

GOKULA KRISHNA COLLEGE OF PHARMACY

HEI CODE: C-26844

NAAC DVV

CYCLE I



3 : RESEARCH, INNOVATIONS & EXTENSION

3.3 Research Publications and Awards

3.3.2 No. of Books & papers published in conferences per Teacher during the last 5 years

3.3.2(2) e-copies of first page, content page and participation of conferences during the Assessment Period



Approved by PCI, New Delhi, Government of AP & Affiliated to JNTUA
Recognized by UGC U/S 2(f), An ISO 9001:2015 Certified Institution

Behind RTC Depot, Sullurupeta, Tirupati Dist, Andhra Pradesh - 524121

☎ 9948990116

🌐 www.gkcp.edu.in

✉ gkcpsp@rediffmail.com



GOKULA KRISHNA COLLEGE OF PHARMACY

Approved by PCI-New Delhi, Government of AP & Affiliated to JNTUA

An ISO 9001:2015 Certified Institution

Behind RTC Depot, Sullurupeta, Tirupati Dist, A.P, INDIA - 524121

Mobile : 9948990116

E-Mail : gkcpsp@rediffmail.com

website: www.gkcp.edu.in

NUMBER OF BOOKS AND CHAPTERS IN EDITED VOLUMES / BOOKS

PUBLISHED PER TEACHER DURING THE LAST FIVE YEARS

S.No	Name of the Full Time Teacher	Title of the Book / Chapters Published	Publisher	ISBN Number	Year of Publication
1	Ms A.R.Sridevi	A Text book for Pharmacology	Pragathi Publications	9-788197-096907	2023
2	Dr Balagani Pavan Kumar	A Text book for Pharmacology	Pragathi Publications	9-788197-096907	2023
3	MrsN.Sukanya	A Text book for Pharmacology	Pragathi Publications	9-788197-096907	2023
4	Ms P.Madhavi	A Text book for Pharmacology	Pragathi Publications	9-788197-096907	2023
5	Dr Balagani Pavan Kumar	Pharmaceutics – I	Nitya Publications	978-93-91669-47-8	2021
6	Mr Sivakumar Peta	A Textbook of Pharmaceutical Analysis	Pragathi Publications	9-788196-887599	2021
7	Dr Balagani Pavan Kumar	A Textbook of Pharmaceutical Analysis	Pragathi Publications	9-788196-887599	2021
8	Dr.P.kishor	A Textbook of Pharmaceutical Analysis	Pragathi Publications	9-788196-887599	2021
9	MrsD.Kalyani	A Textbook of Pharmaceutical Analysis	Pragathi Publications	9-788196-887599	2021
10	MrsB.Swathi	A Textbook of Pharmaceutical Analysis	Pragathi Publications	9-788196-887599	2021



Kavay

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



GOKULA KRISHNA COLLEGE OF PHARMACY

Approved by PCI-New Delhi, Government of AP & Affiliated to JNTUA

An ISO 9001:2015 Certified Institution

Behind RTC Depot, Sullurupeta, Tirupati Dist, A.P, INDIA - 524121

Mobile : 9948990116

E-Mail : gkcp@rediffmail.com

website: www.gkcp.edu.in

11	Ms P.Kavitha	A Text book of Pharmaceutics	Pragathi Publications	9-788196-887568	2021
12	Dr Balagani Pavan kumar	A Text book of Pharmaceutics	Pragathi Publications	9-788196-887568	2021
13	MsSk.Zoofishaan	A Text book of Pharmaceutics	Pragathi Publications	9-788196-887568	2021
14	MsT.Swathi	A Text book of Pharmaceutics	Pragathi Publications	9-788196-887568	2021
15	MrsP.K.Devibala	Physical Pharmaceutics	Pragathi Publications	9-788196-887513	2020
16	MsP.Kavitha	Physical Pharmaceutics	Pragathi Publications	9-788196-887513	2020
17	DrBalaganiPavankumar	Physical Pharmaceutics	Pragathi Publications	9-788196-887513	2020
18	DrM.Soujanya	Physical Pharmaceutics	Pragathi Publications	9-788196-887513	2020
19	DrBalaganiPavankumar	A Text book on Novel Drug Delivery Systems	Pragathi Publications	9-788196-887506	2019
20	MrsP.K.Devibala	A Text book on Novel Drug Delivery Systems	Pragathi Publications	9-788196-887506	2019
21	MsC.B.Hanisha	A Text book on Novel Drug Delivery Systems	Pragathi Publications	9-788196-887506	2019
22	MrSivakumar Peta	A Text book on Novel Drug Delivery Systems	Pragathi Publications	9-788196-887506	2019



Narayana
PRINCIPAL

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Ms. A R Sridevi
Dr Balagani Pavan Kumar
Mrs. N Sukanya
Ms. P Madhavi



TEXTBOOK FOR
PHARMACOLOGY



Navay
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook For Pharmacology

Mr. AR Sridevi, Dr Balagani Pavan kumar, Mrs.N Sukanya,
Ms.P Madavi




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

CONTENTS

Abbreviations.....	6
Preface	8
Chapter 1. GENERAL PHARMACOLOGY. PHARMACOKINETICS ...	9
Chapter 2. GENERAL PHARMACOLOGY. PHARMACODYNAMICS	18
Chapter 3. DRUGS INHIBITING AFFERENT INNERVATION	26
Chapter 4. DRUGS STIMULATING AFFERENT INNERVATION	33
Chapter 5. CHOLINERGIC AGONISTS	42
Chapter 6. CHOLINERGIC ANTAGONISTS	52
Chapter 7. ADRENERGIC AGONISTS	66
Chapter 8. ADRENERGIC ANTAGONISTS. HISTAMINE-, SEROTONIN- AND DOPAMINERGIC DRUGS	77
Chapter 9. DRUGS FOR GENERAL ANESTHESIA	90
Chapter 10. ETHANOL. HYPNOTICS. ANTIPILEPTIC AND ANTIPARKINSONIAN DRUGS ..	100
Chapter 11. NEUROLEPTICS. ANXIOLYTICS. SEDATIVES. LITHIUM SALTS	115
Chapter 12. OPIOID (NARCOTIC) ANALGESICS	130
Chapter 13. NON-OPIOID ANALGESICS	143
Chapter 14. ANAESTHETICS. PSYCHOMOTOR STIMULANTS	160
Chapter 15. ANTI-DEPRESSANTS. ADAPTOGENS. Nootrops. Anorexigens	172
Chapter 16. INOTROPIC DRUGS	186
Chapter 17. ANTIANGINAL DRUGS	197
Chapter 18. ANTI-ARRHYTHMICS	212
Chapter 19. ANTIHYPERTENSIVE DRUGS. HYPERTENSIVE AGENTS	226
Chapter 20. ANTI-ATHEROSCLEROTIC DRUGS	240
Chapter 21. DRUGS ACTING ON HEMOPOIESIS (HEMATINICS) ...	252
Chapter 22. DRUGS ACTING ON BLOOD COAGULATION AND FIBRINOLYSIS	266
Chapter 23. DRUGS ACTING ON RESPIRATORY SYSTEM	281
Chapter 24. GASTROINTESTINAL DRUGS	295
Chapter 25. DIURETICS. ANTI-GOAT DRUGS. DRUGS	




Dr. BALAGANI PAVAN KUMAR
 M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
 PROFESSOR & PRINCIPAL
 GOKULA KRISHNA COLLEGE OF PHARMACY
 SULLURPET, TIRUPATI Dt. A.P - 524121

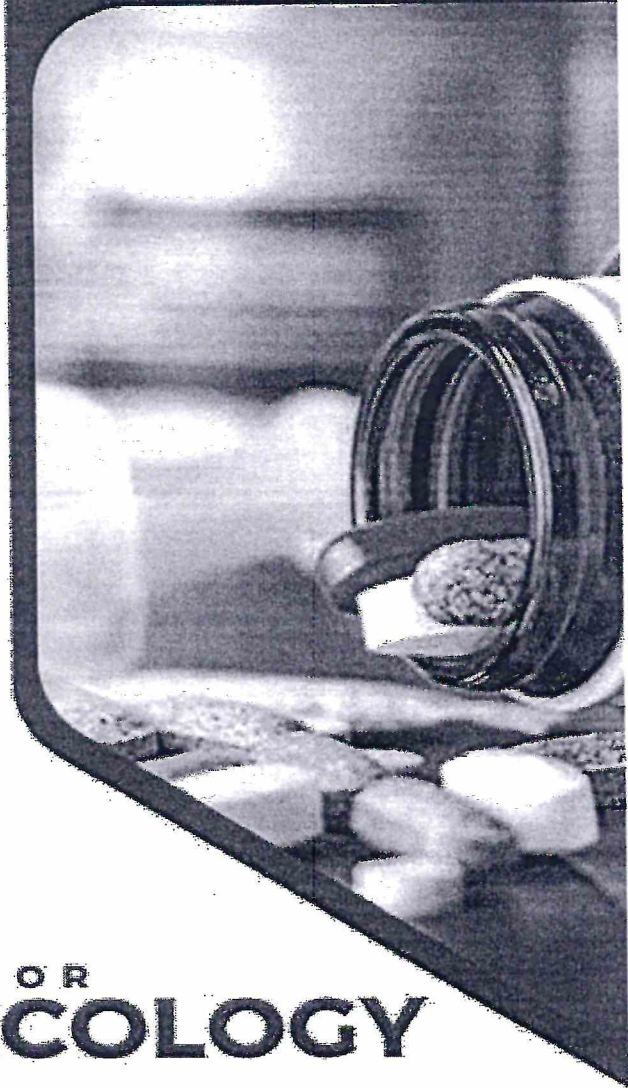
A TEXTBOOK FOR PHARMACOLOGY



Navay

Dr. BALAGANIPAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Ms. A R Sridevi
Dr Balagani Pavan Kumar
Mrs. N Sukanya
Ms. P Madhavi



TEXTBOOK FOR
PHARMACOLOGY



Narayana

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D. FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook For Pharmacology

Mr. AR Sridevi, **Dr Balagani Pavan kumar**, Mrs.N Sukanya,
Ms.P Madavi

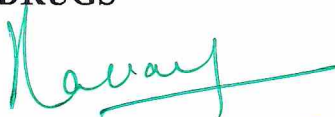



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

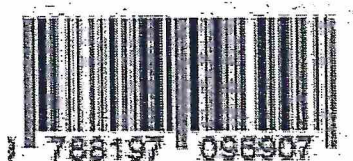
CONTENTS

Abbreviations.....	6
Preface	8
Chapter 1. GENERAL PHARMACOLOGY. PHARMACOKINETICS...	9
Chapter 2. GENERAL PHARMACOLOGY. PHARMACODYNAMICS	18
Chapter 3. DRUGS INHIBITING AFFERENT INNERVATION.....	26
Chapter 4. DRUGS STIMULATING AFFERENT INNERVATION	33
Chapter 5. CHOLINERGIC AGONISTS.	42
Chapter 6. CHOLINERGIC ANTAGONISTS.....	52
Chapter 7. ADRENERGIC AGONISTS.	66
Chapter 8. ADRENERGIC ANTAGONISTS. HISTAMINE-, SEROTONIN- AND DOPAMINERGIC DRUGS	77
Chapter 9. DRUGS FOR GENERAL ANESTHESIA.	90
Chapter 10. ETHANOL. HYPNOTICS. ANTIPILEPTIC AND ANTIPARKINSONIAN DRUGS..	100
Chapter 11. NEUROLEPTICS. ANXIOLYTICS. SEDATIVES. LITHIUM SALTS.....	115
Chapter 12. OPIOID (NARCOTIC) ANALGESICS.	130
Chapter 13. NON-OPIOID ANALGESICS	143
Chapter 14. ANALEPTICS. PSYCHOMOTOR STIMULANTS	160
Chapter 15. ANTI-DEPRESSANTS. ADAPTOGENS. NOOTROPS. ANOREXIGENS.....	172
Chapter 16. INOTROPIC DRUGS.	186
Chapter 17. ANTIANGINAL DRUGS	197
Chapter 18. ANTI-ARRHYTHMICS	212
Chapter 19. ANTIHYPERTENSIVE DRUGS. HYPERTENSIVE AGENTS	2
26	
Chapter 20. ANTI-ATHEROSCLEROTIC DRUGS	240
Chapter 21. DRUGS ACTING ON HEMOPOIESIS (HEMATINICS) ...	252
Chapter 22. DRUGS ACTING ON BLOOD COAGULATION AND FIBRINOLYSIS	266
Chapter 23. DRUGS ACTING ON RESPIRATORY SYSTEM.....	281
Chapter 24. GASTROINTESTINAL DRUGS	295
Chapter 25. DIURETICS. ANTI-GOAT DRUGS. DRUGS	




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXTBOOK FOR PHARMACOLOGY



Kaway

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Ms. A R Sridevi
Dr Balagani Pavan Kumar
Mrs. N Sukanya
Ms. P Madhavi



TEXTBOOK FOR
PHARMACOLOGY



Narayana

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook For Pharmacology

Mr. AR Sridevi, Dr Balagani Pavan kumar, Mrs. N Sukanya,
Ms. P Madavi



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

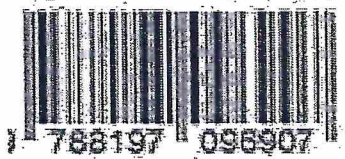
CONTENTS

Abbreviations	6
Preface	8
Chapter 1. GENERAL PHARMACOLOGY. PHARMACOKINETICS...	9
Chapter 2. GENERAL PHARMACOLOGY. PHARMACODYNAMICS	18
Chapter 3. DRUGS INHIBITING AFFERENT INNERVATION.....	26
Chapter 4. DRUGS STIMULATING AFFERENT INNERVATION	33
Chapter 5. CHOLINERGIC AGONISTS.	42
Chapter 6. CHOLINERGIC ANTAGONISTS.....	52
Chapter 7. ADRENERGIC AGONISTS.	66
Chapter 8. ADRENERGIC ANTAGONISTS. HISTAMINE-, SEROTONIN- AND DOPAMINERGIC DRUGS	77
Chapter 9. DRUGS FOR GENERAL ANESTHESIA.	90
Chapter 10. ETHANOL. HYPNOTICS. ANTIPILEPTIC AND ANTIPARKINSONIAN DRUGS..	100
Chapter 11. NEUROLEPTICS. ANXIOLYTICS. SEDATIVES. LITHIUM SALTS.....	115
Chapter 12. OPIOID (NARCOTIC) ANALGESICS.	130
Chapter 13. NON-OPIOID ANALGESICS	143
Chapter 14. ANALEPTICS. PSYCHOMOTOR STIMULANTS	160
Chapter 15. ANTI-DEPRESSANTS. ADAPTOGENS. NOOTROPS. ANOREXIGENS.....	172
Chapter 16. INOTROPIC DRUGS.	186
Chapter 17. ANTIANGINAL DRUGS	197
Chapter 18. ANTI-ARRHYTHMICS	212
Chapter 19. ANTIHYPERTENSIVE DRUGS. HYPERTENSIVE AGENTS	2
26	
Chapter 20. ANTI-ATHEROSCLEROTIC DRUGS	240
Chapter 21. DRUGS ACTING ON HEMOPOIESIS (HEMATINICS) ...	252
Chapter 22. DRUGS ACTING ON BLOOD COAGULATION AND FIBRINOLYSIS	266
Chapter 23. DRUGS ACTING ON RESPIRATORY SYSTEM.....	281
Chapter 24. GASTROINTESTINAL DRUGS	295
Chapter 25. DIURETICS. ANTI-GOAT DRUGS. DRUGS	




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

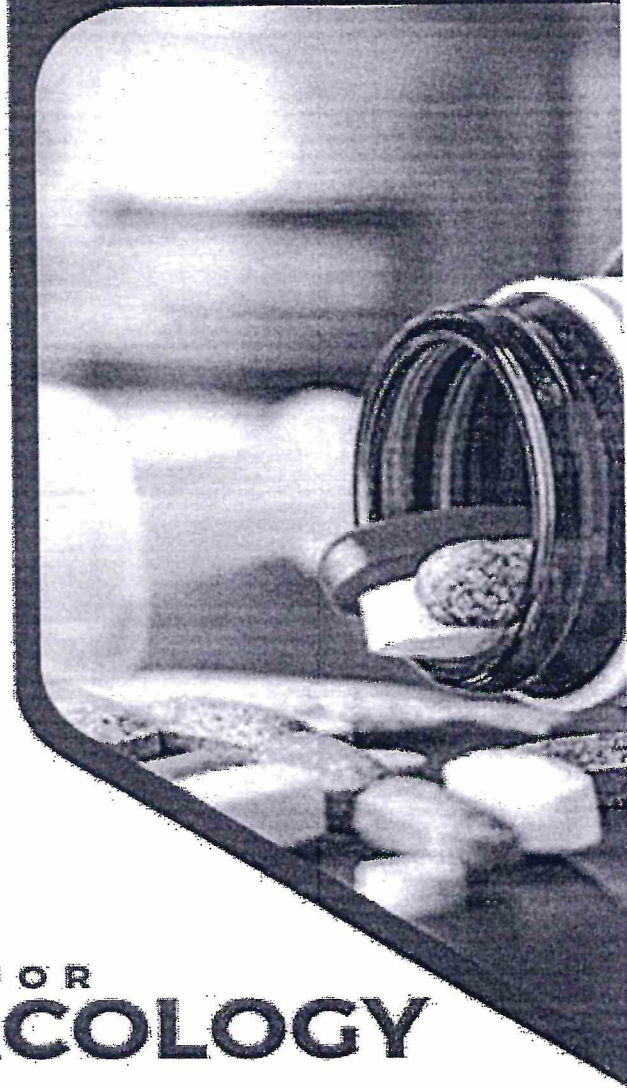
A TEXTBOOK FOR PHARMACOLOGY



Handwritten signature

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Ms. A R Sridevi
Dr Balagani Pavan Kumar
Mrs. N Sukanya
Ms. P Madhavi



TEXTBOOK FOR
PHARMACOLOGY



Narayana
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook For Pharmacology

Mr. AR Sridevi, Dr Balagani Pavan kumar, Mrs. N Sukanya,
Ms. P Madavi




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

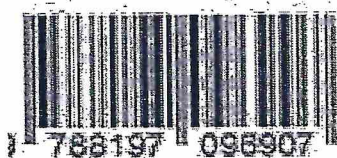
CONTENTS

Abbreviations.....	6
Preface	8
Chapter 1. GENERAL PHARMACOLOGY. PHARMACOKINETICS...	9
Chapter 2. GENERAL PHARMACOLOGY. PHARMACODYNAMICS	18
Chapter 3. DRUGS INHIBITING AFFERENT INNERVATION.....	26
Chapter 4. DRUGS STIMULATING AFFERENT INNERVATION	33
Chapter 5. CHOLINERGIC AGONISTS.	42
Chapter 6. CHOLINERGIC ANTAGONISTS.....	52
Chapter 7. ADRENERGIC AGONISTS.	66
Chapter 8. ADRENERGIC ANTAGONISTS. HISTAMINE-, SEROTONIN- AND DOPAMINERGIC DRUGS	77
Chapter 9. DRUGS FOR GENERAL ANESTHESIA.	90
Chapter 10. ETHANOL. HYPNOTICS. ANTIPILEPTIC AND ANTIPARKINSONIAN DRUGS..	100
Chapter 11. NEUROLEPTICS. ANXIOLYTICS. SEDATIVES. LITHIUM SALTS.....	115
Chapter 12. OPIOID (NARCOTIC) ANALGESICS.	130
Chapter 13. NON-OPIOID ANALGESICS	143
Chapter 14. ANALEPTICS. PSYCHOMOTOR STIMULANTS	160
Chapter 15. ANTI-DEPRESSANTS. ADAPTOGENS. NOOTROPS. ANOREXIGENS.....	172
Chapter 16. INOTROPIC DRUGS.	186
Chapter 17. ANTIANGINAL DRUGS	197
Chapter 18. ANTI-ARRHYTHMICS	212
Chapter 19. ANTIHYPERTENSIVE DRUGS. HYPERTENSIVE AGENTS	2
26	
Chapter 20. ANTI-ATHEROSCLEROTIC DRUGS	240
Chapter 21. DRUGS ACTING ON HEMOPOIESIS (HEMATINICS) ...	252
Chapter 22. DRUGS ACTING ON BLOOD COAGULATION AND FIBRINOLYSIS	266
Chapter 23. DRUGS ACTING ON RESPIRATORY SYSTEM.....	281
Chapter 24. GASTROINTESTINAL DRUGS	295
Chapter 25. DIURETICS. ANTI-GOAT DRUGS. DRUGS	




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXTBOOK FOR PHARMACOLOGY



Narayana

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



NITYA
PUBLICATIONS

As per PCI Regulations Syllabus

PHARMACEUTICS-I



AUTHOR

Dr. K. Kranthi Kumar

CO-AUTHORS

Dr. L. SRINIVAS

Dr. Vema Kiran

Dr. Balagani Pavan Kumar



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



A Hand Book of Pharmaceutics-1

AUTHOR

Dr. K. Kranthi Kumar M.PHARM, PH.D, M.B.A., PRAF
Professor cum Head, Dept. of Pharmaceutics
Mahathi college of Pharmacy, CTM Cross Roads
Madanapalle-517319, Chittoor (Dit)
Andhra Pradesh INDIA

Co- AUTHORS

Dr. L. Srinivas M.PHARM, PH.D
Professor, GITAM Institute of Pharmacy
GITAM Deemed to be University
Gandhinagar campus, Rushikonda
Visakhapatnam – 530 045 Andhra Pradesh INDIA

Dr. Vema Kiran M. PHARM, PH.D,
Head cum Asso.Professor, School of Health and Allied
Sciences, APEX PROFESSIONAL University
Pasighat, Arunachal Pradesh, INDIA

Dr. Balagani Pavan Kumar M.Pharm, Ph.D., FIC, FAGE, FBSS, FICCP
Professor and Principal, Gokula Krishna College of Pharmacy,
Sullurpet, SPSR Nellore Dist, Andhra Pradesh, India



Nitya Publications, Bhopal


Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

First Edition 2021

Publisher's Disclaimer: Due care has been taken while publishing this book, but the Author, Publisher, Printers are not responsible in any manner for any mistake that may have inadvertently crept in.

All rights reserved. No part of this book may be reprinted or reproduced or utilized in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system without permission in writing from the publishers.

Any comments or suggestions should be sent to author and no other place including public domain.

ISBN: 978-93-91669-47-8

Price: Rs.499.00

Published & Printed by:

Nitya Publications, Bhopal MP India

Web: www.nityapublications.com

Email: info@nityapublications.com

Mob. 9009291840

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D. FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



Authors Profiles



DR.K.KRANTHIKUMAR M.PHARM, PH.D, M.B.A. is working as Professor cum Head Dept. Of Pharmaceutics in Mahathi College of Pharmacy Madanapalle, Andhra Pradesh 517319 Affiliated to JNTU-A Anantapuramu Andhra Pradesh INDIA. He is done certified PG course in Industrial Regulatory Affairs and Medical content writing. He has 12 years teaching experience in both U.G – B.Pharmacy and P.G-M.PHARMACY courses on Pharmaceutical Technology, NDDS, Physical Pharmacy, Regulatory Affairs etc. He has 29 National, 2 International publications in his credit. He actively involved in research in pharmacy and guided the research work of 29 M.Pharm graduates and 35 B.Pharm under graduates. Till now 21 Conferences attended, 04 UGC sponsored Conferences conducted, 05 Faculty development programmes and 04 Pharmacy text books published. He has a 01 Patent in Herbal gel for therapy of Acne. He is also an Editorial member and reviewer for various pharmacy journals. He is life time member of APTI.



DR. L. SRINIVAS M.PHARM, PH.D. is working as Professor in GITAM Institute of Pharmacy GITAM Deemed to be University Gandhinagar campus, Rushikonda Visakhapatnam – 530 045. He has 17 years teaching experience in both U.G – B.Pharmacy and P.G-M.PHARMACY courses .He actively involved in research in pharmacy and guided the research work of 48 He has a 01 international Patent. He is also an Editorial member and reviewer for various pharmacy journals. He has life member of APTI, IPGA and IHPA.



Dr. Vema Kiran M. PHARM, PH.D, is working as Head cum Asso.Professor in School of Health and Allied Sciences APEX PROFESSIONAL University Pasighat, Arunachal Pradesh INDIA. He has 14 years of teaching experience in both B. PHARMACY&M. PHARMACY courses on pharmaceutical technology, NDDS etc. He has several research publications in his credit. He actively involved in research in pharmacy and guided the research work of 4 M. Pharmacy graduates and 8 B. Pharmacy under graduates.



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D. FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



Dr. Balagani Pavan Kumar, (M.Pharm, Ph.D., FIC, FAGE, FBSS, FICCP) was awarded the degree of Doctor of Philosophy (PhD) in Pharmaceutical Sciences by JNTUA, Anantapuramu. He is presently working as Professor and Principal at Gokula Krishna College of Pharmacy, Sullurpet, SPSR Nellore dist., Andhra Pradesh, India. He is having 15 years of teaching and research experience. He is having 02 patents to his credit. He has published more than 40 research and review articles in various indexed, peer-reviewed national and international journals with good impact factor. Currently he is serving as Editor-in-Chief in Journal of Comprehensive Pharmacy and as technical Editor in Science Alert Publishing Group. He has received several awards and rewards includes Best Teacher award, APP Appreciation Award and Inspiring Role Model & Leader. In the year 2017 he received the most prestigious —Sushrutha Best Scientist award from the Tamil Nadu Scientific Research Organization (Bose Science Society).

Narayana



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

List of Contents

Ch.No.	Content	Page No.
1	History of profession of Pharmacy in India in relation to Pharmacy education, industry and associations	01
2	Prescription	16
3	Tablets	31
4	Capsules	52
5	Liquid oral preparations	72
6	Topical Preparations	101
7	Nasal preparations	136
8	Powders and granules	143
9	Sterile formulations	154
10	Pharmaceutical aerosols	181
11	Immunological products	193
12	Quality assurance	205
13	Packaging materials	219
14	Pharmaceutical aids	225
15	Novel drug delivery system	232



Raway
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Chapter 1

History of profession of Pharmacy in India in relation to Pharmacy education, industry and associations

History:

The history of pharmacy as an independent science dates back to the first third of the 19th century. Before then, pharmacy evolved from antiquity as part of medicine. The history of pharmacy coincides well with the history of medicine, but it's important that there is a distinction between the two topics. Pharmaceuticals is one of the most-researched fields in the academic industry, but the history surrounding that particular topic is sparse compared to the impact it's made world-wide. Before the advent of pharmacists, there existed apothecaries that worked alongside priests and physicians in regard to patient care.

Asia:

The earliest known Chinese manual on materia medica is the Shennong Bencao Jing (The Divine Farmer's Herb-Root Classic), dating back to the 1st century AD. It was compiled during the Han dynasty and was attributed to the mythical Shennong. Earlier literature included lists of prescriptions for specific ailments, exemplified by a manuscript "Recipes for 52 Ailments", found in the Mawangdui, sealed in 168 BC. Further details on Chinese pharmacy can be found in the Pharmacy in China article. The earliest known compilation of medicinal substances in Indian traditional medicine dates to the 3rd or 4th century AD (attributed to Sushruta, who is recorded as a physician of the 6th century BC). There is a stone sign for a pharmacy with a tripod, a mortar, and a pestle opposite one for a doctor in the Arcadian Way in Ephesus, Turkey.

In Japan, at the end of the Asuka period (538-710) and the early Nara period (710-794), the men who fulfilled roles similar to those of modern pharmacists were highly respected. The place of pharmacists in society was expressly defined in the Taihō Code (701) and re-stated in the Yōrō Code (718). Ranked positions in the pre-Heian Imperial court were established; and this organizational structure remained largely intact until the Meiji Restoration (1868). In this highly stable hierarchy, the pharmacists and even pharmacist assistants were assigned status superior to all others in health-related fields such as physicians and acupuncturists. In the Imperial household, the pharmacist was even ranked above the two personal physicians of the Emperor. Following are the provisions which pharmacist should keep in mind while dealing with his trade:

- (i) Price structure the prices charged should be fair keeping with the quality, quantity and labor or skill required.
- (ii) Fair trade practice Fair practice should be adopted by a pharmacist in the trade without any attempt to capture other pharmacist's business. If a customer brings a prescription (by



The basis for this text book originally stemmed from my passion for developing better methods prevention of diseases and novel methods in development of clinical methods in various treatments of diseases. As the world moves into the digital age, generating vast amount of data and born digital content, there will be a greater need to access legacy material created with outdated technology. It is my passion to not only find out, but to develop tools to break down barriers of accessibility for future generation.

In truth, I could not have achieved my current level of success without a strong support group. First of all, my parents, who supported me with love and understanding? And secondly, my committee members, each of whom has provided patient advice and guidance throughout the research process. Thank you all for your unwavering support.

Pharmacology is the branch of science focused on health. There are two main approaches to health science the study and research of the body and health-related issues to understand how humans (and animals) function, and the application of that knowledge to improve health and to prevent and cure diseases and other physical and mental impairments. The science builds on many sub-fields, including biology, biochemistry, physics, epidemiology, pharmacology, medical sociology. Applied health sciences endeavor to better understand and improve human health through applications in areas such as health education, biomedical engineering, biotechnology and public health.

Organized interventions to improve health based on the principles and procedures developed through the health sciences are provided by practitioners trained in medicine, nursing, nutrition, pharmacy, social work, psychology, occupational therapy, physical therapy and other health care professions. Clinical practitioners focus mainly on the health of individuals, while public health practitioners consider the overall health of communities and populations.

About The Author



DR.K.KRANTHIKUMAR M.PHARM, PH.D, M.B.A. is working as Professor cum Head Dept. Of Pharmaceutics in Mahathi college of Pharmacy Madanapalle, Andhra Pradesh 517319 Affiliated to JNTU-A Anantapuramu Andhra Pradesh INDIA. He is done certified PG course in Industrial Regulatory Affairs and Medical content writing. He has 12 years teaching experience in both U.G – B.Pharmacy and P.G-M.PHARMACY courses on Pharmaceutical Technology, NDDS, Physical Pharmacy, Regulatory Affairs etc. He has 29 National, 2 International publications in his credit. He actively involved in research in pharmacy and guided the research work of 29 M.Pharm graduates and 35 B.Pharm under graduates. Till now 21 Conferences attended, 04 UGC sponsored Conferences conducted, 05 Faculty development programmes and 03 Pharmacy text books. He has a 01 Patent in Herbal gel for therapy of Acne. He is also an Editorial member and reviewer for various pharmacy journals. He has life member of APTI.

DR. BALAGANI RAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524124

Published & Printed By :

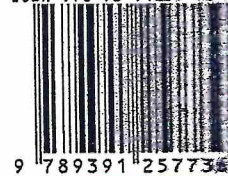
NITYA
PUBLICATIONS

Copyright @ Dr.k.kranthi Kumar

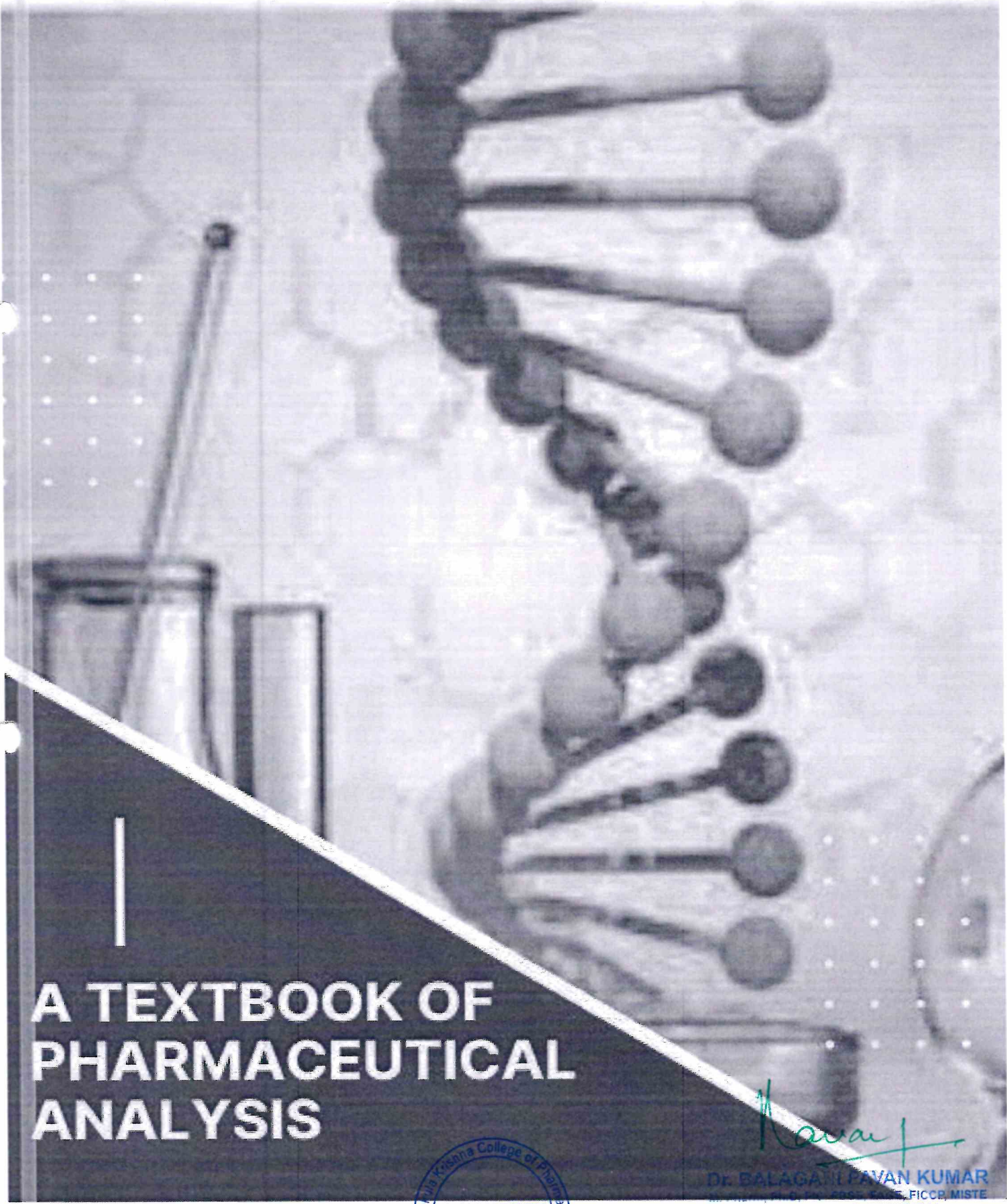
Nitya Publications, Bhopal MP India
Web: www.nityapublications.com
Email : info@nityapublications.com
Mob. : +91-9009291840

MRP Rs.

ISBN 978-93-91257-73-5



● **Mr. Sivakumar Peta, Dr. Balagani Pavan Kumar,
Dr. P Kishor, Mrs. D Kalyani, Mrs. B Swathi**



**A TEXTBOOK OF
PHARMACEUTICAL
ANALYSIS**



Nava
DR. BALAGANI PAVAN KUMAR
M.Pharm., Ph.D., PGD, FICP, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook of Pharmaceutical Analysis

Mr.Siva kumar Peta, Dr.Balagani Pavan kumar, Dr.P.Kishor, Mrs.D Kalyani,
Mrs.B.Swathi




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Contents...

Preface Contributors

1. Form Selection of Pharmaceutical Compounds
2. Preparation of Drug Samples for Analysis
3. High-Performance Liquid Chromatography
4. Mass Spectroscopy in Pharmaceutical Analysis
5. Ultraviolet–Visible Spectroscopy
6. Immunoassay Techniques
7. Applications of Capillary Electrophoresis Technology in the Pharmaceutical Industry
8. Atomic Spectroscopy
9. Luminescence Spectroscopy
10. Solid-State Nuclear Magnetic Resonance Spectroscopy
11. Vibrational Spectroscopy
12. Statistical Considerations in Pharmaceutical Process Development and Validation




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXTBOOK OF PHARMACEUTICAL ANALYSIS

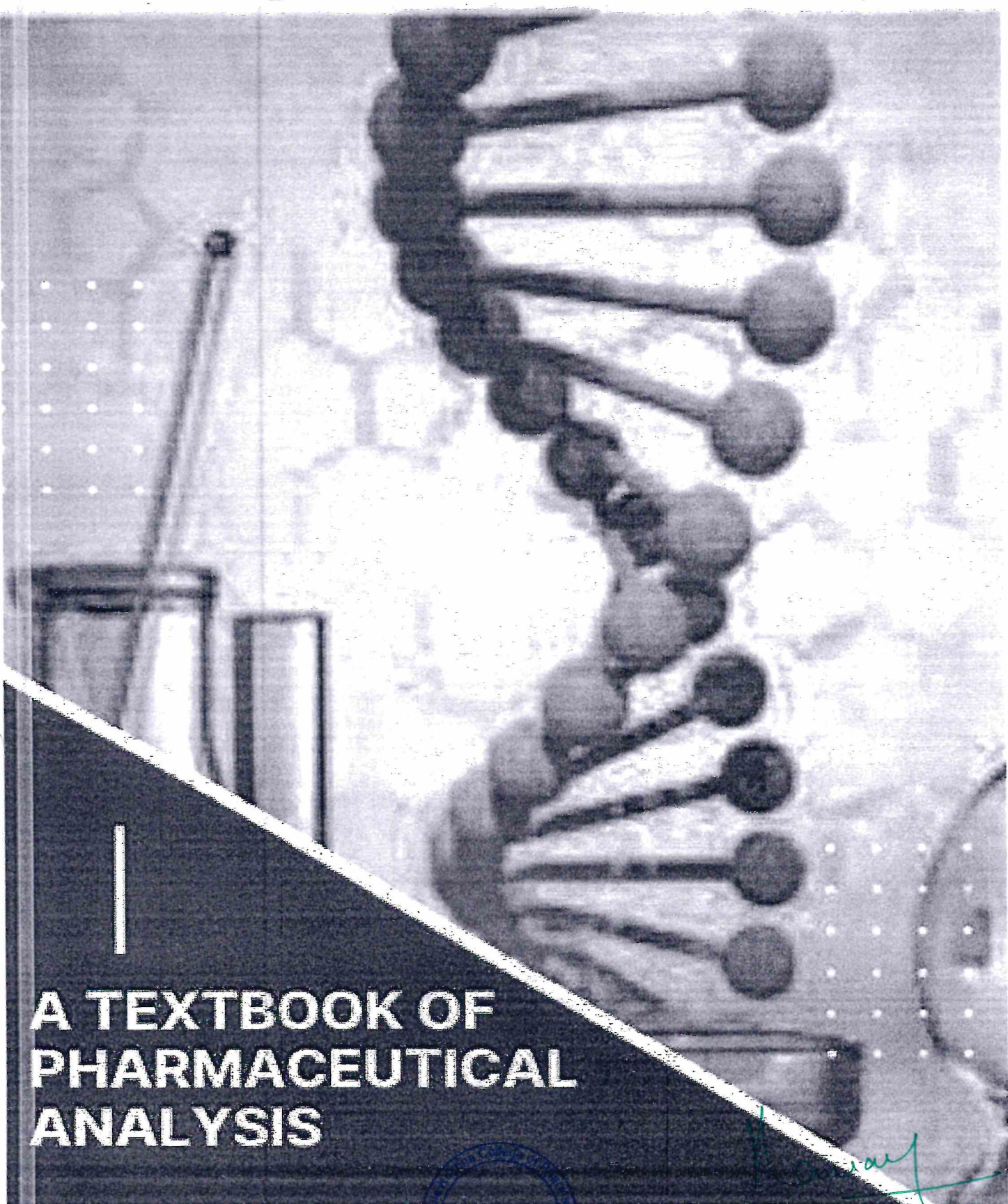


Kavay

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



● Mr. Sivakumar Peta, Dr. Balagani Pavan Kumar,
Dr. P. Kishor, Mrs. D Kalyani, Mrs. B Swathi



A TEXTBOOK OF
PHARMACEUTICAL
ANALYSIS



Balagani Pavan Kumar
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook of Pharmaceutical Analysis

Mr.Siva kumar Peta, **Dr.Balagani Pavan kumar**, Dr.P.Kishor, Mrs.D Kalyani,
Mrs.B.Swathi



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Contents...

Preface Contributors

1. Form Selection of Pharmaceutical Compounds
2. Preparation of Drug Samples for Analysis
3. High-Performance Liquid Chromatography
4. Mass Spectroscopy in Pharmaceutical Analysis
5. Ultraviolet–Visible Spectroscopy
6. Immunoassay Techniques
7. Applications of Capillary Electrophoresis Technology in the Pharmaceutical Industry
8. Atomic Spectroscopy
9. Luminescence Spectroscopy
10. Solid-State Nuclear Magnetic Resonance Spectroscopy
11. Vibrational Spectroscopy
12. Statistical Considerations in Pharmaceutical Process Development and Validation



Navay
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXTBOOK OF PHARMACEUTICAL ANALYSIS

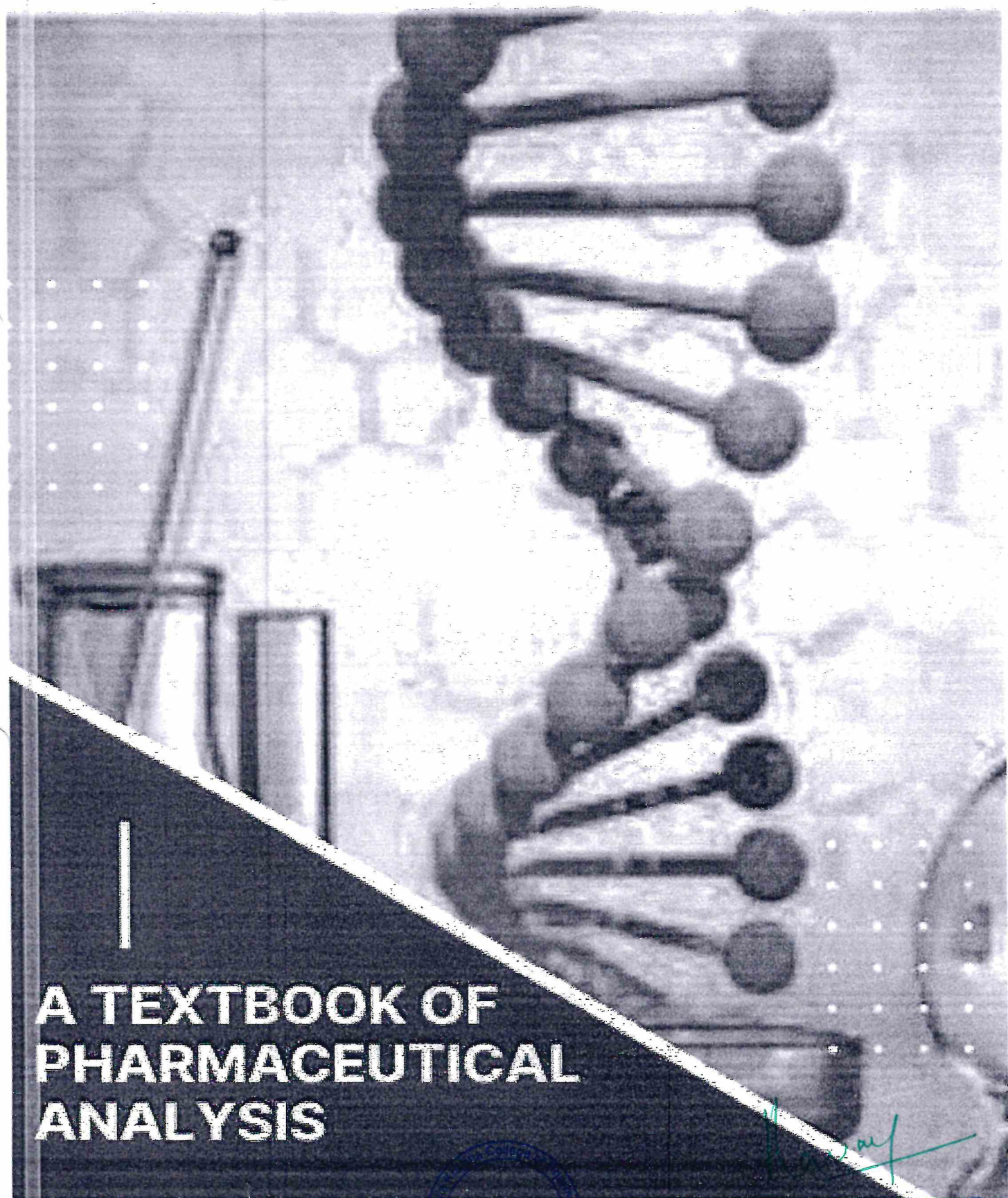


Narayana

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



● Mr. Sivakumar Peta, Dr. Balagani Pavan Kumar,
Dr. P. Kishor, Mrs. D Kalyani, Mrs. B Swathi



|
**A TEXTBOOK OF
PHARMACEUTICAL
ANALYSIS**



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook of Pharmaceutical Analysis

Mr.Siva kumar Peta, Dr.Balagani Pavan kumar, Dr.P.Kishor, Mrs.D Kalyani,
Mrs.B.Swathi



Kaway
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Contents...

Preface Contributors

1. Form Selection of Pharmaceutical Compounds
2. Preparation of Drug Samples for Analysis
3. High-Performance Liquid Chromatography
4. Mass Spectroscopy in Pharmaceutical Analysis
5. Ultraviolet–Visible Spectroscopy
6. Immunoassay Techniques
7. Applications of Capillary Electrophoresis Technology in the Pharmaceutical Industry
8. Atomic Spectroscopy
9. Luminescence Spectroscopy
10. Solid-State Nuclear Magnetic Resonance Spectroscopy
11. Vibrational Spectroscopy
12. Statistical Considerations in Pharmaceutical Process Development and Validation




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXTBOOK OF PHARMACEUTICAL ANALYSIS

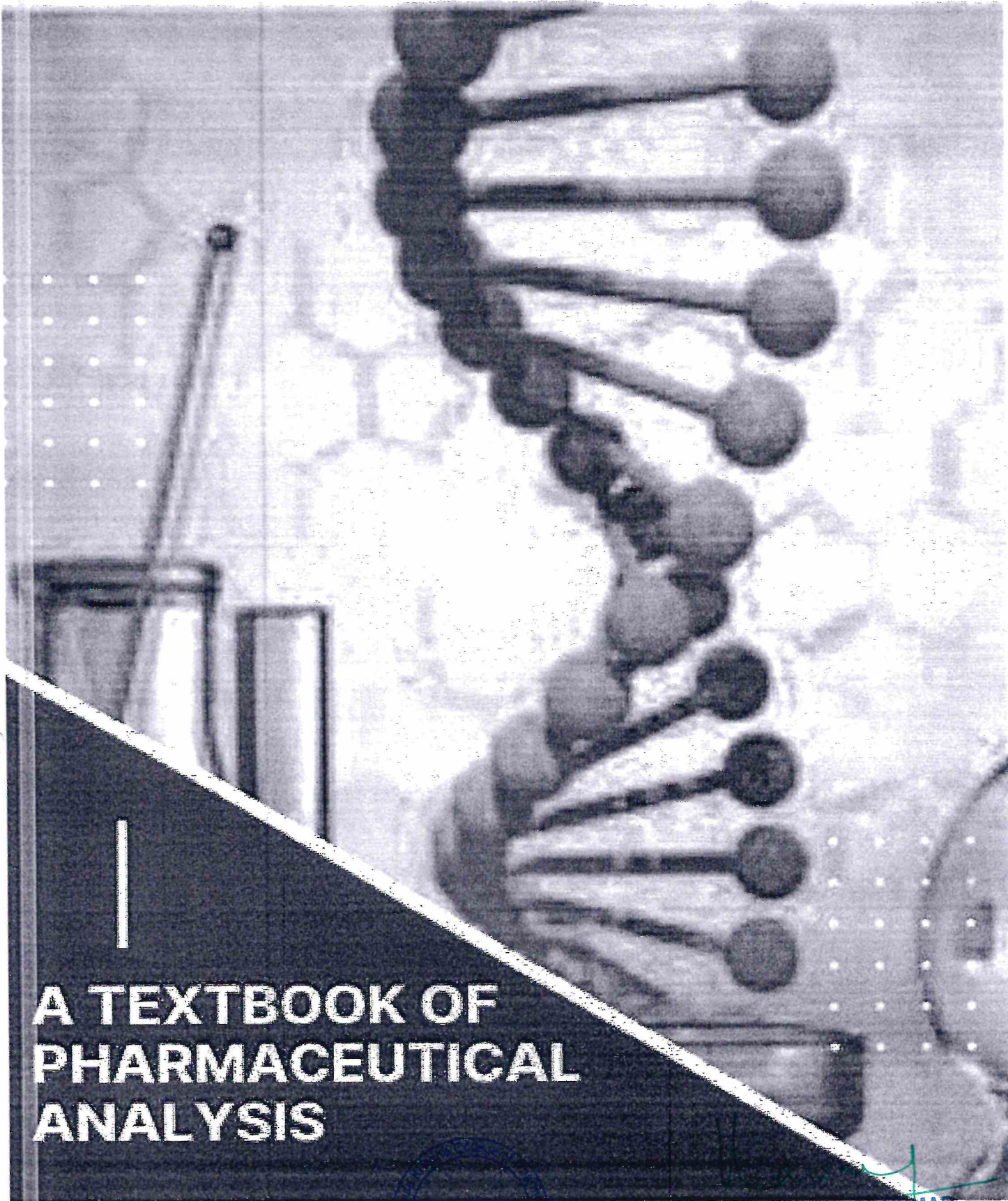


Raway

Dr. BALAGANI PAVAN KUMAR
M.Pharm, Ph.D. FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
SRI KRISHNA COLLEGE OF PHARMACY
SULLURPET, GODPATI Dt. A.P - 524121



● Mr. Sivakumar Peta, Dr. Balagani Pavan Kumar,
Dr. P. Kishor, Mrs. D Kalyani, Mrs. B Swathi



A TEXTBOOK OF
PHARMACEUTICAL
ANALYSIS



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook of Pharmaceutical Analysis

Mr.Siva kumar Peta, Dr.Balagani Pavan kumar, Dr.P.Kishor, Mrs.D Kalyani,
Mrs.B.Swathi



A handwritten signature in green ink, appearing to read 'Kavay'.

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Contents...

Preface Contributors

1. Form Selection of Pharmaceutical Compounds
2. Preparation of Drug Samples for Analysis
3. High-Performance Liquid Chromatography
4. Mass Spectroscopy in Pharmaceutical Analysis
5. Ultraviolet-Visible Spectroscopy
6. Immunoassay Techniques
7. Applications of Capillary Electrophoresis Technology in the Pharmaceutical Industry
8. Atomic Spectroscopy
9. Luminescence Spectroscopy
10. Solid-State Nuclear Magnetic Resonance Spectroscopy
11. Vibrational Spectroscopy
12. Statistical Considerations in Pharmaceutical Process Development and Validation



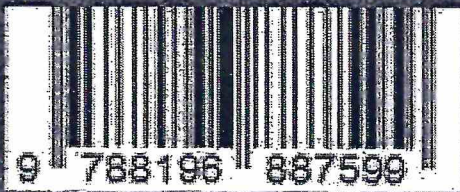

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXTBOOK OF PHARMACEUTICAL ANALYSIS

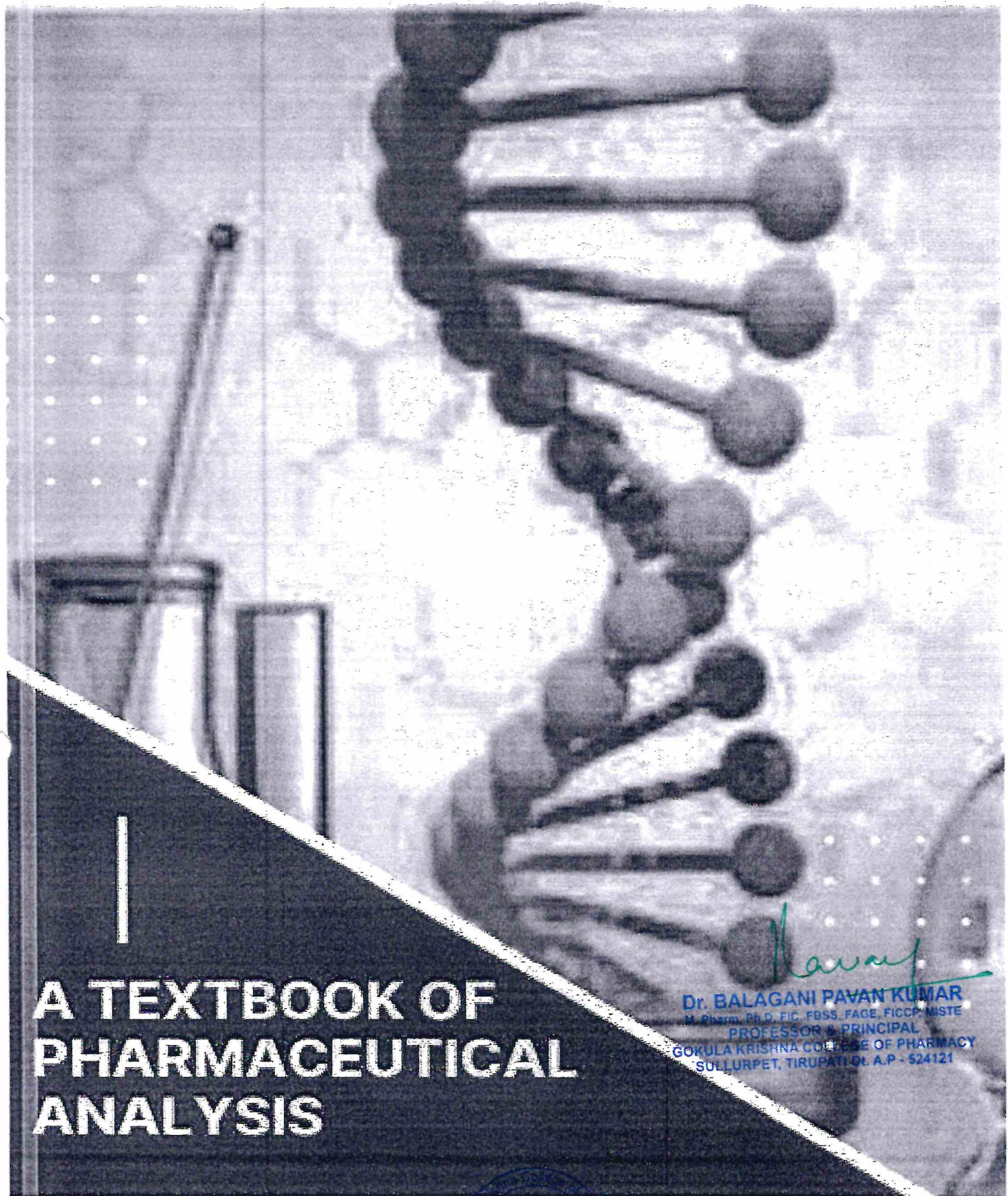


Kavay

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
SRI KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



● Mr. Sivakumar Peta, Dr. Balagani Pavan Kumar,
Dr. P. Kishor, Mrs. D Kalyani, Mrs. B Swathi



|
**A TEXTBOOK OF
PHARMACEUTICAL
ANALYSIS**

Navay
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI DL. A.P - 524121



A Textbook of Pharmaceutical Analysis

Mr.Siva kumar Peta, Dr.Balagani Pavan kumar, Dr.P.Kishor, Mrs.D Kalyani,
Mrs.B.Swathi




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Contents...

Preface Contributors

1. Form Selection of Pharmaceutical Compounds
2. Preparation of Drug Samples for Analysis
3. High-Performance Liquid Chromatography
4. Mass Spectroscopy in Pharmaceutical Analysis
5. Ultraviolet-Visible Spectroscopy
6. Immunoassay Techniques
7. Applications of Capillary Electrophoresis Technology in the Pharmaceutical Industry
8. Atomic Spectroscopy
9. Luminescence Spectroscopy
10. Solid-State Nuclear Magnetic Resonance Spectroscopy
11. Vibrational Spectroscopy
12. Statistical Considerations in Pharmaceutical Process Development and Validation



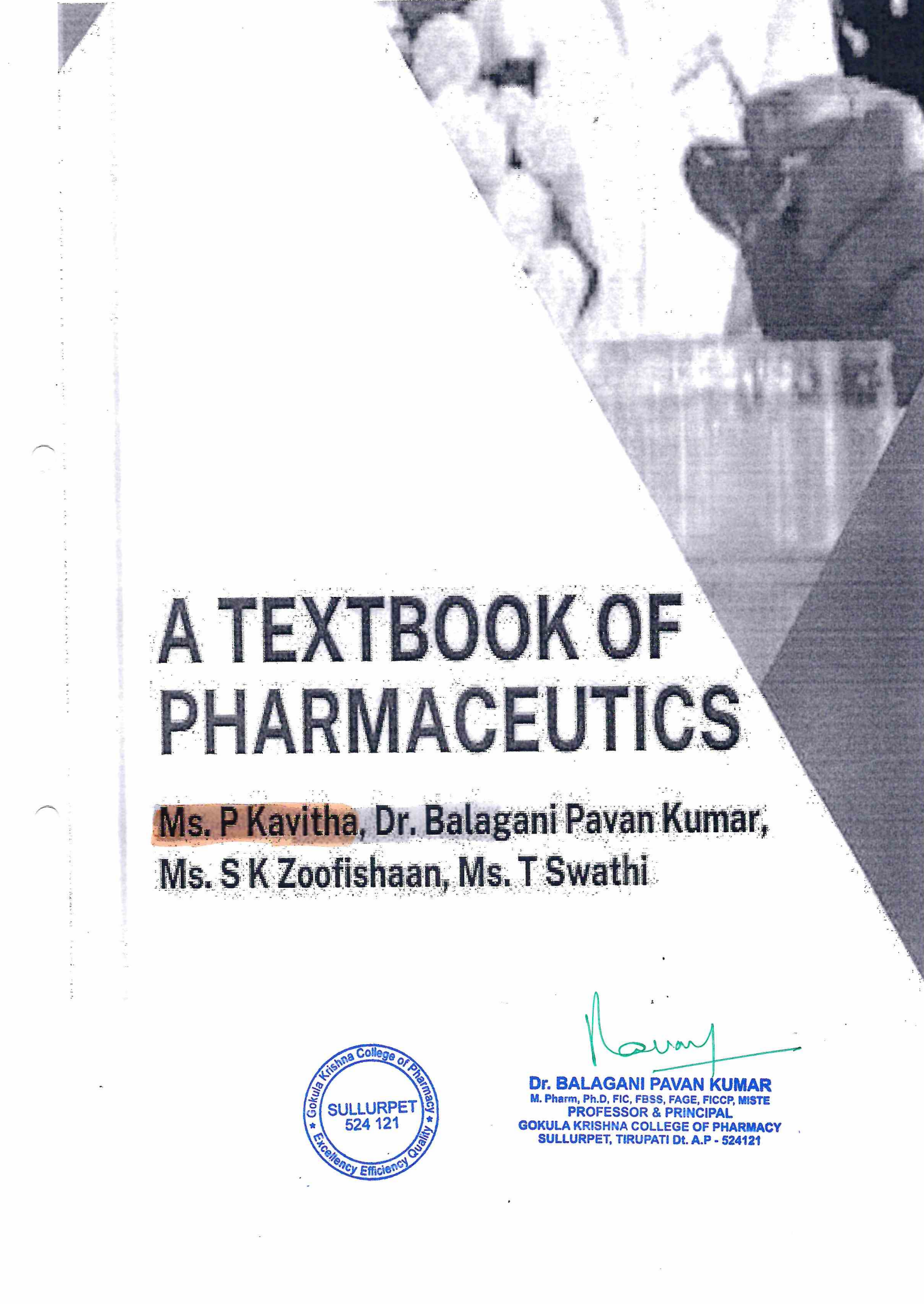

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXTBOOK OF PHARMACEUTICAL ANALYSIS

Navay

Dr. BALAGANI PAVAN KUMAR
Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
SRI SATHYANARAYANA COLLEGE OF PHARMACY
SULLURPET, THIRUPATI Dt. A.P - 524121

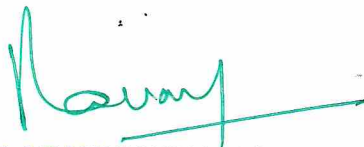




A TEXTBOOK OF PHARMACEUTICS

**Ms. P Kavitha, Dr. Balagani Pavan Kumar,
Ms. S K Zoofishaan, Ms. T Swathi**




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook of Pharmaceutics

Ms P Kavitha , Dr Balagani Pavan Kumar, Ms S K Zoofishaan,

Ms. T Swathi




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



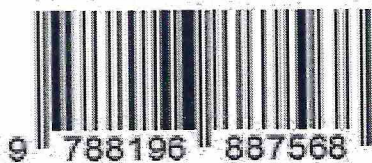
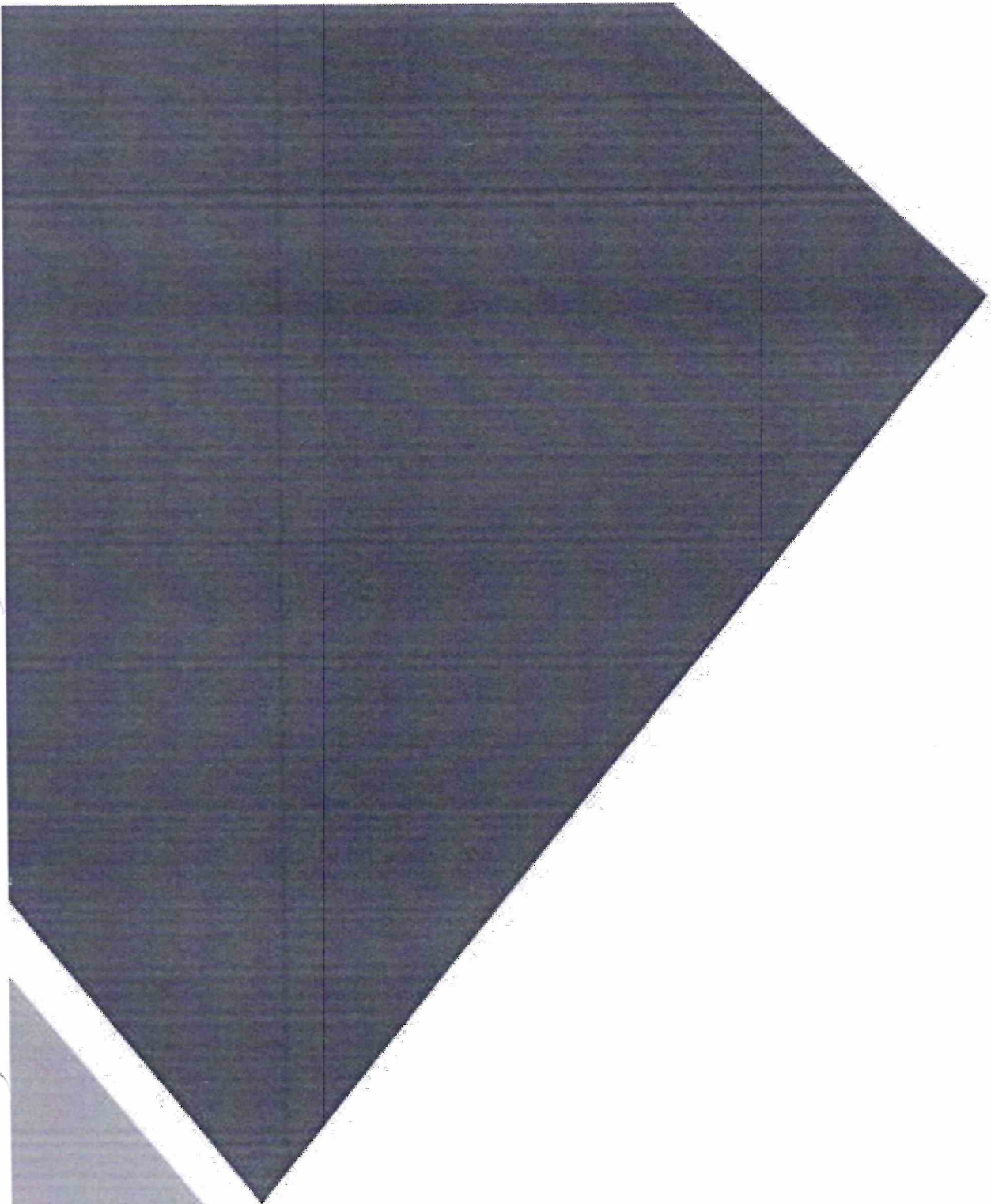
Contents

UNIT-1 : Historical Background, Dosage Forms, Prescription and Posology	1.1 – 1.42
1.1 History of Pharmacy	1.1
1.2 Pharmacy as a Career	1.3
1.3 Introduction to Pharmacopoeia	1.6
1.3.1 Pharmacopoeia	1.6
1.3.2 Indian Pharmacopoeia	1.7
1.3.3 British Pharmacopoeia	1.9
1.3.4 United State Pharmacopoeia	1.11
1.3.5 Extra Pharmacopoeia	1.12
1.4 Introduction to Pharmaceutical Dosage Form	1.13
1.5 Prescription	1.23
1.5.1 Parts of the Prescription	1.23
1.5.2 Handling of Prescription	1.25
1.5.3 Sources of Errors in Prescriptions	1.27
1.5.4 Abbreviation used in Prescription	1.28
1.6 Posology	1.37
1.6.1 Factors Affecting Posology	1.37
1.6.2 Formulae used in Calculations of Pediatric Dose	1.39
Questions	1.41
UNIT-2: Pharmaceutical Calculations, Powders & Liquid Dosage Forms	2.1 – 2.36
2.1 Pharmaceutical Calculation	2.1
2.2 Calculation of Isotonocity	2.3
2.3 Proof Spirit	2.15
2.4 Powder	2.16
2.4.1 Dusting Powder	2.17
2.4.2 Effervescent Powder	2.17
2.4.3 Dentrifices (Tooth Powder)	2.22
2.4.4 Insufflations	2.23
2.4.5 Snuffs	2.23
2.5 Liquid Dosage Form	2.23
2.5.1 Advantages of Liquid Dosage Forms	2.24
2.5.2 Excipients used in Formulation of Liquid Dosage Forms	2.25
2.6 Solubility	2.32
2.7 Techniques of Solubilization	2.33
Questions	2.36



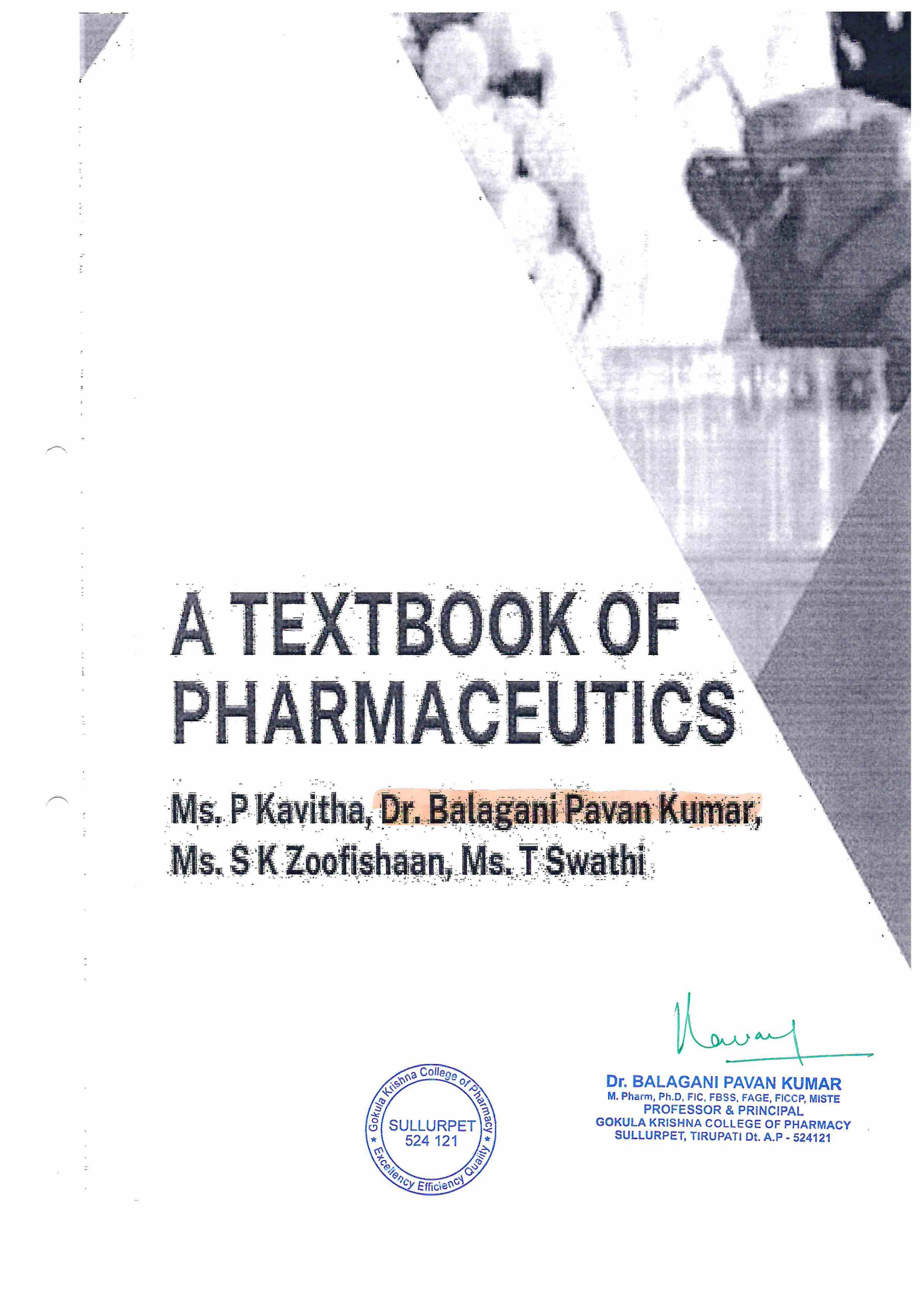

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXTBOOK OF PHARMACEUTICS



Naray

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



A TEXTBOOK OF PHARMACEUTICS

Ms. P Kavitha, **Dr. Balagani Pavan Kumar**,
Ms. S K Zoofishaan, Ms. T Swathi




Kavay

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook of Pharmaceutics

Ms P Kavitha , **Dr Balagani Pavan Kumar**, Ms S K Zoofishaan,
Ms. T Swathi



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121





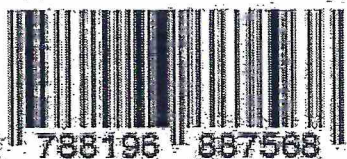
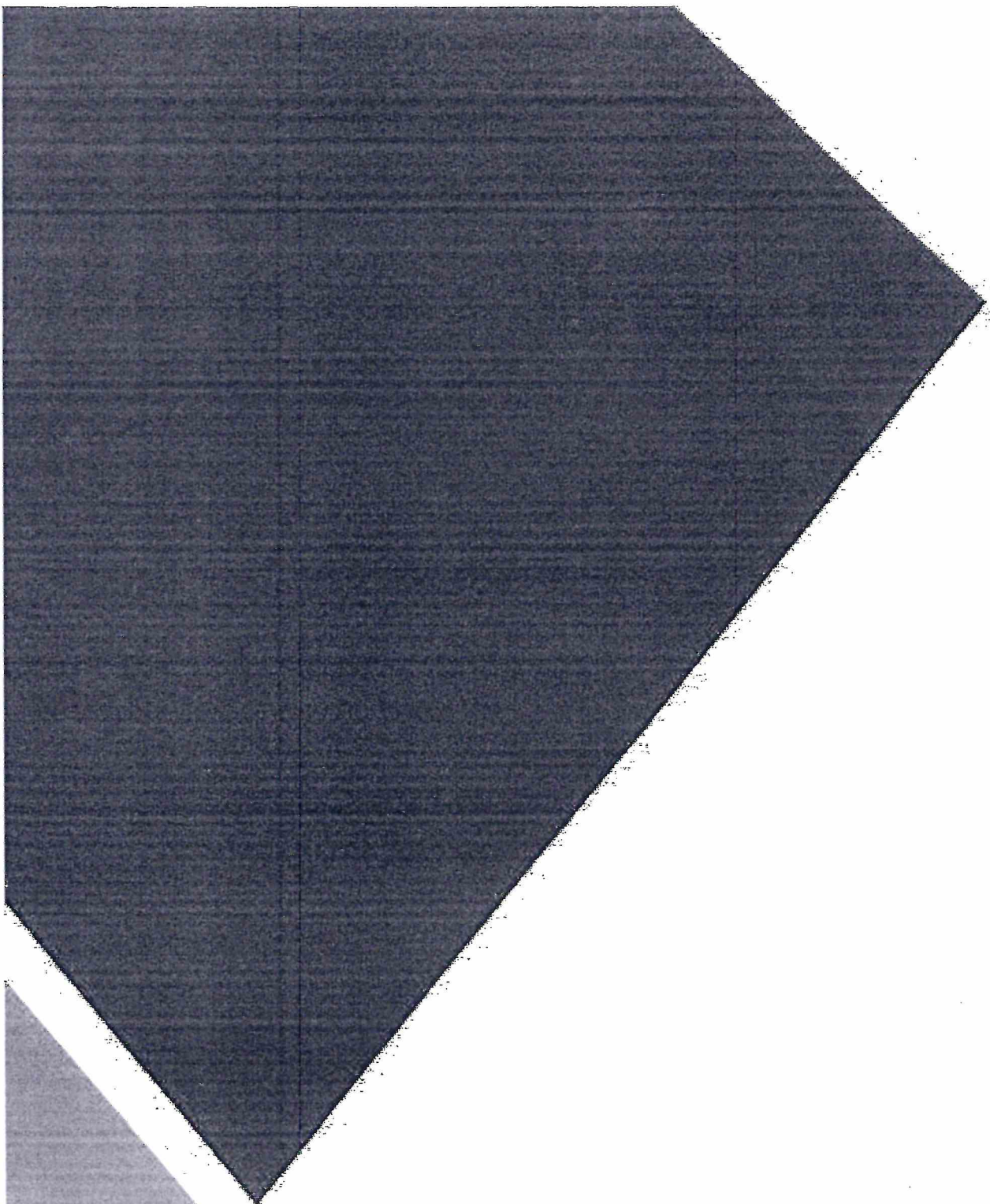
Contents

UNIT-1 : Historical Background, Dosage Forms, Prescription and Posology	1.1 – 1.42
1.1 History of Pharmacy	1.1
1.2 Pharmacy as a Career	1.3
1.3 Introduction to Pharmacopoeia	1.6
1.3.1 Pharmacopoeia	1.6
1.3.2 Indian Pharmacopoeia	1.7
1.3.3 British Pharmacopoeia	1.9
1.3.4 United State Pharmacopoeia	1.11
1.3.5 Extra Pharmacopoeia	1.12
1.4 Introduction to Pharmaceutical Dosage Form	1.13
1.5 Prescription	1.23
1.5.1 Parts of the Prescription	1.23
1.5.2 Handling of Prescription	1.25
1.5.3 Sources of Errors in Prescriptions	1.27
1.5.4 Abbreviation used in Prescription	1.28
1.6 Posology	1.37
1.6.1 Factors Affecting Posology	1.37
1.6.2 Formulae used in Calculations of Pediatric Dose	1.39
Questions	1.41
UNIT-2: Pharmaceutical Calculations, Powders & Liquid Dosage Forms	2.1 – 2.36
2.1 Pharmaceutical Calculation	2.1
2.2 Calculation of Isotonocity	2.3
2.3 Proof Spirit	2.15
2.4 Powder	2.16
2.4.1 Dusting Powder	2.17
2.4.2 Effervescent Powder	2.17
2.4.3 Dentrifices (Tooth Powder)	2.22
2.4.4 Insufflations	2.23
2.4.5 Snuffs	2.23
2.5 Liquid Dosage Form	2.23
2.5.1 Advantages of Liquid Dosage Forms	2.24
2.5.2 Excipients used in Formulation of Liquid Dosage Forms	2.25
2.6 Solubility	2.32
2.7 Techniques of Solubilization	2.33
Questions	2.36



Navay

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



9 788196 887568



Narayana

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXTBOOK OF PHARMACEUTICS

Ms. P Kavitha, Dr. Balagani Pavan Kumar,
Ms. S K Zoofishaan, Ms. T Swathi




Narayana
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook of Pharmaceutics

Ms P Kavitha , Dr Balagani Pavan Kumar, Ms S K Zoofishaan,

Ms. T Swathi




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

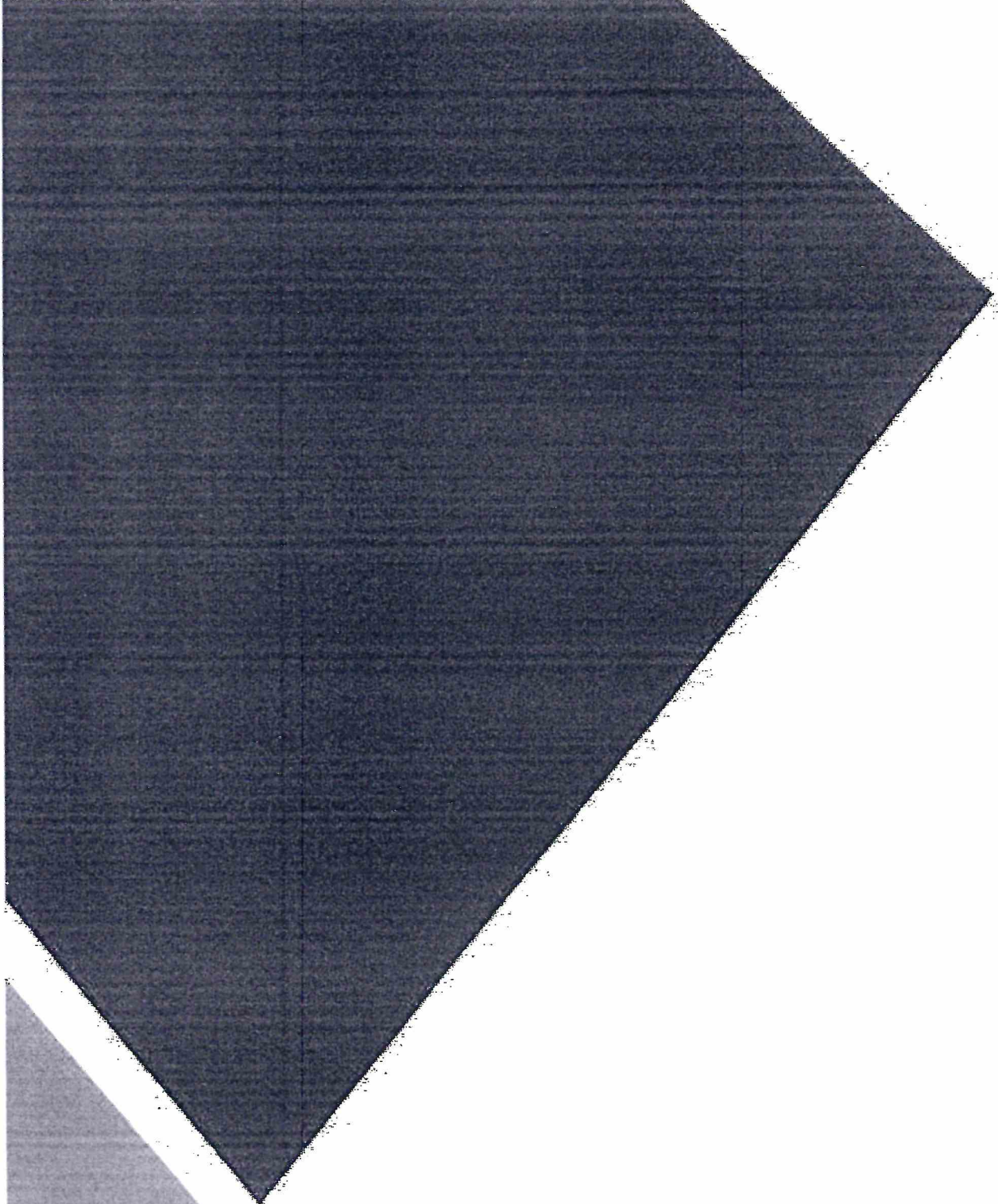
Contents

UNIT-1 : Historical Background, Dosage Forms, Prescription and Posology		1.1 – 1.42
1.1	History of Pharmacy	1.1
1.2	Pharmacy as a Career	1.3
1.3	Introduction to Pharmacopoeia	1.6
1.3.1	Pharmacopoeia	1.6
1.3.2	Indian Pharmacopoeia	1.7
1.3.3	British Pharmacopoeia	1.9
1.3.4	United State Pharmacopoeia	1.11
1.3.5	Extra Pharmacopoeia	1.12
1.4	Introduction to Pharmaceutical Dosage Form	1.13
1.5	Prescription	1.23
1.5.1	Parts of the Prescription	1.23
1.5.2	Handling of Prescription	1.25
1.5.3	Sources of Errors in Prescriptions	1.27
1.5.4	Abbreviation used in Prescription	1.28
1.6	Posology	1.37
1.6.1	Factors Affecting Posology	1.37
1.6.2	Formulae used in Calculations of Pediatric Dose	1.39
	Questions	1.41
UNIT-2: Pharmaceutical Calculations, Powders & Liquid Dosage Forms		2.1 – 2.36
2.1	Pharmaceutical Calculation	2.1
2.2	Calculation of Isotonocity	2.3
2.3	Proof Spirit	2.15
2.4	Powder	2.16
2.4.1	Dusting Powder	2.17
2.4.2	Effervescent Powder	2.17
2.4.3	Dentifrices (Tooth Powder)	2.22
2.4.4	Insufflations	2.23
2.4.5	Snuffs	2.23
2.5	Liquid Dosage Form	2.23
2.5.1	Advantages of Liquid Dosage Forms	2.24
2.5.2	Excipients used in Formulation of Liquid Dosage Forms	2.25
2.6	Solubility	2.32
2.7	Techniques of Solubilization	2.33
	Questions	2.36



Balagani

Dr. BALAGANI PAVAN KUMAR
 M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
 PROFESSOR & PRINCIPAL
 GOKULA KRISHNA COLLEGE OF PHARMACY
 SULLURPET, TIRUPATI Dt. A.P - 524121



9 788196 887568



Navay

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



A TEXTBOOK OF PHARMACEUTICS

Ms. P Kavitha, Dr. Balagani Pavan Kumar,
Ms. S K Zoofishaan, Ms. T Swathi



Navay


Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Textbook of Pharmaceutics

Ms P Kavitha , Dr Balagani Pavan Kumar, Ms S K Zoofishaan,

Ms. T Swathi




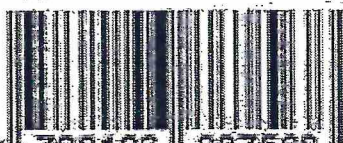
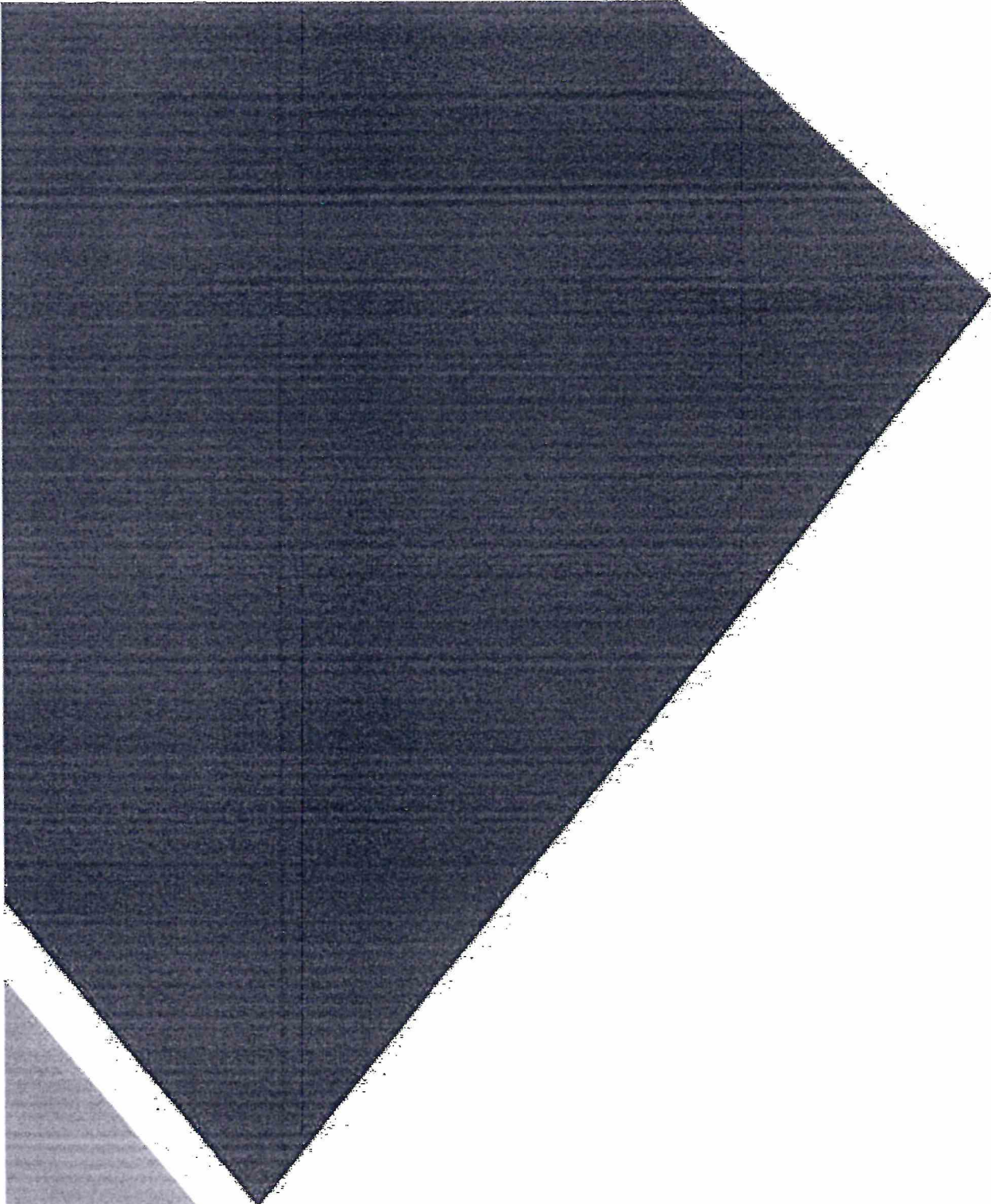

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Contents

UNIT-1 : Historical Background, Dosage Forms, Prescription and Posology		1.1 – 1.42
1.1	History of Pharmacy	1.1
1.2	Pharmacy as a Career	1.3
1.3	Introduction to Pharmacopoeia	1.6
1.3.1	Pharmacopoeia	1.6
1.3.2	Indian Pharmacopoeia	1.7
1.3.3	British Pharmacopoeia	1.9
1.3.4	United State Pharmacopoeia	1.11
1.3.5	Extra Pharmacopoeia	1.12
1.4	Introduction to Pharmaceutical Dosage Form	1.13
1.5	Prescription	1.23
1.5.1	Parts of the Prescription	1.23
1.5.2	Handling of Prescription	1.25
1.5.3	Sources of Errors in Prescriptions	1.27
1.5.4	Abbreviation used in Prescription	1.28
1.6	Posology	1.37
1.6.1	Factors Affecting Posology	1.37
1.6.2	Formulae used in Calculations of Pediatric Dose	1.39
	Questions	1.41
UNIT-2: Pharmaceutical Calculations, Powders & Liquid Dosage Forms		2.1 – 2.36
2.1	Pharmaceutical Calculation	2.1
2.2	Calculation of Isotonocity	2.3
2.3	Proof Spirit	2.15
2.4	Powder	2.16
2.4.1	Dusting Powder	2.17
2.4.2	Effervescent Powder	2.17
2.4.3	Dentifrices (Tooth Powder)	2.22
2.4.4	Insufflations	2.23
2.4.5	Snuffs	2.23
2.5	Liquid Dosage Form	2.23
2.5.1	Advantages of Liquid Dosage Forms	2.24
2.5.2	Excipients used in Formulation of Liquid Dosage Forms	2.25
2.6	Solubility	2.32
2.7	Techniques of Solubilization	2.33
	Questions	2.36




Dr. BALAGANI PAVAN KUMAR
 M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
 PROFESSOR & PRINCIPAL
 GOKULA KRISHNA COLLEGE OF PHARMACY
 SULLURPET, TIRUPATI Dt. A.P - 524121



9 788196 887568

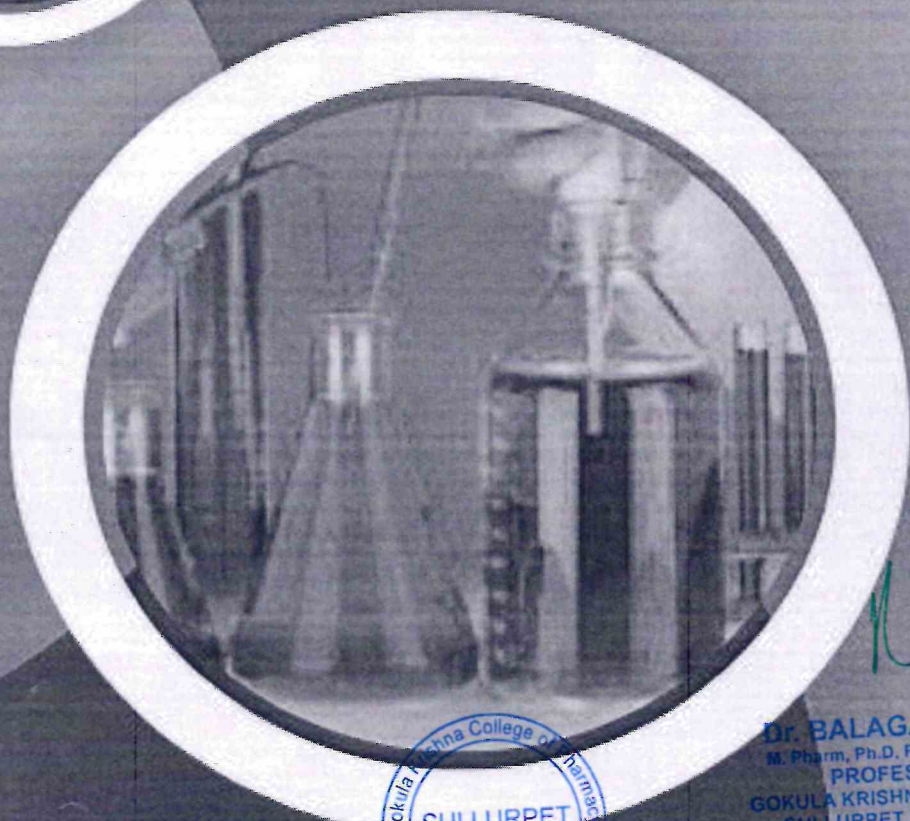
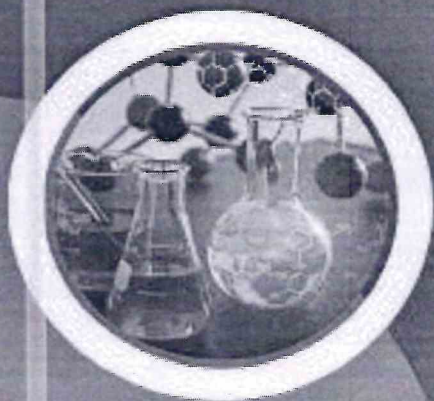


Kavay

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Physical Pharmaceutics

Mrs. P K Devi Bala, Ms.P Kavitha, Dr. Balagani Pavan Kumar, Dr. M Soujanya



Kavay

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



Physical Pharmaceutics

Mrs.P K Devi Bala,Ms.P Kavitha,Dr.Balagani Pavan kumar,
Dr.M Soujanya



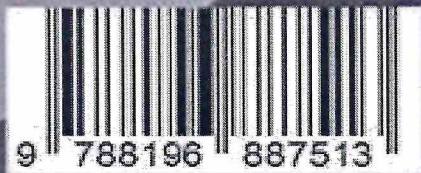

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

1. Solubility of Drugs	1.1 - 1.32
1.1 Introduction	1.1
1.2 Solubility Expressions	1.2
1.3 Mechanisms of Solute Solvent Interactions	1.5
1.4 Ideal Solubility Parameters	1.6
1.5 Solvation	1.7
1.6 Association	1.8
1.7 Quantitative Approach to the Factors Influencing Solubility of Drugs	1.9
1.8 Diffusion Principles in Biological Systems	1.11
1.9 Solubility of Gas in Liquids	1.12
1.10 Solubility of Liquids in Liquids	1.14
1.10.1 Binary Solutions	1.14
1.10.2 Ideal Solutions	1.15
1.11 Raoult's Law	1.17
1.12 Real Solutions	1.21
1.13 Partially Miscible Liquids	1.21
1.14 Critical Solution temperature and its Applications	1.22
1.15 Distribution Law	1.26
1.15.1 Limitations of Distribution Law	1.29
1.15.2 Applications of Distribution Law	1.29
• Exercise	1.30
2. States and Properties of Matter and Physicochemical Properties of Drug Molecules	2.1 - 2.78
2.1 States of Matter and Properties of Matter	2.1
2.1.1 States of Matter	2.1
2.1.2 Changes in the State of Matter	2.5
2.1.3 Latent Heat	2.6
2.1.4 Vapour Pressure	2.7
2.1.5 Sublimation	2.11
2.1.6 Critical Point	2.12
2.1.7 Eutectic Mixtures	2.13
2.1.8 Gases	2.14
2.1.9 Aerosols	2.22



Naray

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



9 788196 887513

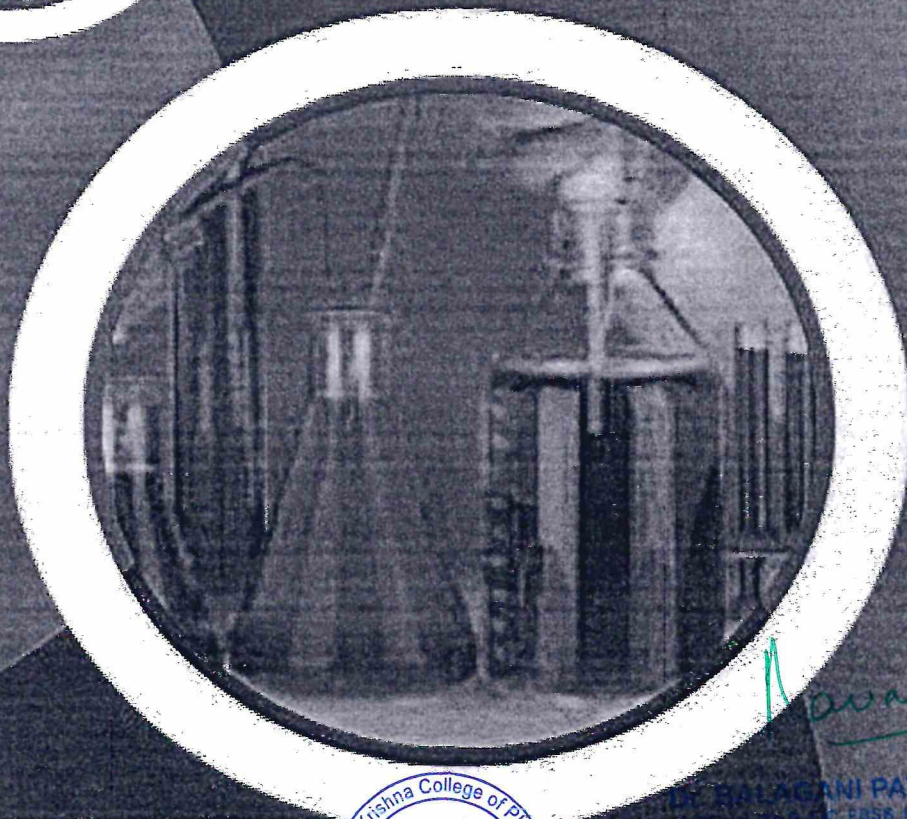
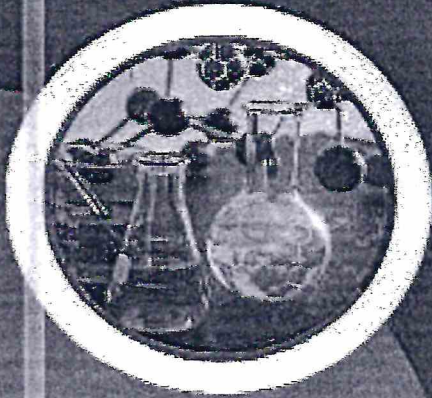


Kavay

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D. FIC, FESS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Physical Pharmaceutics

Mrs. P K Devi Bala, **Ms.P Kavitha**, Dr. Balagani Pavan Kumar, Dr. M Soujanya



M. Pavan
DR. BALAGANI PAVAN KUMAR
M.B.A., M.C. FSSB, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
SRI SRI SISHYA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P. - 524121

Physical Pharmaceutics

Mrs.P K Devi Bala, Ms.P Kavitha, Dr.Balagani Pavan kumar,
Dr.M Soujanya

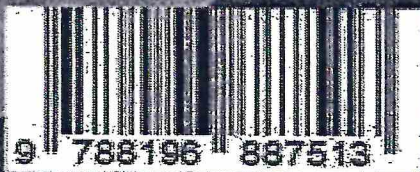


Pavan
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

1.	Solubility of Drugs	1.1 - 1.32
1.1	Introduction	1.1
1.2	Solubility Expressions	1.2
1.3	Mechanisms of Solute Solvent Interactions	1.5
1.4	Ideal Solubility Parameters	1.6
1.5	Solvation	1.7
1.6	Association	1.8
1.7	Quantitative Approach to the Factors Influencing Solubility of Drugs	1.9
1.8	Diffusion Principles in Biological Systems	1.11
1.9	Solubility of Gas in Liquids	1.12
1.10	Solubility of Liquids in Liquids	1.14
	1.10.1 Binary Solutions	1.14
	1.10.2 Ideal Solutions	1.15
1.11	Raoult's Law	1.17
1.12	Real Solutions	1.21
1.13	Partially Miscible Liquids	1.21
1.14	Critical Solution temperature and its Applications	1.22
1.15	Distribution Law	1.26
	1.15.1 Limitations of Distribution Law	1.29
	1.15.2 Applications of Distribution Law	1.29
•	Exercise	1.30
2.	States and Properties of Matter and Physicochemical Properties of Drug Molecules	2.1 - 2.78
2.1	States of Matter and Properties of Matter	2.1
2.1.1	States of Matter	2.1
2.1.2	Changes in the State of Matter	2.5
2.1.3	Latent Heat	2.6
2.1.4	Vapour Pressure	2.7
2.1.5	Sublimation	2.11
2.1.6	Critical Point	2.12
2.1.7	Eutectic Mixtures	2.13
2.1.8	Gases	2.14
2.1.9	Aerosols	2.22




Dr. BALAGANI PAVAN KUMAR
 M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
 PROFESSOR & PRINCIPAL
 GOKULA KRISHNA COLLEGE OF PHARMACY
 SULLURPET, TIRUPATI Dt. A.P - 524121

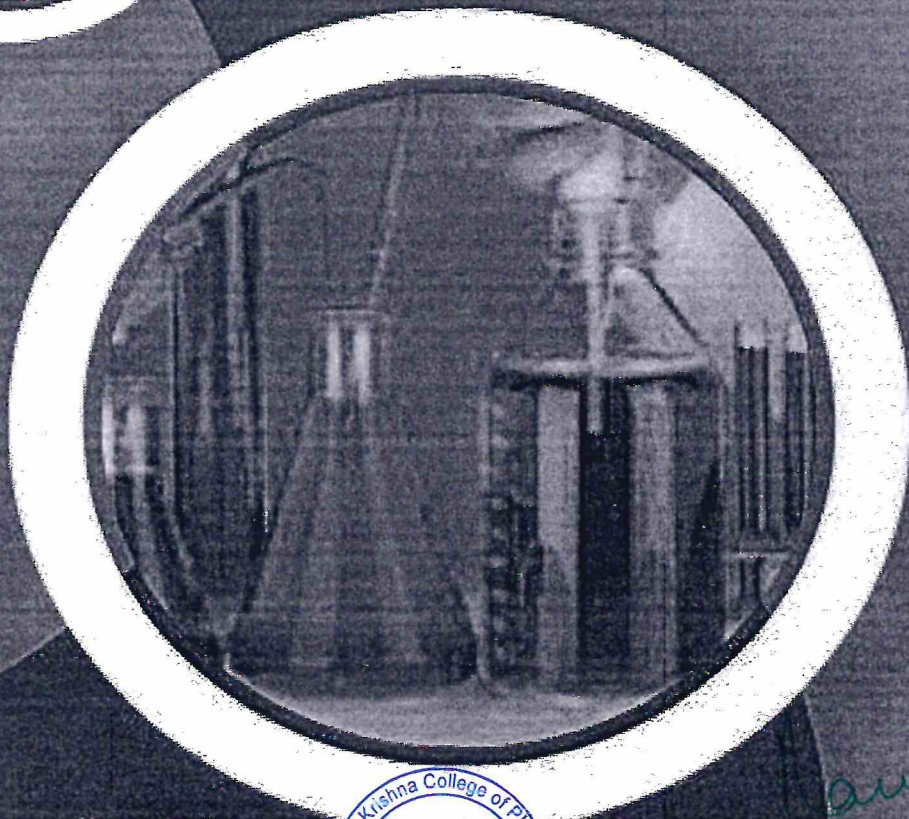
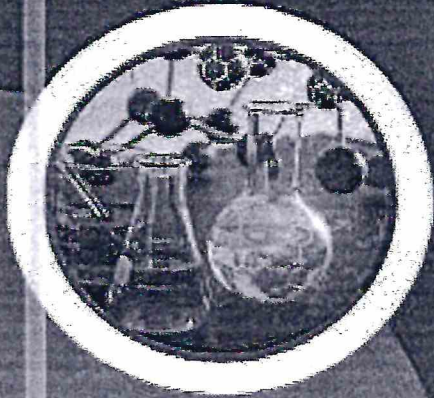


Handwritten signature

DR. M. LAGANI PAVAN KUMAR
M.B.B.S., M.D., FRCR, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Physical Pharmaceutics

Mrs. P K Devi Bala, Ms. P Kavitha, **Dr. Balagani Pavan Kumar**, Dr. M Soujanya



Dr. Balagani Pavan Kumar
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Physical Pharmaceutics

Mrs.P K Devi Bala,Ms.P Kavitha,**Dr.Balagani Pavan kumar,**
Dr.M Soujanya

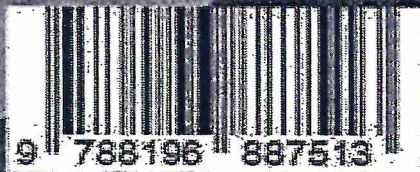


Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

1. Solubility of Drugs	1.1 - 1.32
1.1 Introduction	1.1
1.2 Solubility Expressions	1.2
1.3 Mechanisms of Solute Solvent Interactions	1.5
1.4 Ideal Solubility Parameters	1.6
1.5 Solvation	1.7
1.6 Association	1.8
1.7 Quantitative Approach to the Factors Influencing Solubility of Drugs	1.9
1.8 Diffusion Principles in Biological Systems	1.11
1.9 Solubility of Gas in Liquids	1.12
1.10 Solubility of Liquids in Liquids	1.14
1.10.1 Binary Solutions	1.14
1.10.2 Ideal Solutions	1.15
1.11 Raoult's Law	1.17
1.12 Real Solutions	1.21
1.13 Partially Miscible Liquids	1.21
1.14 Critical Solution temperature and its Applications	1.22
1.15 Distribution Law	1.26
1.15.1 Limitations of Distribution Law	1.29
1.15.2 Applications of Distribution Law	1.29
• Exercise	1.30
2. States and Properties of Matter and Physicochemical Properties of Drug Molecules	2.1 - 2.78
2.1 States of Matter and Properties of Matter	2.1
2.1.1 States of Matter	2.1
2.1.2 Changes in the State of Matter	2.5
2.1.3 Latent Heat	2.6
2.1.4 Vapour Pressure	2.7
2.1.5 Sublimation	2.11
2.1.6 Critical Point	2.12
2.1.7 Eutectic Mixtures	2.13
2.1.8 Gases	2.14
2.1.9 Aerosols	2.22



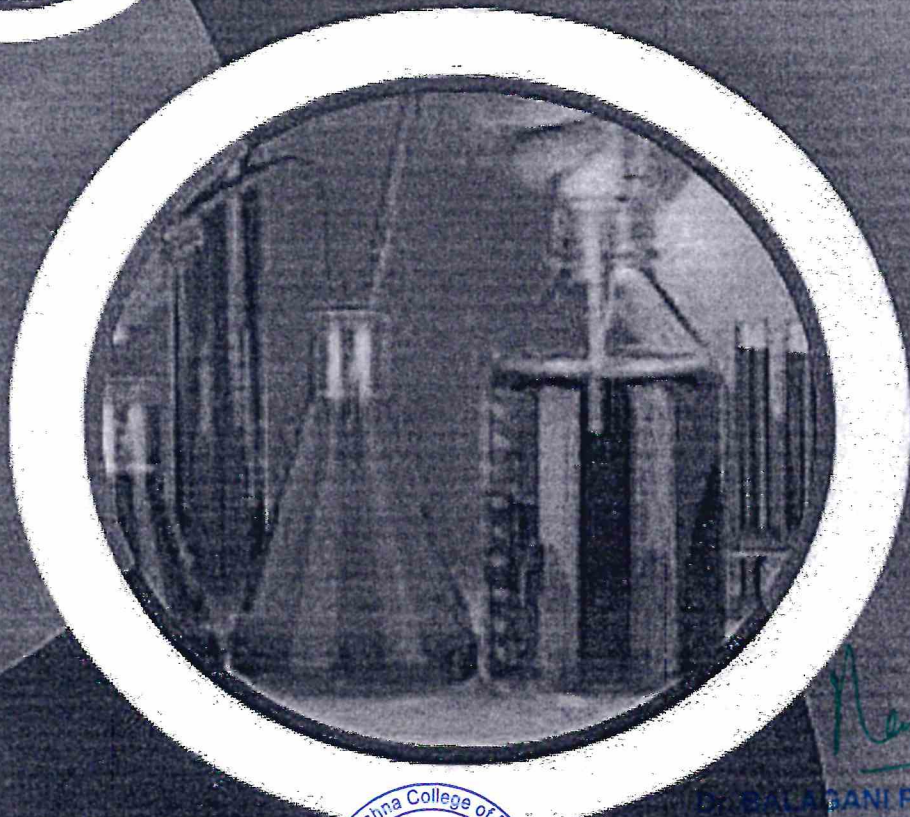
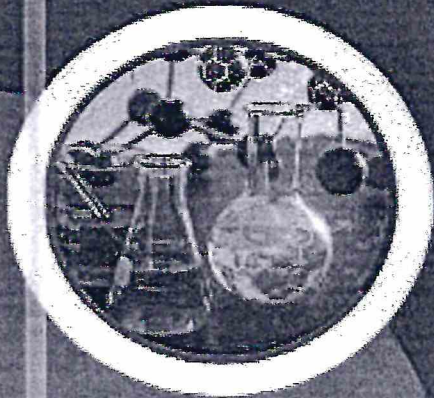

Dr. BALAGANI PAVAN KUMAR
 M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
 PROFESSOR & PRINCIPAL
 GOKULA KRISHNA COLLEGE OF PHARMACY
 SULLURPET, TIRUPATI Dt. A.P - 524121



[Handwritten Signature]
DR. BALARAM PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCI, MSTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Physical Pharmaceutics

Mrs. P K Devi Bala, Ms.P Kavitha, Dr. Balagani Pavan Kumar, **Dr. M Soujanya**



Moulay
Dr. BALAGANI PAVAN KUMAR
M.Pharm, FIC, FSS, FAGE, FICP, MSTE
PROFESSOR & PRINCIPAL
ANNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

Physical Pharmaceutics

Mrs.P K Devi Bala,Ms.P Kavitha,Dr.Balagani Pavan kumar,

Dr.M Soujanya



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



1. Solubility of Drugs	1.1 - 1.32
1.1 Introduction	1.1
1.2 Solubility Expressions	1.2
1.3 Mechanisms of Solute Solvent Interactions	1.5
1.4 Ideal Solubility Parameters	1.6
1.5 Solvation	1.7
1.6 Association	1.8
1.7 Quantitative Approach to the Factors Influencing Solubility of Drugs	1.9
1.8 Diffusion Principles in Biological Systems	1.11
1.9 Solubility of Gas in Liquids	1.12
1.10 Solubility of Liquids in Liquids	1.14
1.10.1 Binary Solutions	1.14
1.10.2 Ideal Solutions	1.15
1.11 Raoult's Law	1.17
1.12 Real Solutions	1.21
1.13 Partially Miscible Liquids	1.21
1.14 Critical Solution temperature and its Applications	1.22
1.15 Distribution Law	1.26
1.15.1 Limitations of Distribution Law	1.29
1.15.2 Applications of Distribution Law	1.29
• Exercise	1.30
2. States and Properties of Matter and Physicochemical Properties of Drug Molecules	2.1 - 2.78
2.1 States of Matter and Properties of Matter	2.1
2.1.1 States of Matter	2.1
2.1.2 Changes in the State of Matter	2.5
2.1.3 Latent Heat	2.6
2.1.4 Vapour Pressure	2.7
2.1.5 Sublimation	2.11
2.1.6 Critical Point	2.12
2.1.7 Eutectic Mixtures	2.13
2.1.8 Gases	2.14
2.1.9 Aerosols	2.22



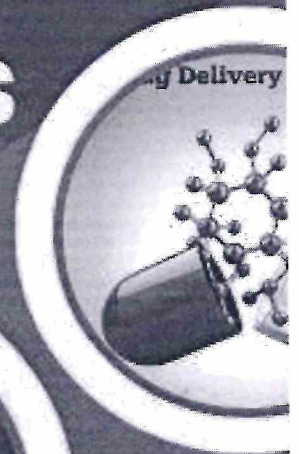
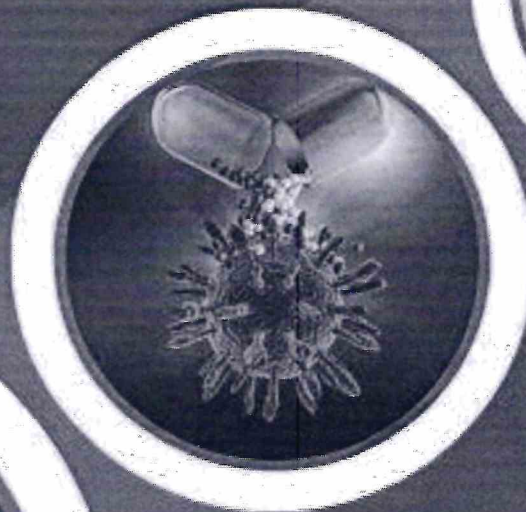
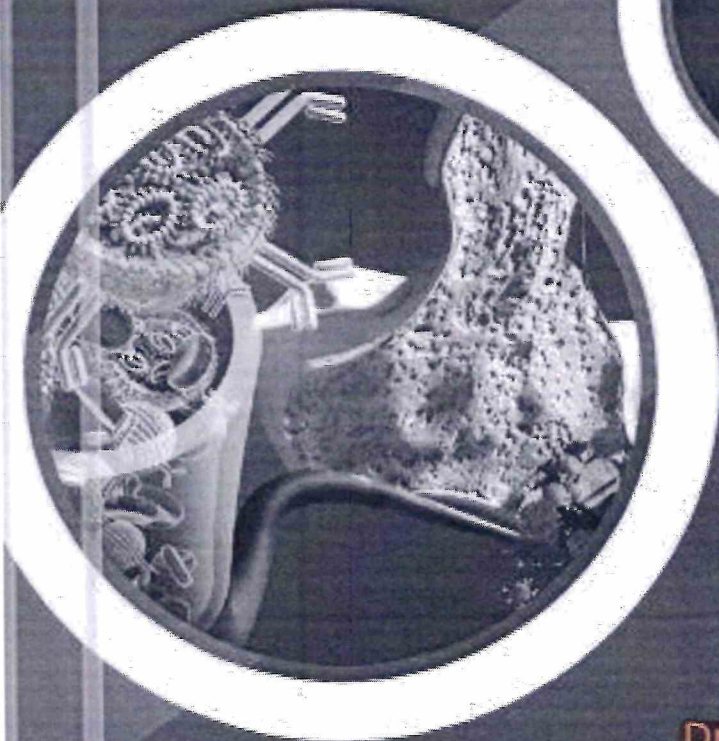
Navay

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121



DR. BALASANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXT BOOK ON NOVEL DRUG DELIVERY SYSTEMS



Dr. Balagani Pavan Kumar

Mrs. P K Devi Bala

Ms. C B Hanisha

Mr Sivakumar Peta



Kavay
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

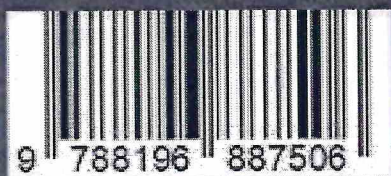
A Text Book on Novel Drug Delivery Systems

**Dr. Balagani Pavan Kumar, Mrs. P.K Devi Bala,
Ms. CB Hanisha, Mr Sivakumar Peta**



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

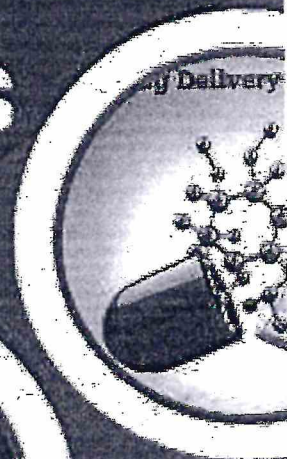
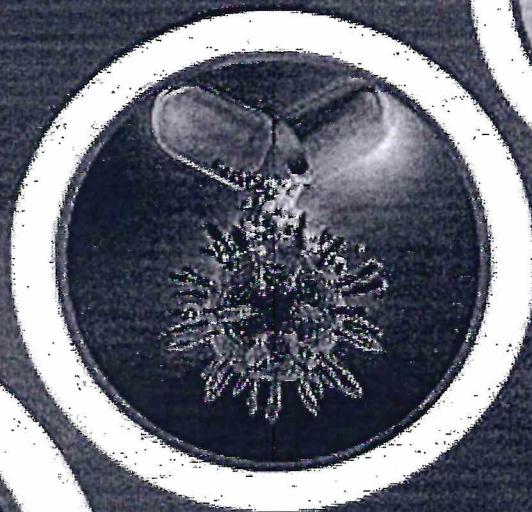
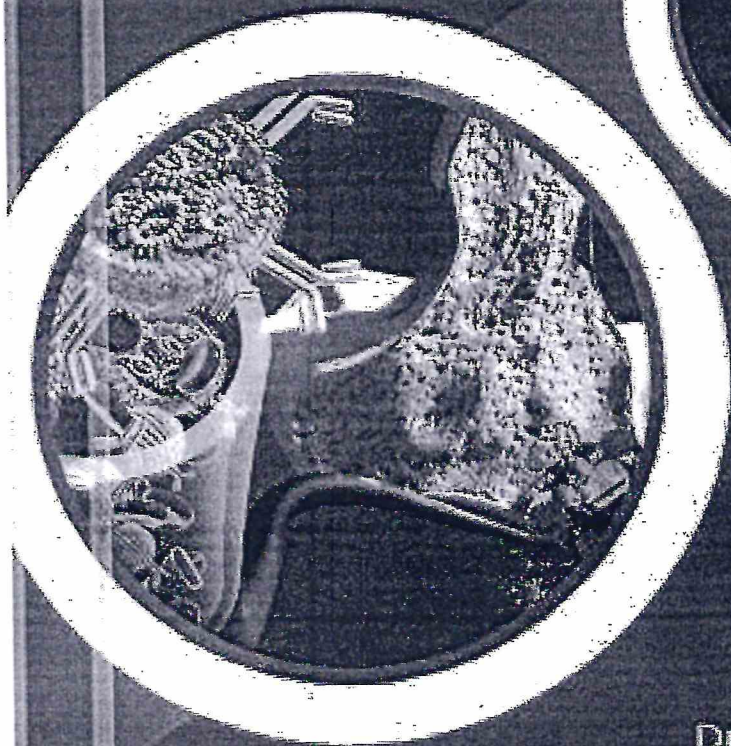
A TEXT BOOK ON NOVEL DRUG DELIVERY SYSTEMS



Balagani

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXT BOOK ON NOVEL DRUG DELIVERY SYSTEMS



Dr. Balagani Pavan Kumar
Mrs. P K Devi Bala
Ms. C B Hanisha
Mr Sivakumar Peta



Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D. FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Text Book on Novel Drug Delivery Systems

Dr. Balagani Pavan Kumar, Mrs. P. K Devi Bala,
Ms. CB Hanisha, Mr Sivakumar Peta



A handwritten signature in green ink, appearing to read "Balagani", with a long horizontal line extending to the right.

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D. FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

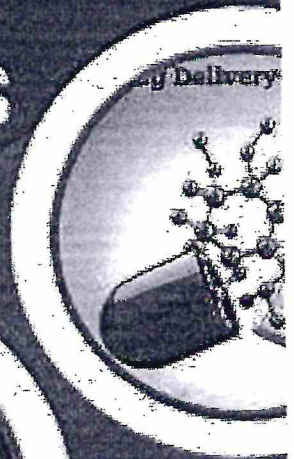
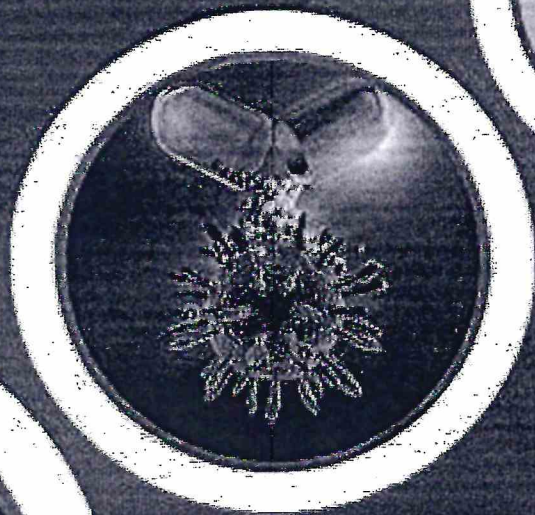
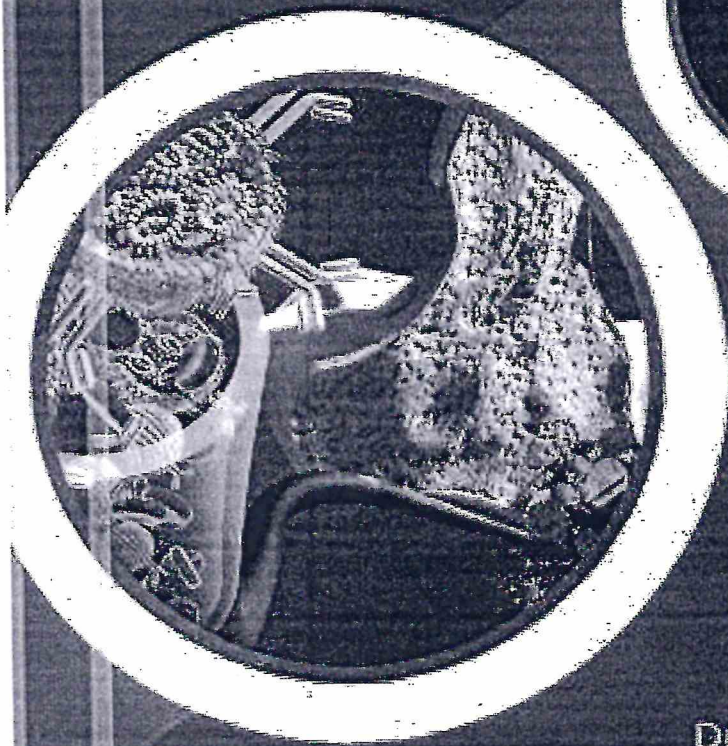
A TEXT BOOK ON NOVEL DRUG DELIVERY SYSTEMS



Navay

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXT BOOK ON NOVEL DRUG DELIVERY SYSTEMS



Dr. Balagani Pavan Kumar
Mrs. P K Devi Bala
Ms. C B Hanisha
Mr Sivakumar Peta




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D. FIC. FBSS. FAGE. FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

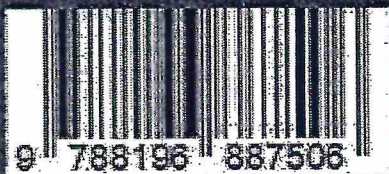
A Text Book on Novel Drug Delivery Systems

Dr. Balagani Pavan Kumar, Mrs. P.K Devi Bala,
Ms. CB Hanisha, Mr Sivakumar Peta



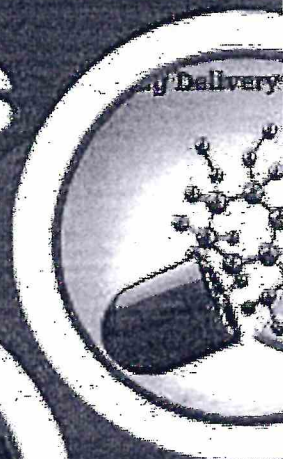
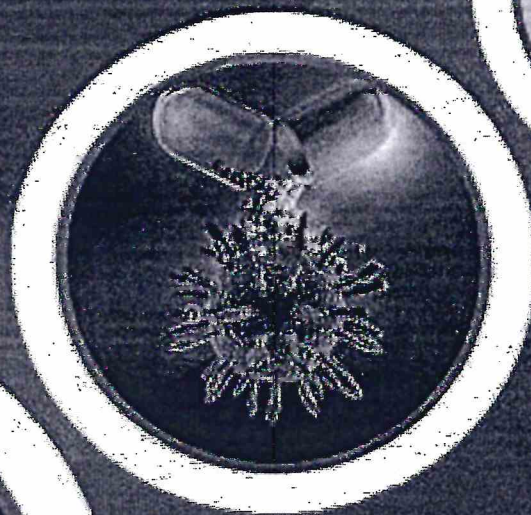
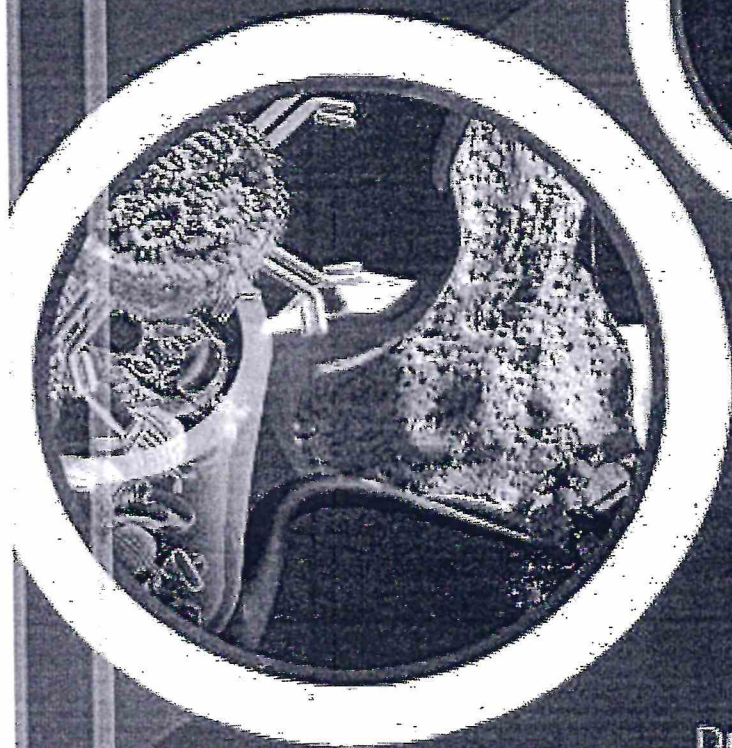

Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXT BOOK ON NOVEL DRUG DELIVERY SYSTEMS



Narayana
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXT BOOK ON NOVEL DRUG DELIVERY SYSTEMS



Dr. Balagani Pavan Kumar
Mrs. P K Devi Bala
Ms. C B Hanisha
Mr Sivakumar Peta



DR. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A Text Book on Novel Drug Delivery Systems

Dr. Balagani Pavan Kumar, Mrs. P.K Devi Bala,
Ms. CB Hanisha, Mr Sivakumar Peta




Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121

A TEXT BOOK ON NOVEL DRUG DELIVERY SYSTEMS



Narayana
Dr. BALAGANI PAVAN KUMAR
M. Pharm, Ph.D, FIC, FBSS, FAGE, FICCP, MISTE
PROFESSOR & PRINCIPAL
GOKULA KRISHNA COLLEGE OF PHARMACY
SULLURPET, TIRUPATI Dt. A.P - 524121