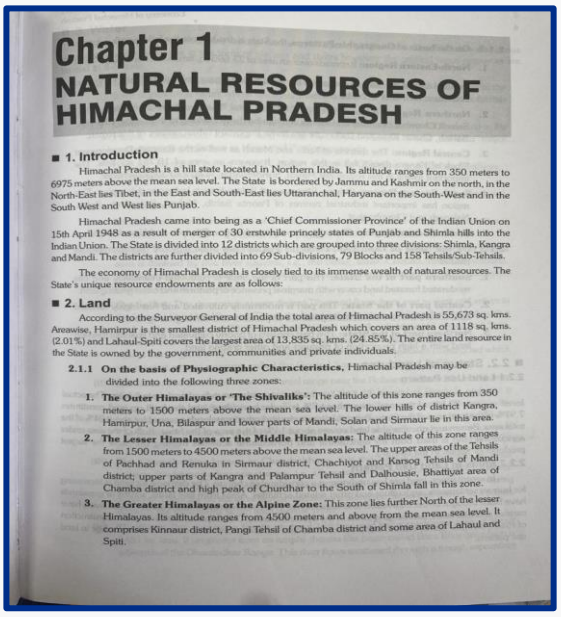
Chapter 1
NATURAL RESOURCES OF HIMACHAL PRADESH

■ 1. Introduction

Himachal Pradesh is a hill state located in Northern India. Its altitude ranges from 350 meters to 6975 meters above the mean sea level. The State is bordered by Jammu and Kashmir on the north, in the North-East lies Tibet, in the East and South-East lies Uttaranchal, Haryana on the South-West and in the South West and West lies Punjab.

Himachal Pradesh came into being as a 'Chief Commissioner Province' of the Indian Union on 15th April 1948 as a result of merger of 30 erstwhile princely states of Punjab and Shimla hills into the Indian Union. The State is divided into 12 districts which are grouped into three divisions: Shimla, Kangra and Mandi. The districts are further divided into 69 Sub-divisions, 79 Blocks and 158 Tehsils/Sub-Tehsils.

The economy of Himachal Pradesh is closely tied to its immense wealth of natural resources. The State's unique resource endowments are as follows:

■ 2. Land

According to the Surveyor General of India the total area of Himachal Pradesh is 55,673 sq. kms. Areawise, Hamirpur is the smallest district of Himachal Pradesh which covers an area of 1118 sq. kms. (2.01%) and Lahaul-Spiti covers the largest area of 13,835 sq. kms. (24.85%). The entire land resource in the State is owned by the government, communities and private individuals.

2.1.1 **On the basis of Physiographic Characteristics,** Himachal Pradesh may be divided into the following three zones:

1. **The Outer Himalayas or 'The Shivaliks':** The altitude of this zone ranges from 350 meters to 1500 meters above the mean sea level. The lower hills of district Kangra, Hamirpur, Una, Bilaspur and lower parts of Mandi, Solan and Sirmaur lie in this area.
2. **The Lesser Himalayas or the Middle Himalayas:** The altitude of this zone ranges from 1500 meters to 4500 meters above the mean sea level. The upper areas of the Tehsils of Pachhad and Renuka in Sirmaur district, Chachiyot and Karsog Tehsils of Mandi district; upper parts of Kangra and Palampur Tehsil and Dalhousie, Bhattiyat area of Chamba district and high peak of Churdhar to the South of Shimla fall in this zone.
3. **The Greater Himalayas or the Alpine Zone:** This zone lies further North of the lesser Himalayas. Its altitude ranges from 4500 meters and above from the mean sea level. It comprises Kinnaur district, Pangi Tehsil of Chamba district and some area of Lahaul and Spiti.

Book Published by Dr. Anupama Tandon

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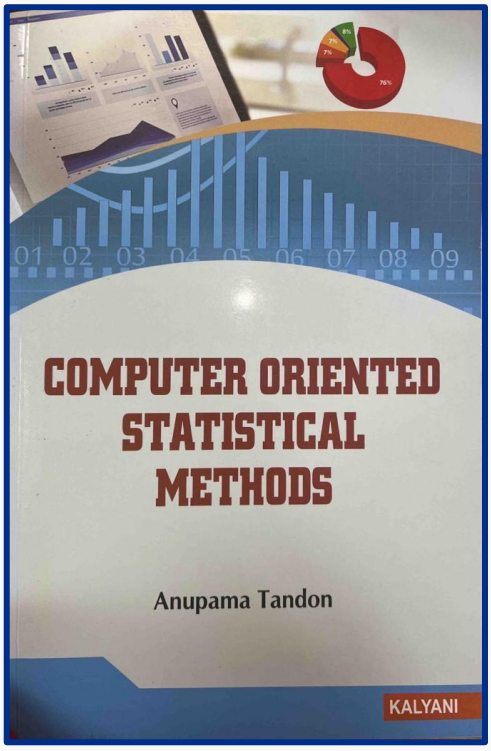

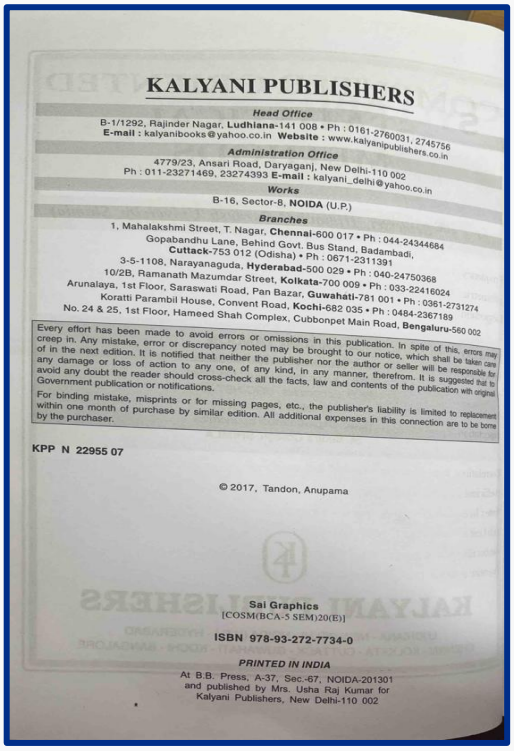
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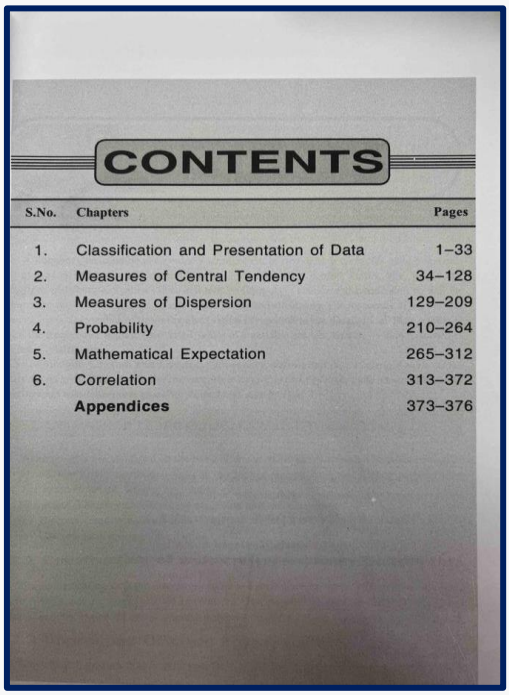
KPP N 22955 07

Sai Graphics
[COSM(BCA-5 SEM)20(E)]
ISBN 978-93-272-7734-0
PRINTED IN INDIA
At B.B. Press, A-37, Sec.-67, NOIDA-201301
and published by Mrs. Usha Raj Kumar for
Kalyani Publishers, New Delhi-110 002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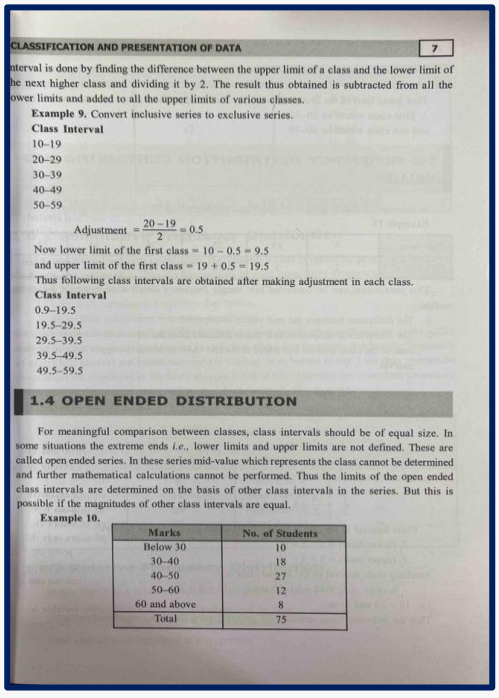

nterval is done by finding the difference between the upper limit of a class and the lower limit of he next higher class and dividing it by 2. The result thus obtained is subtracted from all the ower limits and added to all the upper limits of various classes.

Example 9. Convert inclusive series to exclusive series.

Class Interval
10–19
20–29
30–39
40–49
50–59

$$\text{Adjustment} = \frac{20-19}{2} = 0.5$$

Now lower limit of the first class = 10 – 0.5 = 9.5
and upper limit of the first class = 19 + 0.5 = 19.5
Thus following class intervals are obtained after making adjustment in each class.

Class Interval
0.9–19.5
19.5–29.5
29.5–39.5
39.5–49.5
49.5–59.5

1.4 OPEN ENDED DISTRIBUTION

For meaningful comparison between classes, class intervals should be of equal size. In some situations the extreme ends *i.e.*, lower limits and upper limits are not defined. These are called open ended series. In these series mid-value which represents the class cannot be determined and further mathematical calculations cannot be performed. Thus the limits of the open ended class intervals are determined on the basis of other class intervals in the series. But this is possible if the magnitudes of other class intervals are equal.

Example 10.

Marks	No. of Students
Below 30	10
30–40	18
40–50	27
50–60	12
60 and above	8
Total	75

Book Published by Dr. Anupama Tandon

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Title of Book: Solutions to Problems in Business Mathematics and Statistics"
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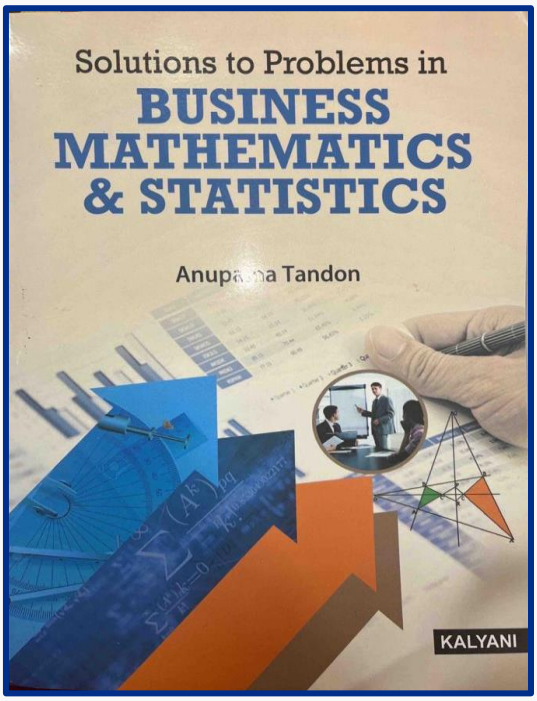
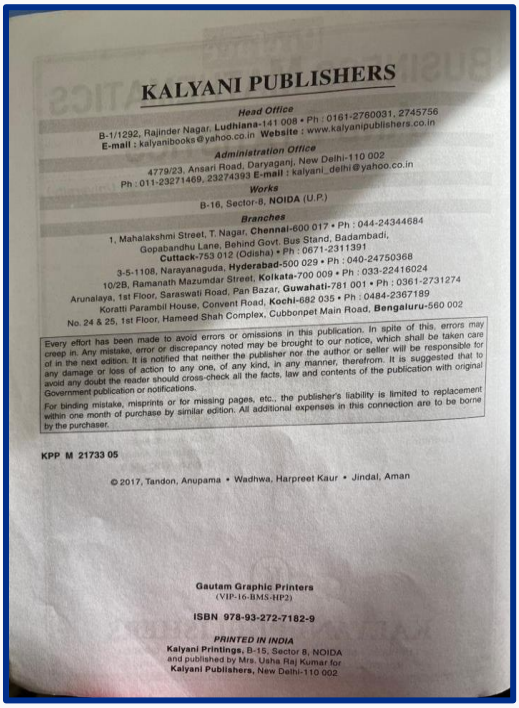
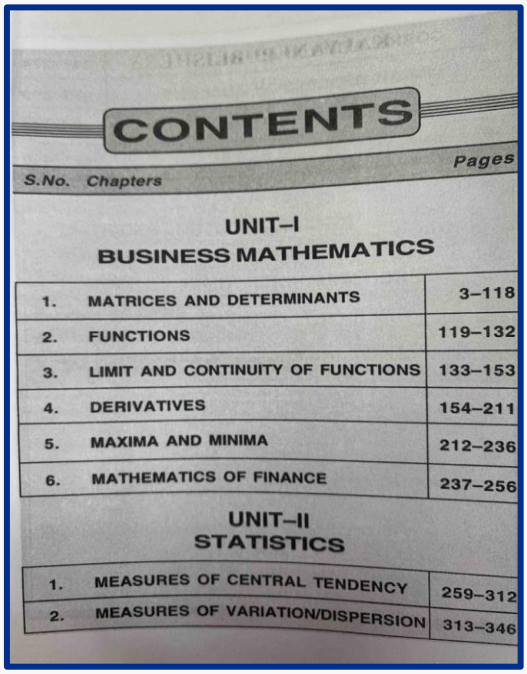
ISBN: 978-93-272-7527-8



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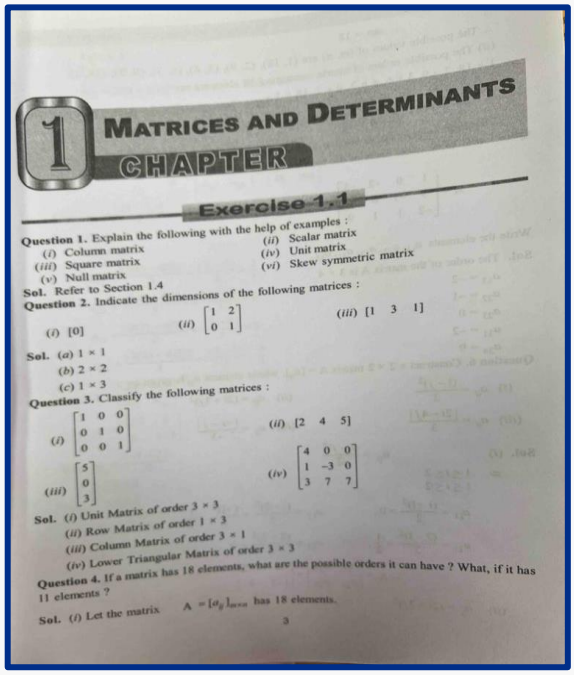
CHAPTER 1 MATRICES AND DETERMINANTS

Exercise 1.1

Question 1. Explain the following with the help of examples :
(i) Column matrix (ii) Scalar matrix
(iii) Square matrix (iv) Unit matrix
(v) Null matrix (vi) Skew symmetric matrix

Sol. Refer to Section 1.4

Question 2. Indicate the dimensions of the following matrices :

(i) $[0]$ (ii) $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ (iii) $[1 \quad 3 \quad 1]$

Sol. (a) 1×1
(b) 2×2
(c) 1×3

Question 3. Classify the following matrices :

(i) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ (ii) $[2 \quad 4 \quad 5]$

(iii) $\begin{bmatrix} 5 \\ 0 \\ 3 \end{bmatrix}$ (iv) $\begin{bmatrix} 4 & 0 & 0 \\ 1 & -3 & 0 \\ 3 & 7 & 7 \end{bmatrix}$

Sol. (i) Unit Matrix of order 3×3
(ii) Row Matrix of order 1×3
(iii) Column Matrix of order 3×1
(iv) Lower Triangular Matrix of order 3×3

Question 4. If a matrix has 18 elements, what are the possible orders it can have ? What, if it has 11 elements ?

Sol. (i) Let the matrix $A = [a_{ij}]_{m \times n}$ has 18 elements.

3

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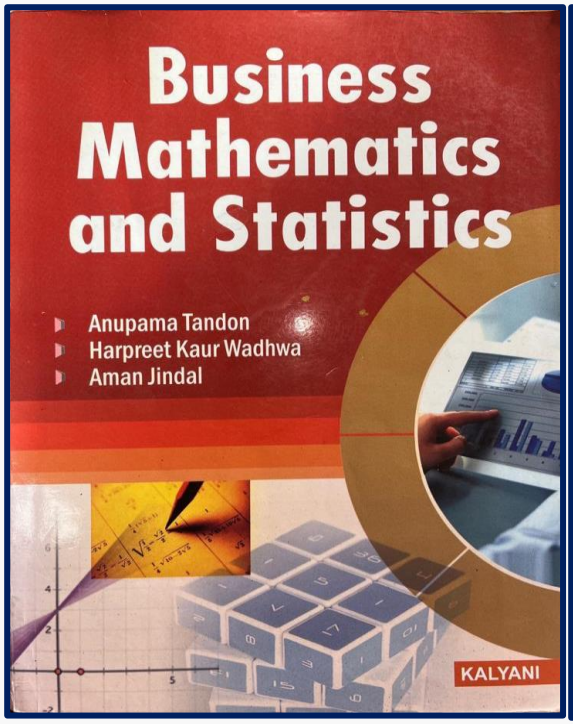
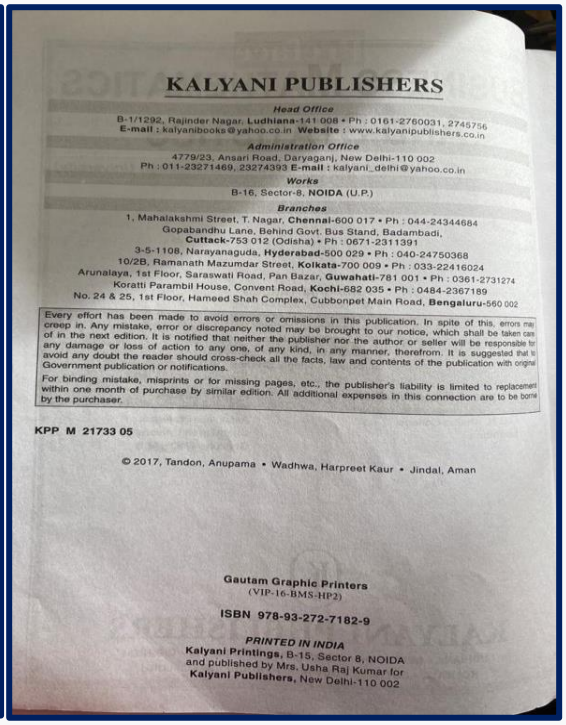
ISBN: 978-93-272-7182-9

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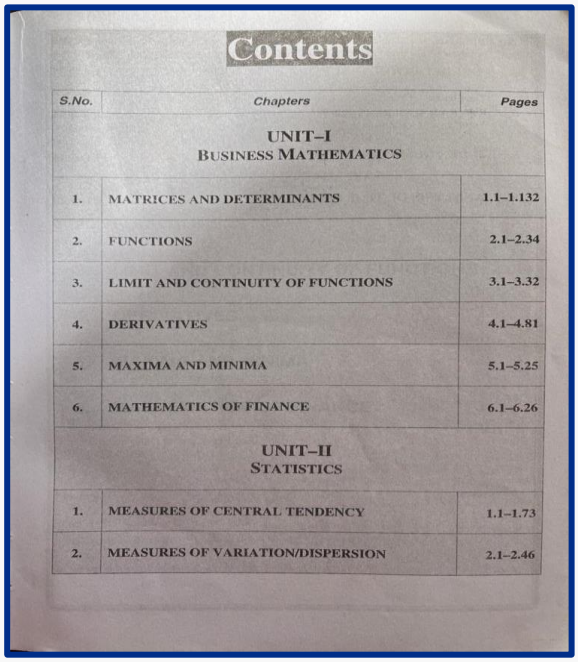
KPP M 21733 05

Gautam Graphic Printers
(VIP-16-BMS-HP2)
ISBN 978-93-272-7182-9
PRINTED IN INDIA
Kalyani Printings, B-15, Sector 8, NOIDA
and published by Mrs. Usha Raj Kumar for
Kalyani Publishers, New Delhi-110 002



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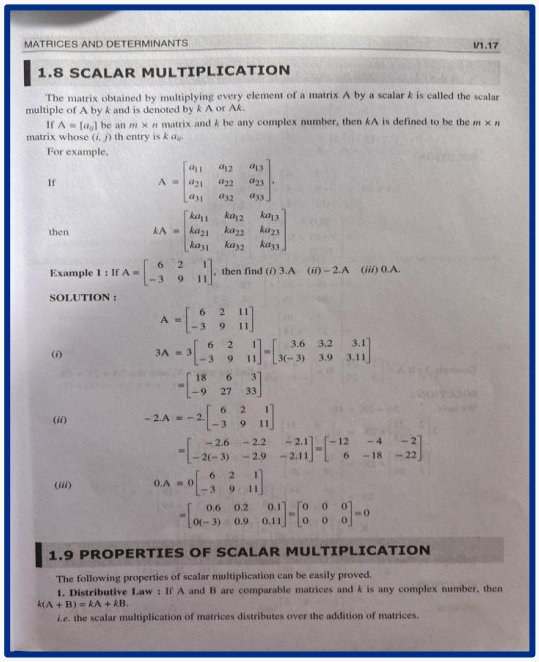

MATRICES AND DETERMINANTS VI.17

1.8 SCALAR MULTIPLICATION

The matrix obtained by multiplying every element of a matrix A by a scalar k is called the scalar multiple of A by k and is denoted by k A or Ak.

If $A = [a_{ij}]$ be an $m \times n$ matrix and k be any complex number, then kA is defined to be the $m \times n$ matrix whose (i, j) th entry is ka_{ij}.

For example,

If $$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix},$$

then $$kA = \begin{bmatrix} ka_{11} & ka_{12} & ka_{13} \\ ka_{21} & ka_{22} & ka_{23} \\ ka_{31} & ka_{32} & ka_{33} \end{bmatrix}$$

Example 1 : If $A = \begin{bmatrix} 6 & 2 & 1 \\ -3 & 9 & 11 \end{bmatrix}$, then find (*i*) 3A (*ii*) −2A (*iii*) 0A.

SOLUTION :

$$A = \begin{bmatrix} 6 & 2 & 11 \\ -3 & 9 & 11 \end{bmatrix}$$

(*i*) $$3A = 3\begin{bmatrix} 6 & 2 & 1 \\ -3 & 9 & 11 \end{bmatrix} = \begin{bmatrix} 3.6 & 3.2 & 3.1 \\ 3(-3) & 3.9 & 3.11 \end{bmatrix}$$
$$= \begin{bmatrix} 18 & 6 & 3 \\ -9 & 27 & 33 \end{bmatrix}$$

(*ii*) $$-2A = -2\begin{bmatrix} 6 & 2 & 1 \\ -3 & 9 & 11 \end{bmatrix}$$
$$= \begin{bmatrix} -2.6 & -2.2 & -2.1 \\ -2(-3) & -2.9 & -2.11 \end{bmatrix} = \begin{bmatrix} -12 & -4 & -2 \\ 6 & -18 & -22 \end{bmatrix}$$

(*iii*) $$0A = 0\begin{bmatrix} 6 & 2 & 1 \\ -3 & 9 & 11 \end{bmatrix}$$
$$= \begin{bmatrix} 0.6 & 0.2 & 0.1 \\ 0(-3) & 0.9 & 0.11 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} = 0$$

1.9 PROPERTIES OF SCALAR MULTIPLICATION

The following properties of scalar multiplication can be easily proved.

1. Distributive Law : If A and B are comparable matrices and k is any complex number, then $k(A + B) = kA + kB$.

i.e. the scalar multiplication of matrices distributes over the addition of matrices.

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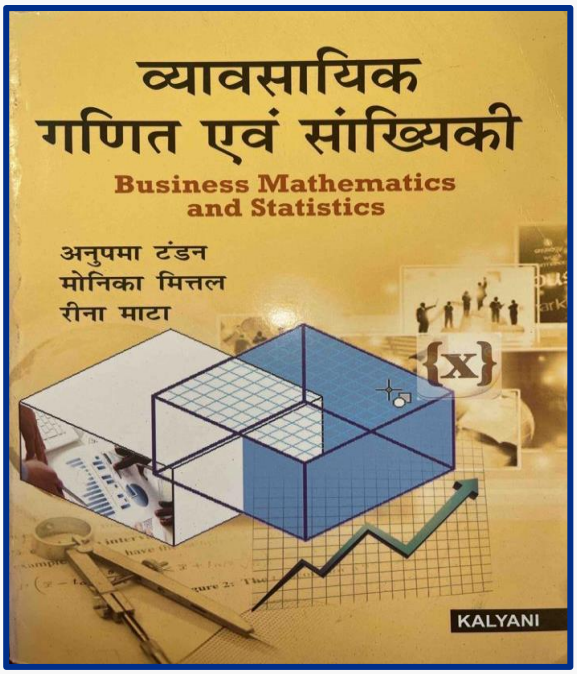
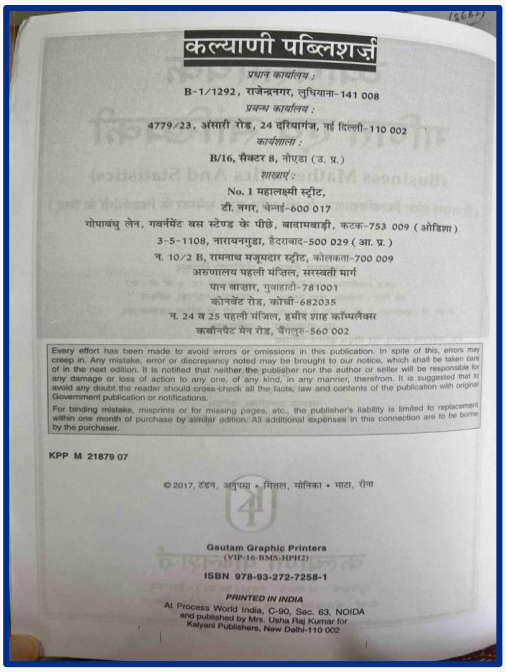
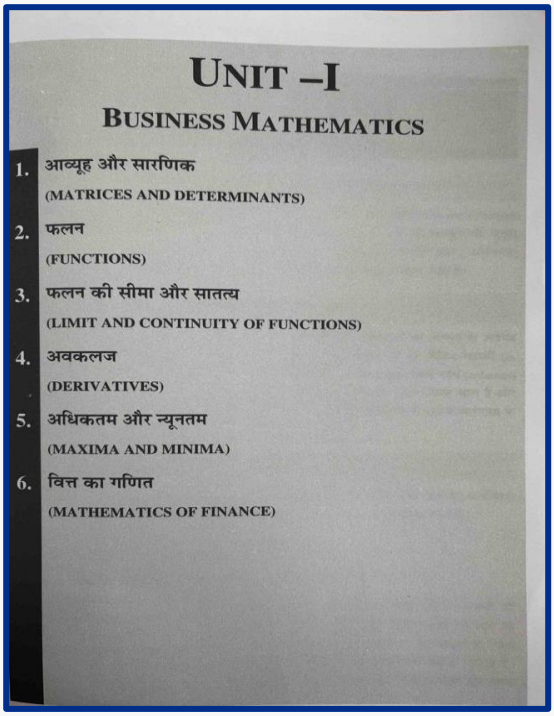
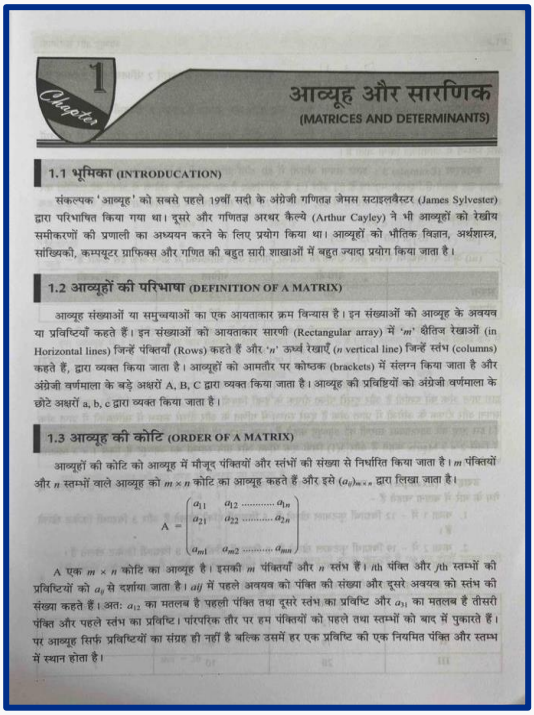
Title of Book: Business Mathematics and Statistics (Hindi Version)
Year: 2017-18
ISBN: 978-93-272-7258-1









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