

# Contemporary Issues in Marketing Management



**Editors**

**Prof. Audhesh Kumar, Punit Kumar Kanujiya**



**MKSES PUBLICATIONS  
LUCKNOW, INDIA**

# Contemporary Issues in Marketing Management

**Editors**

**Prof. Audhesh Kumar**

Professor, Department of Commerce, University of Lucknow

Lucknow, UP India

**Punit Kumar Kanujiya**

Assistant Professor, Department of Commerce

National P.G. College,

An Autonomous, CPE and NAAC Grade 'A' College

University of Lucknow, Lucknow, UP India



**MKSES Publisher (India)**



**MKSES Publisher (India)**

**Publisher Address:** Head Office: 1st Floor, Building No-85A, (Nanak Arcade Near Sani Mandir, Parag road, LDA colony, Kanpur Road, Lucknow-226012

**Mobile No:** +91 9838298016, +91 8299547952 **Office Land line No:** +91 5223587193

**E-mail:** mkespublication@gmail.com

**Website:** www.mksepublications.com

**Copyright**© MKSES Publisher Lucknow India

**First Published:** August 2021

**ISBN:** 978-93-91248-17-8

**Page No.** 1-233

**Disclaimer:** The views expressed by the authors are their own. The editors and publishers do not own any legal responsibility or liability for the views of the authors, any omission or inadvertent errors.

© All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means without the prior written permission of the publishers.

## Contents

Chapter No.	Chapter Name	Page No.
1.	Exploring the Factors Influencing Third Party Reverse Logistics Service Providers in Chennai city: An Exploratory Study <i>A. Appu and Dr. S. G. Balaji</i>	1-8
2.	A Study on the Challenges Faced by Retailers as a Consequence of Online Marketing <i>Dr. L. Devi Priya and Dr. S. Durga Devi</i>	9-18
3.	Critical Distinction between Green Consumption and Greenwashing: A study conducted in and around Bangalore <i>Dr. S. Sriranjani Mokshagundam and Dr. Sagar G</i>	19-32
4.	A Study on Impact of COVID-19 on Digital Marketing <i>Prof. Anillesh Kumar, Punit Kumar Kanujiya and Hargun Sahni</i>	33-41
5.	Covid 19 and E-Commerce: Rise in Digital payment continues <i>Jayasree Das</i>	42-59
6.	Digital Public Relations in Today's Era of 21st Century and its Benefits to Business Organisations <i>Rajwinder Kaur</i>	60-70
7.	COVID-19 Pandemic and E-commerce: Trends, Challenges and Suggestions <i>Hargun Sahni and Punit Kumar Kanujiya</i>	71-78
8.	Rise of Agri-Business Enterprises and Marketing Management <i>Ramishankar Varma</i>	79-89
9.	A Study on E-Marketing or Digital Marketing and Its Impact <i>Biplab Anandya</i>	90-100
10.	A Study on Effectiveness of Green Marketing <i>Dr. D. Charumathi</i>	101-110
11.	A Study on the Impact of Green Marketing in Thoothukudi	111-122

	<i>R. Tiffany and Dr. V. Sangeetha</i>	
12.	Influencer Marketing in India: Issues, Concepts & Limitations <i>Mahesh Pandu</i>	123-134
13.	Marketing Strategies in the Scenario of Coronavirus Pandemic <i>Dr. Vidyullata Rahul Hundle</i>	135-145
14.	Impact of COVID-19 Pandemic on Online Shopping Behaviour of Consumers <i>Punit Kumar Kanujiya and Mukesh Kumar</i>	146-158
15.	Use of Digital Banking Services among Lady Teachers in Kerala <i>Chippy John and Dr. Shyju Mathew</i>	159-168
16.	A Study of Competing in Dynamic and Global Market <i>Kritika Khandelwal and Dr. Bhawna Chahar</i>	169-180
17.	Study on marketing mix of Apparel Street Vendors in Tenkasi district <i>S. Subhamangala and Dr. V. Anandhavalli</i>	181-193
18.	The Concept of Green Marketing and its way forward: An Empirical Study based on the Perception of Consumers in West Bengal <i>Priyajit Ray</i>	194-214
19.	Housekeeping Service Quality: A Study of Selected Hotels in Cochin, Kerala <i>Dr. Jeril Tom and Josy K Thomas</i>	215-223
20.	A Study on Utilisation and Satisfaction towards Electronic Commerce (With special reference to Pollachi taluk) <i>Dr. M. Deepa</i>	224-233

## Chapter: 13

### Marketing Strategies in the Scenario of Coronavirus Pandemic

**Dr. Vidyullata Rahul Hande, Associate Professor, Department of Cost and Works Accounting, R.N.C. Arts, J.D.B. Commerce And N.S.C. Science College, Nasik-Road, Nasik. (Maharashtra)**

#### Abstract:

The Coronavirus (COVID-19) has tremendously damaged the whole world, socially, physically, economically. It has been declared as a global pandemic by World Health Organization (WHO). The industry sector across India witnessed a significant decline in growth rate compared to 2018-19, due to impact of corona. The coronavirus crisis had affected marketing, branding, supply chain, retail, marketing strategy, and consumer behavior. Strategic marketing decision and marketing policies can play a crucial role in the pandemic period. For marketers, digital marketing is emerged as an opportunity in pandemic period. Through digital media, marketers can be in touch with their prospective buyer. The article focuses on concept of marketing strategies, COVID-19 pandemic scenarios, and marketing challenges, how marketing strategy changes will work in the pandemic. The article talks about marketing and significance of marketing strategies in present pandemic scenario.

**Keywords:** Covid-19, Pandemic period, Marketing Strategy, digital marketing.

#### 1. Introduction:

COVID-19 has been declared as a global pandemic by World Health Organization. This contagious virus has tremendously damaged the whole world, socially, physically, economically. This crisis had affected marketing, branding, supply chain, retail, marketing strategy, and consumer behavior. The industry sector across India witnessed a significant decline in growth rate compared to 2018-19, due to impact of corona. A huge population had lost their employment. Industrial workers were migrated to their hometowns in fear of pandemic. Everyone is in fear with the increasing cases, increasing deaths across the country. After reporting the first case in late Jan 2020 in the southern Kerala, today we are facing horrible picture of this pandemic. In second wave, India has passed 200000 deaths mark, which is about



one in 16 of all Corona deaths across the world. But, world never ends, never stops. Everyday sun rises with new hope. And definitely we will overcome this situation. Difficult time always create new opportunities for us and one can turn such bad time into opportunity. Though we are locked in our homes and finding it difficult to fulfill our daily needs, but online purchasing is the way to satisfy customer's needs. For industries also digital marketing is emerged as an opportunity in pandemic period. Through digital media, they can be in touch with their prospective buyer. In digital Marketing, mainly the internet or electronic media is used to promote the products and services in the market. Various digital technologies are used for such promotion of products. Marketers can facilitates their customers with the help of digital marketing tools. On the other hand, digital marketing media provides an interactive platform to customers and also allow them to communicate with the manufacturer. Customers can get information about the product, complain the problems, enquire, and resolve their problems through the internet. The main objective of this article is to study concept of marketing strategy and how it is significant in the scenario of pandemic and to study various challenges marketing. This study also describes advantages of digital marketing.

### Objectives:

1. To study marketing and marketing strategy concepts.
2. To study the effects of pandemic on business sector.
3. To understand how Covid-19 pandemic has affected marketing strategies and marketing policies.

### 2. Literature Review

In last two decades use of internet and social media was drastically increased. The electronic media revolution had affected marketers as well as customers. Pandemic and lockdown forced everyone to use internet and social media. Hence companies have this opportunity to market their products on this platform. Atshaya s. & Sristy Rungta, quoted in their article, 'it refers to marketing or promotion of products, services or brands using digital media, or electronic media through various channels both online and offline like social media marketing, pay per click, search engine optimization, email marketing, content marketing, phone marketing, print ads, banners, digital advertising, television marketing radio advertising, gaming advertising etc.' P. Sathya suggested that 'improve technical advancement in promotion of digital marketing.

collect and implement the feedback of customers, provide transparent and good service to customers, create awareness among customers, provide complete description to online shoppers.' Singh S.N. concluded his article as 'There is a need to change the marketing strategy of various companies from traditional marketing to digital marketing. If the companies does not use the digital platforms to market their products and services then they will lack the competition that exist in a perfect competition market and hence the future of the company cannot be assured and it will go in loss.'

### 3. Marketing:

As per American Marketing Association, (2017) 'Marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large.' Marketing is the activity of showing and advertising a company's products in the best possible way. It refers to all those activities, which any company undertakes to advertise the product, or services. It includes advertising, selling, supplying, delivering products or services to customers, maintaining relationship with past customers, establishing communication with prospective customers. It also involves market research, product promotion, sales, distribution etc. It is a process of getting potential customers who are interested in your product. In short, marketing is something, which every company should implement as a growth strategy. During this pandemic period digital or online marketing is one of the significant tool for business.

### 4. Marketing Strategy:

Marketing strategy is not a single decision, but it is a combination of many techniques which were taken over a period of time. It refers to business's long term planning for getting maximum buyers. For that, the objective oriented planning and specific actions are important. As per changing marketing condition, competition, business rivals etc., marketing strategy can be changed. Strategies also depend on the position of the product in life cycle. Whether the product is newly entered, or it is established brand, or it is in growing stage. There are four elements marketing mix, which can also be used for framing the strategies. For example, product strategies, price strategies, place strategies, promotion strategies.



**Digital Marketing:** Due to Covid-19, the whole world is learning to cope with the new way of living. The companies have already changed their strategies from offline to online marketing. In this, role of digital marketing is growing day-by day, and for that, having functional website is not sufficient. The companies should pushed customers to their product pages. Here, digital marketing tools can be used.

**Email Marketing:** For small businesses, email marketing can be easy solution to connect with customers in this current pandemic situation. It is easy to create, send and analyze email marketing campaigns. It is steady and reliable tool of marketing. It has connected public to businesses like never before, due to COVID. Now a days, email marketing is at the center of the stage, as it is easy way to connect with public.

**4 P's of Marketing:** For many companies, COVID has shifted the 4 P's of marketing to 4 C's i.e. calamity, confusion, complexity, and complication. Now it is time to reassess and readjust the 4 P's. Corporates have to focus on balancing the long term and short term requirements of business, maintaining the quality of the products, engaging the buyers, moving to online mode, etc.

**Advertising:** This pandemic period is challenging time for the advertising industry. The advertising expenditure was declined in last few months. This is a recession like situation for advertising industry. But, with few changes in advertising strategy, corporates can overcome, such as, - by focusing on ads of emotional marketing appeals, targeted advertising, creating innovative marketing practices, and use of social media effectively. Corporates have to change their strategy to sustainable marketing.

## **7. Pandemic Period Marketing Challenges :**

There are many advantages of using online marketing tools to advertise products or services but there are some challenges that the marketer has to face. During this pandemic period these challenges are increased. Few of them are as follows:

- **Maintain Customers relationship:** Sometimes in online shopping, customers are not showing brand loyalty. Hence, firms have to manage customer relationship in all possible way like- by sending reminders, birthday wishes, new offers, discount coupons etc.



In digital marketing, customers get thousand numbers of options, brands, sizes, colors, which is not possible in offline mode. Various market surveys also say that customers are happier with online mode, as it is simple and easy to operate. Its customer's psychology, they spend more on online mode as compared to cash payment in offline mode. Spending cash in hand is a sad feeling for customer. So online shopping motivates them to purchase. Now a days, maintaining hygiene at outlet, preventing staff from infection, avoiding unnecessary crowd, sanitizing the environment, are very costly, time consuming and tedious task for marketers. Online marketing is a safe option in pandemic. Digital marketing allows 24 hours and 7 days of service to the customers to purchase. Customers can compare, can put products on hold i.e.in cart, can return in case of any issue, prices are transparent and customer can enjoy burden free shopping.

Digital marketing is more affordable than traditional offline marketing methods. A social media campaign or an e-mail can forward marketing message to customers. It is cost saving marketing option than the TV advertisement. Digital advertisement can be easily tracked or monitored. It provides quickly the market data, customer's response, rating is easy, easy market survey and research data. In lockdown, it is difficult to open outlets for customers. Here through online marketing a business can reach to millions of customers in a moment. It's an opportunity to businesses to endorse them at world level.

Marketers can monitor the frequency of viewers, what was viewed, how often and for how long, which products works which not, guess customers liking, can suggest, can recommend, offer discount or combo pack, can motivate to purchase. Marketers can easily collect feedback from customers as compare to traditional marketing tools. Even customers response can monitor, problem can be solved, and customer's time is also saved. During pandemic period, customer's health and safety is of prime importance. So marketers can supply goods at their doorstep through healthy and hygienic supply chain. Marketers can take more care of the packaging and can maintain quality of product.

## **9. Conclusion:**

The COVID-19 crisis had affected marketing, branding, supply chain, retail, marketing strategy, and consumer behavior. Fall in consumption, decrease in income level, reduced employment and financial means, consumers defaults, recession etc., are few factors of change in

consumer behavior. Change in marketing strategy and marketing policies can overcome this to some extent. In Covid-19 pandemic scenario, digital marketing is emerging strategy and an opportunity to approach to customers. Through digital media, marketers can be in touch with their prospective buyer. Digital marketing means promotion of services or products by using electronic media. There are various online marketing channels such as social media marketing, search engine optimization, email, phone, print media, television, radio, internet etc. As the world is rapidly transforming from traditional to digital. Customers are consuming more and more digital content. Corporates also have recognized this trend and have adapted digital marketing strategies. Through online marketing, retailers and marketers can increase awareness about product or services. Digital marketing is also helpful in analyzing the effectiveness of campaign, sale, demand etc. it also provides detail record of number of views, feedback, duration of views of any particular product and buyer behavior.



**References:**

1. Terry L. Esper, (2020) 'Supply Chain Management amid the Coronavirus Pandemic', *Journal of Public Policy and Marketing*, Sage Journals, 14<sup>th</sup> Feb 2020.
2. Pawar A.V., (2014), 'Study of the effectiveness of online marketing on integrated marketing communication', M.Phil. dissertation, D. Y. Patil University, Navi Mumbai
3. Soheila Bostanshirin, (Sept. 2014) 'Online Marketing: Challenges and Opportunities', proceedings of SOCIOINT14-*International conference on social science and humanities*, Istanbul, Turkey, pp.783-792
4. Fatema, Yasmin, Tasneem, , "Effectiveness of Digital Marketing in Challenging Age : An Empirical Study", *International Journal of Management, Science and Business Administration*, Vol 1, Issue 5, April 2015, pp.69-80.
5. Sathya P., "A Study of Digital Marketing and its Impact", *International Journal of Science and Research*, Vol 6, Issue 2, Feb 2017, pp.866-868.
6. Atshaya and Sristy Rungta, "Digital Marketing vs Internet Marketing: A detailed Study", *International Journal of Novel Research in Marketing, Management & Economics*, Vol-3, Issue 1 pp.29-33.
7. Singh, Kumar and Kumar Dubey, "Digital Marketing: Necessity and Key Strategies to Succeed in Current Era" pp. 14-19.

**Websites:**

1. [www.researchgate.net](http://www.researchgate.net)
2. [www.academia.edu.in](http://www.academia.edu.in)
3. [www.ijsr.net](http://www.ijsr.net)
4. <http://www.statista.com>
5. [www.iec.edu.in](http://www.iec.edu.in)
6. <http://www.business-standard.com>

## About the Editors

### Prof. Audhesh Kumar



Prof. Audhesh Kumar, Head of Department, is working with the University of Lucknow prominently in the areas of Finance and Accounts, Corporate Accounting, Cost Accounting and Specialised Company Accounts. Professor Audhesh Kumar has been associated with institutions of national and international repute for academic and research work. He is Life member of AICA, IAA, Indian Science Congress, Saransh International Journal, Allahabad and Commerce and Management Research Association. He possess a rich experience of over 30 years in the field of teaching and research.

He has authored 6 books in his area of specialisation viz Accounting and Finance. His research paper and articles have been published in various reputed Refereed Journals and edited books. His 50 research papers have been accepted/presented at various national and international seminars and conferences. He has guided over 14 research scholars in obtaining their doctoral degree and 4 research scholar are presently enrolled under him. The fondness and veneration of academic fraternity is the testimony of his dedication towards academia.

### Punit Kumar Kanujiya



Assistant Professor at National P. G. College, An Autonomous, CPE and NAAC Grade 'A' College of University of Lucknow, Lucknow. He holds Masters in Commerce (M.Com), Bachelor in Education (B.Ed) and Bachelor in Commerce (B.Com) from CSJM University of Kanpur. He has qualified UGC NET JRF (Commerce) in the year 2015. He has a good amount of experience in teaching and research field with publications in refereed & UGC listed journals.

His key area of interest include Financial Management, Financial Accounting, Management Accounting, Corporate Accounting, Accounting for Business Decision, Strategic Cost Accounting, Company Law, Business Organisation, Marketing Management, etc.

## MKSES PUBLICATIONS LUCKNOW, INDIA

Address: Head office: 1st Floor, Building No-85A,  
(Nanak Arcade Near Shani Mandir, Parag road,  
LDA Colony, Kanpur Road, Lucknow-226012  
Mobile No: +919838298016, +918299547952  
office Land line No: +91 5223587193  
E-mail: [mkespublication@gmail.com](mailto:mkespublication@gmail.com)  
Website: [mkespublications.com](http://mkespublications.com)



ISBN-978-93-91248-17-8



PRICE  
INR (Rs.): 300/  
USD (\$): 10/

Available on

Book available at  
**amazon**

Flipkart



# Botany (Paper - III)

## Spermatophyta and Paleobotany

T. Y. B. Sc. (Sem. - V) (BO - 353)

◆ Dr. Vilas A. Patil

◆ Dr. Ashok R. Tuwar

◆ Dr. Dilip Shimpi

Choice Based Credit System (CBCS)



As Per  
New  
Syllabus  
2021







### **Dr. Vilas A. Patil**

**M.Sc. Ph.D.**

**Dr. B.N.P. Arts, Smt. S. G. Gupta Commerce & Smt. S.A. Mithaiwala Science College Lonavala.**

Dr. Vilas A. Patil Working as Vice-Principal and Head, Department of Botany, Dr. B.N.P. Arts, Smt. S. G. Gupta Commerce & Smt. S A. Mithaiwala Science College Lonavala. Recognized Ph. D. guide of Savitribai Phule Pune University. Three students are working for Ph. D. degree. Having Teaching Experience of 27 Years (UG and PG level). Received best teacher award. Completed two minor Research Project sanctioned by BCUD, University of Pune, and one UGC sponsored. 15 Research papers published in National and international Journals. Attended and presented papers in many national and international conferences.



### **Dr. Ashok R. Tuwar**

**M.Sc. Ph.D.**

**Arts, Commerce and Science College, Sonai, Newasa, Ahmednagar.**

Dr. Ashok Tuwar Working as Head, Department of Botany, Arts, Commerce and Science College Sonai. He is member of Board of Studies in Botany (SPPU). He is recognized Ph. D. guide of Savitribai Phule Pune University. Three students are working for Ph. D. degree. Having Teaching Experience of 29 Years (UG and PG level). Awarded by CWS-KNAW FUNGAL BIODIVERSITY CENTRE Institute of the Netherland Academy of Arts & Sciences, for best identifier of fungi at the 10<sup>th</sup> IMC-2014 at Bangkok (Thailand). He also has been awarded as a Best Student Welfare Officer, by students Development Department of S.P.U Pune. He is life member of the Indian Botanical Society. He is Executive Editor for International Journal of Researches in Biosciences, Agriculture & Technology. He completed three minor and one Major Research Project supported by UGC New Delhi and BCUD, Savitribai Phule Pune University Pune. He authored 20 books including Marine Fungi of India (Monograph), published by Broadway publishing House Goa. He was Convenor of 2 State level, 2-National Level and 2-International Level Conferences. 33 Research papers published in National and International Journals. He Attended and presented papers in many national and international conferences. He worked as a resource person in many National, State level and University level conferences and workshops. He has visited South Korea, Thailand and Nepal.



### **Dr. Dilip Shimpi**

**M.Sc., Ph.D.**

**Gokhale Education Society's RNC Arts, JDB commerce & NSC Science College, Nashik Road, Nashik.**

Dr. Dilip Shimpi currently working as a HOD and Associate professor, Department of Botany at Gokhale Education Society's RNC Arts, JDB commerce & NSC Science College, Nashik Road. He has 31 years teaching and research experience. He is a recipient of Guru Dronacharya purskar by Akhil Bhartiya Aher Shimpi Samaj in 2020. He is a recipient of Best teacher award by Smith-Harsh Academy Nashik in 2021. He is appointed as a Botany expert for study of biodiversity in Nashik district by Divisional office, Social Forestry department Nashik. He has participated in various National and International conferences, symposium and workshops. He published several research papers.

**ISBN : 978-93-24457-51-3**



# **SUCCESS PUBLICATIONS**

**Address : Radha Krishna Apartment, 535, Shaniwar Peth,**

**Appa Balwant Chowk, Opp. Prabhat Theatre, Pune - 30.**

**Ph. No. 24434662, Mobile : 9325315464**

**E-mail : sharpgroup31@rediffmail.com**

**Website : www.sharpmultinational.com**

**PT-  
3562**





**Dr. D. N. Patil**  
 (M.Sc., M.Ed., Ph.D.)  
 Bhavitra Jee Sanghatans, Arts, Science and Commerce College, Wagholi, Pune.

Dr. D. N. Patil has M.Sc. (Botany), M.Ed. and Ph.D. from Savitribai Phule Pune University, Pune. He completed his Ph.D. work on *Flora of Sahyadri National Park and Nagaria Wildlife Sanctuary*, from Botanical Survey of India as research Centre. He is currently working as Professor, Head of Botany Department and Coordinator for Environment Awareness Course at Bhavitra Jee Sanghatans, Arts, Science and Commerce College, Pune, Nagar Road, Wagholi, Pune (M.S.). He has 23 years of teaching and research experience. He has published many research papers in National and International reputed journal.



**Dr. Babu K. Avchar**  
 M.Sc., Ph.D. and LL. B.  
 Vidya Pratishthan's Arts, Science and Commerce College, Vidyanagari, Baramati.

Dr. B.K. Avchar is currently working as Associate Professor of Botany at Vidya Pratishthan's Arts, Science and Commerce College, Vidyanagari, Baramati, Dist. Pune (M.S.). He has 26 years of teaching and research experience at Under Graduate and Post Graduate levels. He was Principal of Faculty for Ph.D. students at Savitribai Phule Pune University, Pune. He has supervised 100 Ph.D. projects in Botany and related subjects. He holds several academic positions like Professor, Head of Botany Department, Savitribai Phule Pune University, Pune. He has published many research papers in National and International journals. He has authored several reference books entitled "Taxonomy of Higher Plants", "Success Publication, Pune, H.C. Singh and Sons, Lucknow, India, 2007.



**Prof. Dr. Deelip G. Shimpi**  
 M.Sc., Ph.D.  
 RNC Arts, JDB Commerce NSC Science College, Nashik.

Prof. Dr. Deelip G. Shimpi is currently working as HOD and Associate Professor, Department of Botany at Gokhale Education Society's RNC Arts, JDB Commerce and NSC Science College, Nashik. He has almost 26 years of teaching experience. He has vast experience in the field of Research. He has published several Research papers in National and International Journals and also attended various National Conferences, Symposia and Workshops. He has been participated in syllabus framing of Botany syllabus of S.P.P.U., Pune. He worked as a Co-ordinator and subject expert for TMC program of Nashik Municipal Corporation from 2003-2005. He is working as a Chief Examination Superintendent for Indian Institute of Industrial Engineering, CIDO Deolap, Navi Mumbai and as a College Examination Officer for S.P.P.U., Examination.



**Prof. Dr. Balasaheb S. Gaikwad**  
 M.Sc., Ph.D.  
 K. J. Somaiya College, Kopergaon, Ahmednagar.

Prof. Dr. Balasaheb S. Gaikwad is working as HOD and Assistant Professor in Department of Botany at K. J. Somaiya College, Kopergaon, Ahmednagar. He received his M.Sc. in Palaeobotany and Ph.D. in Mutation Breeding from S.P.P.U., Pune. He has 20 years of teaching experience in Botany. He has published 6 Research Papers in leading National and International Journals. He attended and presented his Research Papers in several Conferences and Seminars. He has been interest in Taxonomy and Mutation Breeding. He has published several scientific articles in leading Marathi magazine. He worked as student welfare officer of Board of student welfare and working as assistant programme officer of National service Scheme.



**Dr. Vilas A. Patil**  
 M.Sc., Ph.D.  
 Dr. B. N. Purandare Arts, Smt. S. G. Gupta Commerce & Smt. S.A. Mithaiwala Science College, Lonavala.

Dr. Vilas A. Patil working as Vice Principal and Head, Department of Botany, at Dr. B.N. Purandare Arts, Smt. S. G. Gupta Commerce & Smt. S.A. Mithaiwala Science College, Lonavala. He has 25 years of teaching experience at PG and UG level. He has completed two minor research project funded by UGC New Delhi and BCSU Savitribai Phule Pune University Pune. Recognized guide for Ph.D. of Savitribai Phule Pune University, Pune. Three students registered for Ph.D. Degree. Fifteen research papers published in National and International Journal. Attended many National Seminars and Conferences and presented Papers in the National and International Seminars and Conferences.

ISBN : 978-93-24457-36-4



**SUCCESS PUBLICATIONS**

Address : Radha Krishna Apartment, 535, Shaniwar Peth,  
 Appa Balwant Chowk, Opp. Prabhat Theatre, Pune - 30.

Ph. No. 24434662, Mobile : 9325315464

E-mail : sharpgroup31@rediffmail.com

Website : www.sharpmultinational.com

PT-  
 3358



# Environment Studies

(For All Faculties - Second Year Semester III and IV)

◆ Dr. Devidas N. Patil

◆ Dr. Bapu K. Avchar

◆ Dr. Deelip G. Shimpi

◆ Dr. B. S. Gaikwad

◆ Dr. Vilas A. Patil

Choice Based Credit System (CBCS)



As Per  
New  
Syllabus  
2020



**SUCCESS PUBLICATIONS**



ISBN: 978-93-91768-62-1

# ADVANCES IN MATHEMATICAL AND STATISTICAL SCIENCE

## Editors

**Dr. Med Ram Verma**

**Dr. Megha Bhamare**

**Dr. Sheetal Gomkar**

**Dr. H. S. Tomar**



**First Edition: 2022**

**Advances in Mathematical and Statistical Science**

**(ISBN: 978-93-91768-62-1)**

**Editors**

**Dr. Med Ram Verma**

Principal Scientist  
ICAR-Indian Veterinary Research  
Institute, Izatnagar,  
Bareilly, Uttar Pradesh

**Dr. Megha A. Bhamare (Patil)**

Department of Mathematics,  
Krantiveer Vasanttrao Narayanrao Naik  
Arts, Commerce and Science College,  
Nashik, M. S.

**Dr. Sheetal Gomkar**

Department of Mathematics,  
Janata Mahavidyalya,  
Chandrapur, M.S

**Dr. H. S. Tomar**

Department of Mathematics,  
Chintamani College of Arts and Science,  
Gondpipri, Dist. Chandrapur, M.S.



*Bhumi Publishing*

**2022**



**First Edition: June, 2022**

**ISBN: 978-93-91768-62-1**



**© Copyright reserved by the Editor**

Publication, Distribution and Promotion Rights reserved by Bhumi Publishing, Nigave Khalasa, Kolhapur

Despite every effort, there may still be chances for some errors and omissions to have crept in inadvertently.

No part of this publication may be reproduced in any form or by any means, electronically, mechanically, by photocopying, recording or otherwise, without the prior permission of the publishers.

The views and results expressed in various articles are those of the authors and not of editors or publisher of the book.

Published by:

Bhumi Publishing,

Nigave Khalasa, Kolhapur 416207, Maharashtra, India

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

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

Book Available online at:

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



## **PREFACE**

*We are delighted to publish our book entitled "**Advances in Mathematical and Statistical Science**". This book is the compilation of esteemed articles of acknowledged experts in the fields of basic and applied mathematical science.*

*This book is published in the hopes of sharing the excitement found in the study of mathematics and statistical science. Mathematical science can help us unlock the mysteries of our universe, but beyond that, conquering it can be personally satisfying. We developed this digital book with the goal of helping people achieve that feeling of accomplishment.*

*The articles in the book have been contributed by eminent scientists, academicians. Our special thanks and appreciation goes to experts and research workers whose contributions have enriched this book. We thank our publisher Bhumi Publishing, India for taking pains in bringing out the book.*

*Finally, we will always remain a debtor to all our well-wishers for their blessings, without which this book would not have come into existence.*

- **Editors**



## CONTENT

<b>Sr. No.</b>	<b>Book Chapter and Author(s)</b>	<b>Page No.</b>
1.	<b>FACTORIZATION OF COMPLETE GRAPH AND ITS APPLICATION</b> Chandramani I and Sakthivadivu M	1 – 11
2.	<b>INTUITIONISTIC FUZZY <math>\pi\beta</math> GENERALIZED CLOSED SETS</b> Prema S and Nandhitha K	12 – 24
3.	<b>ON INTUITIONISTIC FUZZY <math>\pi\gamma</math> GENERALIZED CONTINUOUS MAPPINGS</b> Prema S and Archana A	25 – 35
4.	<b>RATIO TYPE ESTIMATORS FOR FINITE POPULATION MEAN USING KNOWN PARAMETERS OF AUXILIARY VARIABLE</b> Rajesh Tailor, Med Ram Verma, Sunil Chouhan and Ritesh Tailor	36 – 49
5.	<b>A SEPARATE RATIO-CUM-PRODUCT ESTIMATOR OF POPULATION MEAN USING AUXILIARY INFORMATION IN STRATIFIED RANDOM SAMPLING</b> Rajesh Tailor, Med Ram Verma, Sunil Chouhan, Ritesh Tailor and Priyanka Malviya	50 – 58
6.	<b>FORECASTING OF AREA, YIELD AND PRODUCTION OF HORSE GRAM IN ODISHA</b> Balaga Divya, Abhiram Dash, Akhilesh Kumar Gupta and Manoranjan Sen	59 – 69
7.	<b>MHD FLOW WITH POROUS MEDIUM</b> Hariom Singh Tomar and Pradeep Kashyap	70 – 72
8.	<b>DIMENSIONAL ANALYSIS AND SIMILITUDE</b> Hariom Singh Tomar and Pradeep Kashyap	73 – 75
9.	<b>SEPARATE ESTIMATORS IN STRATIFIED RANDOM SAMPLING</b> Hilal A. Lone, Rajesh Tailor and Med Ram Verma	76 – 84
10.	<b>MATHEMATICAL INVENTIONS: PREHISTORIC MATHEMATICS TO MATHEMATICS IN TODAY</b> Megha Abhiman Bhamare	85 – 93

---

11.	<b>STATISTICAL INFERENCE</b>	94 – 99
	R. R. Tembhone	
12.	<b>TEACHING-LEARNING OF LIMITS OF FUNCTIONS: A TEACHER-STUDENT PERSPECTIVE</b>	100 – 108
	Kailas S. Borase	
13.	<b>k – NEAREST NEIGHBOR (k-NN) ALGORITHM FOR CLASSIFICATION</b>	109 – 114
	Sudha Bishnoi	
14.	<b>MICRO <math>g^*</math>-CONTINUOUS MAPS AND MICRO <math>g^*</math>-IRRESOLUTE MAPS IN MICRO TOPOLOGICAL SPACES</b>	115 – 125
	S. Sandhiya, R. Anandhi and N. Balamani	
15.	<b>MICRO <math>\Psi</math>-CONTINUOUS MAPS AND MICRO <math>\Psi</math>-IRRESOLUTE MAPS IN MICRO TOPOLOGICAL SPACES</b>	126 – 136
	T. Sowmiya, R. Anandhi and N. Balamani	

---



## **TEACHING-LEARNING OF LIMITS OF FUNCTIONS:**

### **A TEACHER-STUDENT PERSPECTIVE**

**Kailas S. Borase**

Department of Mathematics,

RNC Arts, JDB Commerce and NSC Science College, Nasik Road-422 101

Corresponding author E-mail: [ksb.ganit@rediffmail.com](mailto:ksb.ganit@rediffmail.com)

#### **Abstract:**

The research can be taken up this experimental research with a view to assess an effectiveness of teaching-learning process in the concept of limits of functions in mathematics through the graphical approach in raising the overall the knowledge, skill, and attitude towards the mathematics. The graphical approach in understanding the mathematical concept of limits of functions through the Inquiry Oriented Approach (IOA)<sup>3</sup> model can have found effective in enhancing the level of understanding of this concept.

#### **1. Introduction:**

Together with philosophy, Mathematics is the oldest academic discipline known to human being<sup>3</sup>. Currently, mathematics is a huge complex enterprise, far beyond the keen of anyone individual. Those of us who choose to study the subject can only choose a micro of it, and in the end must specialize rather drastically in order to make any contribution to the evolution of ideas involved.

This research article in this chapter provides an outline of the current research in students' understanding of topics in limits of functions. The intent of work is to provide an overview of specific difficulties based on education research in the subject communication in Mathematics in the context of limits of functions.

##### **1.1. Limits of functions**

The limits of the functions, in brief limits concept is an important part of the foundations of mathematical analysis and not understanding it clearly might lead to problems when dealing with concepts such as infinity, infinitesimals, convergence, continuity and derivatives which are the main aspects of Calculus. If the student grasps the concept of limits, the above connected concepts become easier to work with, but it is difficult for the students to make sense of this concept. In India, limits of functions are the main topic treated almost in all branches viz. graduate and undergraduate as well as Engineering, Science, Commerce, and Chartered

Accountants etc. Here attempts have been made the approach of students for understanding mathematics through geometrical one rather the conventional one for the limits.

In fact, even many great mathematics researchers have found it hard to accurately handle limits through time, this is one more.

## **1.2 Importance and learning of mathematics**

Learning Mathematics is the endeavor requiring a number of abilities, which may vary from different mathematical topics. How students learn mathematics, may also vary. Mathematics has several characteristic properties viz. the use of models describing the real world, the compact and unambiguous formulations for clear expositions, and the deductive reasoning in proving problem solving. Each property offers its own set of challenges for mathematics students as well as teachers, for example, from a model to the real world, from everybody language to a mathematical expression or from one step to another in mathematical proof.

As mathematics is the queen of science, calculus is the soul of mathematics and limits is at the heart of the calculus. Hence, proper learning of mathematics is the most important part of mathematics in teaching-learning process of mathematics. One aspect focused on this research article is transition, e.g. inquisition and replication.

## **1.3 History of mathematics in context of limits of functions**

Mathematical history is exciting, and it is a significant slice of the intellectual pie. A good education consists of learning difficulties of the students at different methods of conversation, and certainly, mathematics is one of the most well developed and important models of conversation that the world has observed so far.

For many centuries, the idea of a limit was confused with vague and something philosophical ideas of infinity i.e. infinitely large, infinitely small numbers and other mathematical entities. The idea of limit was also confused with subjective and undefined geometric intuitions. Here in this research article, the researcher's aim is to highlight the contribution of geometrical approach in understanding the concept of limits.

The history of limits of functions shows that it was not obvious how a definition of limits should be stated or even if limits were useful. One of the research in which the idea of limit was introduced to resolve three types of difficulties<sup>1</sup>:

- Geometric problems, e.g. the calculations of area, 'exhaustion' and consideration of the nature of geometric lengths;
- The problem of the sum and rate of convergence of a series;



- The problems of differentiation that come from the relationship between two quantities that simultaneously tends to zero.

This research work focuses on calculus teacher's knowledge of student thinking about limit and, using historical development as a lens that explores the nature of the difficulties associated with the concept of limit. More specifically, the research study addresses the following questions:

- (a) What do the teachers of calculus know of their student's thinking of limit? and
- (b) How can the historical development of the limit help us make sense of college teacher's knowledge of student thinking about limit?

## **2. Purpose and significance of the study:**

The researcher became aware of student's problems with the idea of the concept of limits in a huge branch of Calculus in vigorous subject Mathematics. The concept of limit is included in the curriculum of XII<sup>th</sup> Science and undergraduate courses of Science stream at University level of an Indian education system. This covers the definition of a limit, formal as well as epsilon-delta form, a limit as  $x$  approaches to infinity and the obvious relation between limits and continuity in addition to these properties of the limits, continuity, problems on continuity. To finish the same, the little time, about four clock hours is given for its teaching-learning in University curriculum.

Research in common parlance refers to search for knowledge. One can also define as a scientific and systematic search for pertinent information on a specific topic. Indeed, research is an art of scientific investigation. The advance learner's dictionary of current English lays down meaning of research as a careful investigation or inquiry especially through search for new facts in any branch of knowledge. "All progress is born of inquiry. Doubt is often better than confidence, which leads to inquiry, and inquiry leads to invention and invention finally can leads to replication." The said quotation is an extension of famous Hudson Maxim in context of significance of research.

There are three ways to study Mathematics through the following three approaches:

- 1) Analytical Approach,
- 2) Geometrical Approach,
- 3) Practical Approach.

Here the researcher used to apply second approach of geometrical to better understand the concept of limits instead of the traditional way. Geometrical approach is nothing but the graphical way of understanding the concept in mathematics. As far as the concept of limit is

concerned, it is defined on the functions and functions can be drawn by using graphs at all times and once able to draw the graphs, apply the concept of understanding of limit via graphical approach, then you are through. Many attempts have been made to break through this dilemma but without much success.

Hence, there is an urgent need to develop some Inquiry Oriented Approach (IOA) in Learning Difficulties of Mathematics in general and especially for limit theory. Here the researcher focuses on the theory of limits and hopes that this IOA can be applied to the rest fields of Mathematics.

### **3. Scope of the study:**

The following limitations of the research study have been observed.

1. The study can be limited to your own class of mathematics background students.
2. The authenticity of the data used depends entirely on the accuracy of such data.
3. During course of personal interviews, the prejudices or bias on part of interviews may have influence on the response received.
4. The study comprises both genders in equal numbers to overcome the gender differences.
5. Time is the biggest constraint.
6. Sample is randomly selected.
7. Questionnaire tool is used for data collection.
8. Replication Principle is used for selected students.

### **4. Objectives of the study:**

As the main body of mathematical analysis, Calculus is mankind's a greatest discovery in the 20th century, and a statue of human's wisdom. Limit theory is the basic theory of calculus, and limit concept is the core concept of limit theory, henceforth it is very important for students to learn limit concept well. However, to teach limit concept well is a worldwide difficult job as far as teaching learning concerned, and this situation urgently need to be changed by times and calculus teaching reform.

On the other hand, inquiry teaching has made remarkable achievements on elementary mathematics teaching reform, but there is not even a single progress on advanced mathematics teaching reform. Absolutely, the way in elementary mathematics teaching reform is not quit fit advanced mathematics teaching reform. Therefore, combining with improving students' learning style and learning enthusiasm, limit concept inquiry teaching is a very important significant research subject. Here research objective itself makes a question originated in hypothesis-born



from individual's experience right from the student till to a mathematics teacher and discussions with colleagues-which "inquiry" practices in the form of definitions, properties, examples, problems, curiosity, confidence, intelligence, skill etc. strongly influence what students learn about limits at college level.

In order to progress this experimental research among junior college and undergraduate students in a class of students, it had proposed in mind the following objectives.

- To diagnose learning difficulties along with misconceptions in the concept and applications in Limit Theory (Limits of Functions).
- To raise the level of students' living, impact of literacy of their parents and curiosity and confidence in their own in about this concept during the teaching-learning process.
- To analyze gender differences and/or differences in living status and/or impact of literacy of the parents of students' in their study and/or overall curiosity, confidence of the students for the topic considered and hence in mathematics, in general.
- To prescribe and introduce the graphical approach, called the inquiry-oriented approach (IOA) of understanding the concept of limits better than the formal approach.

### **5. Experience of the study:**

Mathematics at the higher secondary and undergraduate level in India is formally presented in textbooks and at lectures. An initial course in mathematics at Indian universities usually comprises algebra and calculus including the notion of limits of functions, which has been proven to be difficult for students to learn at a formal base only. Many different aspects regarding the notion of limits and the nature of learning that cause these difficulties are addressed in this research study. The experience, as a student and later on as a college mathematics teacher, implied to researcher that learning limits of functions expense time and effort, perhaps to a greater extent than other parts of basic calculus. Here, the expectations wanted to understand more about how students perceive and learn limits of functions. The overall research question became: How do students deal with the concept of limits of functions at the basic higher secondary and undergraduate level in India? In an attempt to answer this vast question, it is conducted studies at a large in five stages in a Mathematics class. No such study on limits probably had previously been done in India and it was therefore compared mostly to foreign research results. It is important that teachers who work with college level mathematics education are aware of the learning situation of students

and are prepared to meet them at their levels in their teaching- learning processes, meaning that the pre-knowledge of students is crucial.

### **6. Hypothesis:**

A statistical hypothesis is unproven statement about the distribution of the random variables under consideration.

$H_0$ :- There is no significant difference in the achievement of learning ‘limit theory’ after using IOA in the classroom.

$H_1$ :- There is significant difference in the achievement of learning ‘limit theory’ after using IOA in the classroom.

The conclusion will be drawn according to the acceptance or rejection of the hypothesis  $H_0$ .

### **7. Methodology adopted:**

To carry out any type of research work an adoption of correct methodology is an art and way of success for that particular research. The researcher shall choose the most appropriate instruments procedures and methods that will provide the collection and analysis of data upon which hypothesis may be tested. The researcher shall meet with mathematics teachers teaching mathematics especially Calculus at junior colleges and undergraduate classes to seek their opinion about inquisition and replication with difficulties in understanding the concept of limit in teaching-learning process of mathematics.

The investigator shall assume the research work as an experimental research for assessing the effectiveness in enhancing the level of knowledge, curiosity level along with parents’ literacy in addition to the residential status of the students involved under the study. This is an experimental research for assessing the effectiveness of the strategy of adopting the geometrical approach especially graphical view in understanding of the limit concept. Much attempt may have been done so far with this, but this can be one more with specially covered the psychological attitudes among the students, together with the residential impact for their understanding in topic considered.

As an example, students from Junior college and undergraduate level with mathematics are one of the subjects were taken as population for this research study, which is summarizing in the following Table 1.1.



**Table 1.1: Distribution of the sample for the study**

Sex/Group	Controlled Group	Experimental Group	Total
Boys	125	125	250
Girls	125	125	250
<b>Total</b>	250	250	<b>500</b>

**8. Design of the study:**

The sample had divided into two groups namely the controlled group (CG) and an experimental group (EG) with equal number of boys and girls students from the sample.

The research work was conducted at the college. The researcher lectures mathematics in the college. The students are enrolled for the 12<sup>th</sup> Science undergraduate students with mathematics is one of the subjects. The main topics are limits, continuity, differentiation and integration including their applications in real-life. It is multi-cultural, multi-status classroom and the students are taught through the medium of English, which is their second language.

The concepts of limits under the study were to be taught in class by making use of discussions, problem solving tasks, viz. interviews and questionnaires etc. These tasks were to assessed in order to determine possible misconceptions of the limits of functions and through pre-test, post-test and retention-test by understanding the limit concept using graphical approach more better by conventional one. The same planed to analyze with the help of several statistical tools viz. t-test, chi-test, z-test ANOVA etc. Absolutely, might be the first time use of principle of replication in this research study.

It had been prepared four tests Pre-Test, Post-Test, Retention-Test and the test for effectiveness of Principle of Replication in five stages accordingly with four major related topics of the limits of functions which is depicted in the following Table 1.2

**Table 1.2: Plan of research study**

Test Level	Plan of Period	Actual Action Period
<b>Concept I:</b> Basic concept of limits of functions	At the beginning of the research	August 2010
<b>Concept II:</b> Epsilon-delta definition of limit	After Two Weeks	August 2010
<b>Concept III:</b> Problems of limit	After Four Weeks	September 2010
<b>Concept IV:</b> Problems of continuity	After Four Months	January 2011

### 9. Variables of the study:

In this typical research experiment, there are two types of variables used-independent and dependent. An independent variable is the variable that scientist manipulates (the treatment) to determine its effect on some research (the dependent).

In present study, it has taken into account eight types of variables as observed from the specific objectives and corresponding to the null hypothesis as mentioned earlier.

These variables are as under<sup>2</sup>:

#### **Pedagogical Dependent Variables (Attributes)**

- Curiosity gained
- Confidence gained
- Literacy status of the family
- Residential status of the family

#### **Psychological Independent Variables**

- Intelligence
- Interest
- Attitude
- Skill

### 10. Organization of the study:

It can be organized the plan of study as in Table 1.1 following ways, there are five stages; A, B, C, D, and E in which Pre-Test, Post-Test and Retention- Test was planned to conduct for the study in hand for both the Controlled group (CG) and the Experimental group (EG).

**Table 1.3: Stages of research study**

Test	Teaching-Learning and Questionnaire Schedule	Groups	Stages
Pre-Test	-	CG+EG	A
-	About limits of Functions	EG	B
Post-Test	-	CG+EG	C
Retention-Test	-	CG+EG	D
-	Proposition Type Questionnaires	Randomly Selected 100 respondents from EG	E



### **11. Population and sample for the study:**

An experimental research cannot be done without the population. Here, the sample is a group of students, which will evaluate the applicability of an Inquiry Oriented Approach (IOA) technique.

Total Population	:	5000
Sample Size	:	500
Geographical Area	:	Local College
Sampling Procedure	:	Random Sample

The sample was taken randomly from local colleges of the city to achieve the goal of the study.

### **Conclusions:**

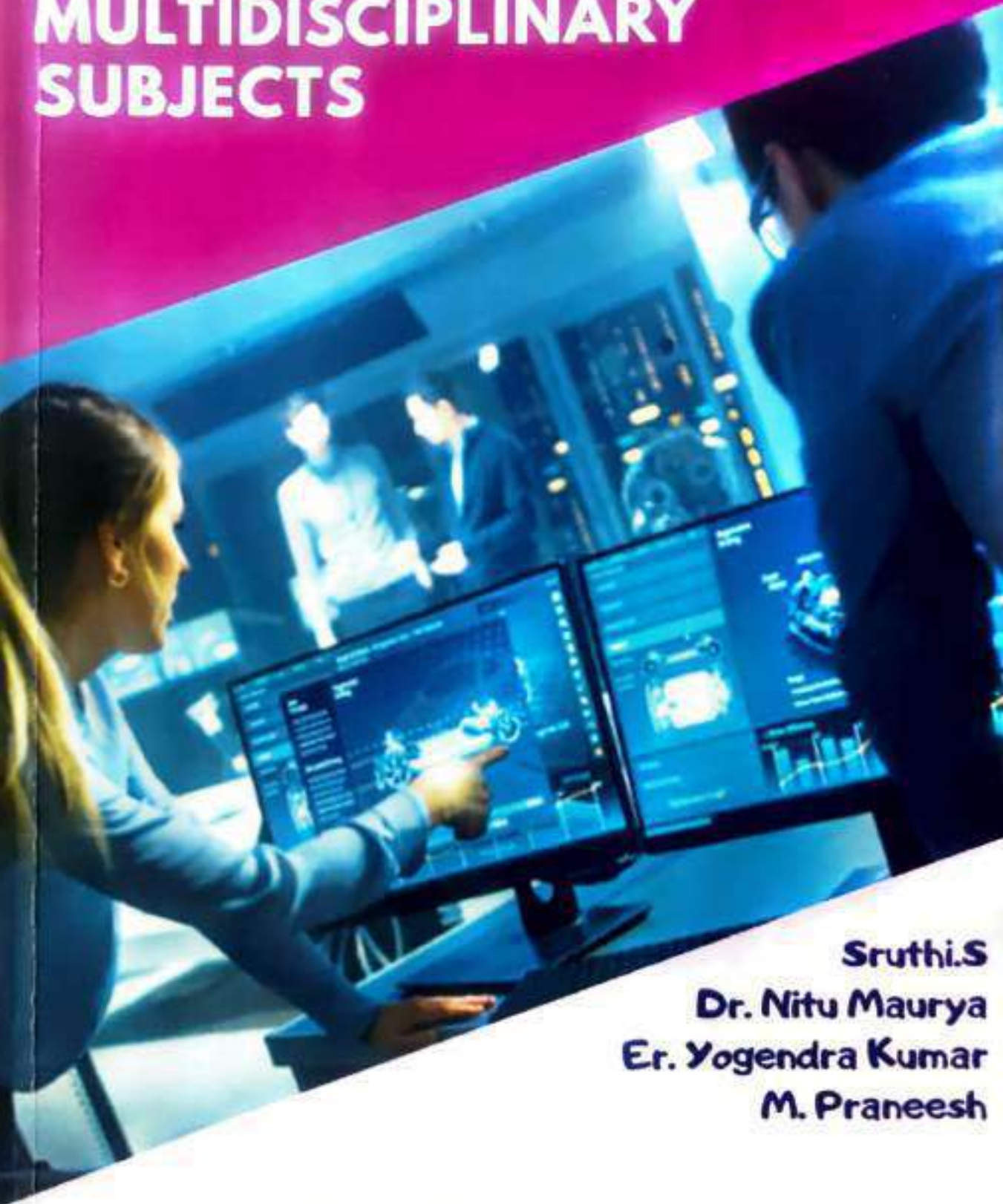
This covers a research work that presents a research investigation into the effect on student conceptual understanding of the central topics in the limit concepts, and overall achievement, with incorporation of an Inquiry Oriented Approach (IOA) with the attributable variables under study. There can be several significant differences between the groups of students who completed limit concepts without the IOA. The IOA group can score significantly higher in conceptual understanding and achievement.

### **References:**

1. Dede, Y. & Soyabas, D. (2011). Perspective mathematics teacher's experiences about function and equation concepts: *Eurasia Journal of Mathematics, Science & Technology Education*, 7(2), 89-103.
2. Jaworski, B. (2002). Sensitivity and challenge in university mathematics tutorial teaching: *Educational Studies in Mathematics*, 51, 71-94.
3. Rasmussen, Chris. (2007). An inquiry-oriented approach to undergraduate mathematics: *The Journal of Mathematical Behavior*, 26.

VOLUME-1

# RESEARCH TRENDS IN MULTIDISCIPLINARY SUBJECTS



**Sruthi.S**  
**Dr. Nitu Maurya**  
**Er. Yogendra Kumar**  
**M. Praneesh**

**Archers & Elevators Publishing House**  
**www.aeph.in**

## CONTENTS

S.NO	TITLE	PAGE NO
1	<b>PRESENT REGULATORS OF RURAL DEVELOPMENT IN INDIA: A REVIEW</b> Piyali Sarkar, Dr. Sonia Sharma	1
2	<b>BATTLE OF AFGHANISTAN AND IT'S MARK ON INTERNATIONAL SECURITY AND TRADE OVER THE DECADES</b> Dr Sumanta Bhattacharya	6
3	<b>BENEFITS AND PITFALLS OF WORK FROM HOME DURING PANDEMIC IN MANGALURU</b> Dr. Neetu Suraj, Asha Priya Dsouza	11
4	<b>ROLE OF WOMEN IN THE ENTREPRENEURSHIP CONTEXT: A BRIEF LITERATURE STUDY</b> Mahanish Panda	21
5	<b>BIOMEDICAL INFORMATICS AND TRANSLATIONAL MEDICINE</b> Ramshankar Varma	27
6	<b>HUMANITARIAN MECHANISM IN THE CONTEXT OF HUMAN RIGHTS</b> Moumita De, Mousumi Mukherjee	34
7	<b>ANCHORING OF FURAN RESIN: GREENER ROUTE</b> Satish M. Chavan, Manjusha M. Kulkarni	41
8	<b>STATUS OF INCLUSIVE EDUCATION IN NATIONAL EDUCATION POLICY 2020, MAJOR PROVISIONS, MISSES AND REAL BENEFIT TO LEARNING</b> Mr. Anchal Saxena	57
9	<b>SCIENTIFIC WRITING: TECHNICAL WRITING TO COMMUNICATE SCIENCE</b> Dr. Meenakshi V. Rathi	63
10	<b>ROLE OF PEACE IN REDUCING CONFLICTS WITHOUT VIOLENCE AND TO BUILD HARMONIOUS RELATIONSHIPS</b> Sunita Devi	68
11	<b>INTERNET OF THINGS -APPLICATIONS</b> Vidhula Thomas , Sruthy K B	72
12	<b>A STUDY ON PROBLEMS FACED BY THE DOMESTIC WOMEN WORKERS IN INDIA</b> Bijay Das, Rina Adak	80



**SCIENTIFIC WRITING: TECHNICAL WRITING TO COMMUNICATE SCIENCE****Dr. Meenakshi V. Rathi**

Department of Chemistry, RNC Arts, JDB Commerce, NSC Science College, Nashik Road, Nashik (Maharashtra) India Affiliated to Savitribai Phule Pune University

**ABSTRACT**

It is well acknowledged that widely sharing scientific information is crucial. This type of dissemination ensures that crucial scientific knowledge reaches other researchers, policymakers, and the general public. Scientific writing is one approach to communicate with others. It is the technical writing that scientists do to share their research through proper communication of data, figures, research methodologies, and results with others. It is the goal of a research article to provide a novel finding, explain its relevance, and situate it in a cohesive manner within the current body of knowledge. For non-scientists, the scientific style is defined by its stance on problems such as truth and presentation; scene; cast; and thought and language. The result is a technical report or scientific paper that examines current information, presenting it logically and orderly, with evidence supporting statements and citations. Peer review is also common in the scientific community. Scientific research requires references. Citation guidelines for scientific publications help authors increase their manuscript's reputation, minimise plagiarism difficulties, and appropriately link readers to sources. The most crucial aspect of scientific writing is adhering to ethical research and writing guidelines.

**Key Words:** Scientific Writing, Research Publication, Citation guidelines, References

**INTRODUCTION**

Although writing is essential to the scientific process, it is usually taught as an afterthought to concepts and is only rarely taught prior to the scientific process. No doubt you can think of other students who devoted weeks to lab or class assignments, then put together the written report the day before it was due. Many consider this a typical result because, even though we place a high value on the scientific process, we ignore the writing process in favour of it. Many students find scientific writing tough and tedious. It deviates from the structure and manner in which we've been trained to write in various academic disciplines. When you're confronted with new, sophisticated knowledge, it might make the scientific writing process feel overwhelming. (Day, R. A., & Gastel, 1995) On the other hand, excellent writing is capable of prompting one to provide a logical and consistent narrative that is grounded in prior research and fresh findings. Clear scientific writing often includes sections for introduction, hypotheses to be tested, methodology, and results, as well as a conclusion piece to tie everything together. (Boice & Jones, 1984) This is a standard structure that occurs in most scientific writing, making knowledge easier to pass from author to reader if some basic rules are followed. (Booth, 1984). Writing science is more than telling people about research results: it is telling stories about how science works. The scientific style produces a distinctive method of writing that is mainly unfamiliar to the students. Well-documented scientific and engineering reports synthesise peer-reviewed work.

It is necessary to follow a concise step-by-step approach that outlines tactics for excellent scientific writing, with the goal of increasing the focus on writing in scientific way. In addition to the fact that there are no hard and fast rules when it comes to scientific writing, following principles will help researchers to overcome the early hurdles involved with writing scientific articles. (Schimmel, 2012)



References must be accurate and thorough. Citation guidelines for scientific publications help authors increase their manuscript's reputation, minimise plagiarism difficulties, and appropriately link readers to sources. (Riordan, 2012)

The utmost important point in scientific writing is adhering to ethical principles for research and scientific writing. (Roig, 2006). Research has the greatest benefit when its findings are published in scientific journals so that others can study and build upon them. Adhering to ethical principles is essential for fostering scientific growth (Carver et al., 2011) Scientific misconduct is regarded a violation of ethical rules related to plagiarism and authorship (Lorés-Sanz, 2011).

It's fairly typical for unethical mistakes in writing and publishing to occur. There are numerous existing policies that institutions might change to meet their unique needs. Both students and professors should have access to policies linked to plagiarism, and there should be recommendations that help students and teachers avoid and identify plagiarism. It is possible to define roles on projects, which can also help establish authorship order on manuscripts before the writing process has even begun. Teams of scientists can support ethical publishing by encouraging cooperation and clearly defining authorship and publishing guidelines.

## CONCLUSION

Impending technical report or scientific article analyses current knowledge, presents it logically and orderly, with evidence supporting statements and references. We hope to have offered a wide overview of contemporary advancements and understanding of science writing from the standpoint of students and researchers.

## REFERENCES

1. Aluisio, S. M., Barcelos, I., Sampaio, J., & Oliveira, O. N. (2001). How to learn to write: many unwritten "rules of the game" of the academic discourse: A hybrid approach based on critiques and cases to support scientific writing. *Proceedings - International Conference on Advanced Learning Technologies, ICALT 2001*, 25-26. <https://doi.org/10.1109/ICALT.2001.943916>
2. Boice, R., & Jones, F. (1984). Why Academicians Don't Write. *The Journal of Higher Education*, 55(5), 567-582. <https://doi.org/10.1080/00221546.1984.11780679>
3. Booth, V. (1984). How to write and publish a scientific paper. *Biochemical Education*, 12(3), 102-102. [https://doi.org/10.1016/0307-4412\(84\)90089-X](https://doi.org/10.1016/0307-4412(84)90089-X)
4. Carver, J., Dellva, B., Emmanuel, P., & Parchure, R. (2011). Ethical considerations in scientific writing. *Indian Journal of Sexually Transmitted Diseases and AIDS*, 32(2), 124. <https://doi.org/10.4103/2589-0557.85425>
5. Coghill, A. M., & Garson, L. R. (2006). *ACS style guide*. American Chemical Society.
6. Day, R. A., & Gastel, B. (1995). *How to write and publish a scientific paper*. 5.
7. Derish, P. A., Maa, J., Ascher, N. L., & Harris, H. W. (2007). Enhancing the Mission of Academic Surgery by Promoting Scientific Writing Skills. *Journal of Surgical Research*, 140(2), 177-183. <https://doi.org/10.1016/j.jss.2007.02.015>
8. Garcia-Granda, S. (2013). Writing science: how to write papers that get cited and proposals that get funded. *Crystallography Reviews*, 19(1), 53-54. <https://doi.org/10.1080/0889311x.2013.769529>
9. Hofmann, A. H. (2010). *Scientific writing and communication: papers, proposals and presentations*. Oxford, UK.
10. Kruse, O. (2003). Getting Started: Academic Writing in the First Year of a University. *Education* (pp. 19-28). [https://doi.org/10.1007/0-306-48195-2\\_2](https://doi.org/10.1007/0-306-48195-2_2)

11. Lorés-Sanz, R. (2011). *The construction of the author's voice in academic writing: the interplay of cultural and disciplinary factors\**. 173-193. <https://doi.org/10.1515/TEXT.2011.008>
12. Riordan, L. (2012). Modern-Day Considerations for References in Scientific Writing. *Journal of Osteopathic Medicine*, 112(8), 567-569. <https://doi.org/https://doi.org/10.7556/jaoa.2012.112.8.567>
13. Roig, M. (2006). *Avoiding plagiarism, self-plagiarism, and other questionable writing practices: A guide to ethical writing*.
14. Russell, D. R., & Cortes, V. (n.d.). *Academic and Scientific Texts: The Same or Different Academic and Scientific Texts: The Same or Different Communities?* Retrieved August 11, 2021, from [https://lib.dr.iastate.edu/engl\\_pubs](https://lib.dr.iastate.edu/engl_pubs)
15. Schimel, J. (2012). (2012). *Writing science: how to write papers that get cited and proposals that get funded*. OUP USA.
16. Venables, A., & Summit, R. (2003). Enhancing scientific essay writing using peer assessment. *Innovations in Education and Teaching International*, 40(3), 281-290. <https://doi.org/10.1080/1470329032000103816>





# **New Trends** and **Digital Adoption**

**A Paradigm Shift in Higher Education**



*Editors*

**Arvind Nawale**  
**M. Maniruzzaman**  
**Amar Singh**  
**Saumya Priya**

*Foreword by*  
**Narendra Jadhav**

# Contents

<i>Foreword</i>	5
<i>Preface</i>	9
1. A Need of Digital Adoption in Teaching and Research for Transforming Higher Education <b>Arvind M. Nawale</b>	19
2. Technology in Teaching ESL/EFL: Integration, Application, Tools and Resources <b>M. Maniruzzaman</b>	29
3. Using Multimedia in Literature Classroom <b>Amar Singh</b>	52
4. Digital Humanities: Exploring the Interdisciplinary Trends in Higher Education <b>Saumya Priya</b>	61
5. Blended Learning in Higher Education: A Method for Learners to Engage in Interactive, Collaborative, and Active Learning <b>Tushar Brahmhatt</b>	71
6. Reanalysing the Impact of Online Teaching Learning Experiences during the Covid Pandemic <b>Kiranjeet Kaur Bedi</b>	81
7. 'Blended/ Flipped Learning: The Necessity of the Time' <b>Ravindra D. Hajare</b>	85
8. Attempted Healing: A Visionary Reading on Higher Education during the Pandemic <b>Aswathi Prasanth</b>	98
9. India: Educating the Population via Online Tools <b>Meenakshi V. Rathi</b>	104
10. Advantages of E-Learning and Various Platforms of E-Learning in Higher Education <b>Seema Shukla and Neelanjana Pathak</b>	111



# India: Educating the Population via Online Tools

Meenakshi J. Rath

## Abstract

Online education and skills are becoming popular among millions of students and teachers in India in the previous fifteen to eighteen months. Lectures that are being delivered via online technologies are being given to students who are situated outside of the classroom. With the widespread use of online education and skills in India, we're in a pivotal time. Learn more about the collection of online learning portals on this page: here. Online learning and teaching is a significant paradigm shift for the Indian education system. Despite these steps, the country is still some way off from implementing it. One step such institutions can take is to allow their degrees to be offered wholly online under the automatic route, and these schools are permitted to do so, according to the University Grants Commission's recent decision.

**Keywords:** Online education, skill based learning, educational tools, learning platforms

## Introduction

We're in the midst of a transition in which the domain of skills and education is shifting from face-to-face to online learning and digital tools (Lacker 20) with the added benefit of eliminating the need for breaks in learning. Some vocational training schools have moved to give online sessions with practical hands on training at the core of their curriculum (McQuarter 47). There have been initiatives undertaken by the federal government, colleges, and even corporations like IBM and TCS to deliver instructional content through online learning portals. There are over 10 digital learning portals, ranging from secondary and post-secondary institutions to research and development organisations (Taylerson 170).



eBooks, factual, bibliographies, citations, etc. for higher education. ("E-ShodhSindhu: Consortium for Higher Education Electronics"). All academic institutions like central and state universities and colleges can avail of the services.

## Conclusion

All above online courses give learners access to resources, meet and communicate with others on the go, and join in on online discussions. Ensure that excellent educational outcomes are being encouraged by all-encompassing methods that are both creative and secure.

These classes provide both video lectures, class materials, quizzes, examinations, and other supplemental materials for an exciting learning experience. The majority of these portals provide a mix of free and paid courses. Certification information is available on the individual course pages and varies depending on the course. Furthermore, the majority of the portals are mobile-friendly, which means they include an app that students and teachers can use on their phones.

## Works Cited

- Bharat, [bharatskills.gov.in](http://bharatskills.gov.in).
- Department of School Education and Literacy. *DIKSHA – Government of India*, 17 Sept. 2021, [diksha.gov.in](http://diksha.gov.in).
- E-PGPathshala, [epgp.inflibnet.ac.in](http://epgp.inflibnet.ac.in).
- "E-ShodhSindhu: Consortium for Higher Education Electronics." *E-ShodhSindhu: Consortium for Higher Education Electronics*, [ess.inflibnet.ac.in/ojs](http://ess.inflibnet.ac.in/ojs).
- Gregson, Margaret, and Patricia Spedding. "Practice! Practice! Practice!" *Practice-Focused Research in Further Adult and Vocational Education*, 2020, pp. 1-19.
- Hanbrick, David Z. "Why are some people more knowledgeable than others? A longitudinal study of knowledge acquisition." *Memory & Cognition*, vol. 31, no. 6, 2003, pp. 902-917.
- IBM SkillsBuild | *Free Skills-Based Learning From Technology Experts*, [skillsbuild.org](http://skillsbuild.org).
- Luckee, Barbara B. "Shifting digital, shifting context: (re)considering teacher professional development for online and blended learning in the COVID-19 era." *Educational Technology Research and Development*, vol. 69, no. 1, 2020, pp. 17-20.
- McQuirter, Ruth L. "Lessons on Change: Shifting to Online Teaching during COVID-19." *Brock Education Journal*, vol. 29, no. 2, 2020, p. 47.
- NASSCOM *FutureSkills: Homepage*, [futureskills.nasscom.in](http://futureskills.nasscom.in).

*National Skills Network*, 17 Sept. 2021, [www.nationalskillsnetwork.in](http://www.nationalskillsnetwork.in).

*Swayam Central*, [swayam.gov.in](http://swayam.gov.in).

*Swayam Prabha | Free 34 DTH Channels*, [www.swayamprabha.gov.in](http://www.swayamprabha.gov.in).

Taylorson, Lynne. "Identity in Focus: Examining FE Practitioners' Informal Professional Learning Through the Lenses of Online Community Dialogues." *Practice-Focused Research in Further Adult and Vocational Education*, 2020, pp. 145-170.



# प्राकृतिक भूगोल

प्रथम वर्ष कला  
सत्र पहिले  
पेपर-1

प्रा. डॉ. राजेंद्र ओंकार परमार

प्रा. डॉ. सुधाकर जगन्नाथ बोरसे

प्रा. डॉ. नितीन नथुराम मुंढे

प्रा. डॉ. विनोद रामदास राऊत

हिमालया पब्लिशिंग हाऊस

ISO 9001:2015 CERTIFIED



## लेखक परिचय



**प्रा. डॉ. राजेंद्र ओंकार परमार** (एम.ए., बी.एड., पीएच.डी.)

भूगोल विभाग, चांगु काना ठाकूर महाविद्यालय, नवीन पनवेल, येथे सहा. प्राध्यापक म्हणून कार्यरत. एकुण अध्यापन 25 वर्षे, संशोधन मार्गदर्शक व मा. सदस्य, भूगोल अभ्यास मंडळ, मुंबई विद्यापीठ, पाच भूगोल संस्थांचे आजीव सभासद, राष्ट्रीय व आंतरराष्ट्रीय स्तरावरील जर्नल्स मध्ये 28 संशोधन लेख प्रकाशित, एकुण 18 पाठ्यपुस्तक व संदर्भ ग्रंथ प्रकाशित, विविध कार्यशाळा व चर्चासत्रांमध्ये 33 ठिकाणी सादरीकरण, 42 ठिकाणी सहभाग व 25 ठिकाणी साधन व्यक्ती म्हणून कार्य. राष्ट्रीय स्तरावरील तीन व राज्य स्तरावरील तीन पुरस्कार प्राप्त.



**प्रा. डॉ. सुधाकर जगन्नाथ बोरसे** (एम.ए., पीएच.डी., नेट)

भूगोल विभाग, आर.एन.सी. आर्ट्स, जे.डी.बी. कॉमर्स व एन.एस.सी. सायन्स कॉलेज, नाशिकरोड, येथे 12 वर्षांपासून सहा. प्राध्यापक म्हणून कार्यरत. एका संस्थेचे आजीव सभासद, राष्ट्रीय व आंतरराष्ट्रीय स्तरावरील जर्नल्स मध्ये 30 संशोधन लेख प्रकाशित, विविध कार्यशाळा व चर्चासत्रांमध्ये 20 ठिकाणी सादरीकरण, 24 ठिकाणी सहभाग, राज्य स्तरावरील एक पुरस्कार प्राप्त.



**प्रा. डॉ. नितीन नथुराम मुंडे** (एम.ए., एम.एस्सी., पीएच.डी., पी.डी.एफ. नेट)

भूगोल विभाग, सर परशुरामभाऊ महाविद्यालय, पुणे येथे 12 वर्षांपासून सहा. प्राध्यापक म्हणून कार्यरत. तीन भूगोल संस्थांचे आजीव सभासद, राष्ट्रीय व आंतरराष्ट्रीय स्तरावरील जर्नल्स मध्ये 35 संशोधन लेख प्रकाशित, विविध कार्यशाळा व चर्चासत्रांमध्ये 32 ठिकाणी सादरीकरण, 40 ठिकाणी सहभाग व 30 ठिकाणी साधन व्यक्ती म्हणून कार्य. राष्ट्रीय स्तरावरील तीन पुरस्कार प्राप्त.



**प्रा. डॉ. विनोद रामदास राऊत** (एम.ए., बी.एड., एम.फील., पीएच.डी., नेट)

भूगोल विभाग प्रमुख, पुणे विद्यार्थीगृहाचे, श्रीराम सदाशिव धामणकर महाविद्यालय, नाशिक येथे कार्यरत असून गेली 15 वर्षे महाविद्यालयात अध्यापनाचा अनुभव आहे. वेगवेगळ्या राष्ट्रीय व आंतरराष्ट्रीय जर्नल्स मध्ये 15 शोध निबंध प्रकाशित. विद्यापीठ संकेत स्थळावर इ-सामग्रीची निर्मिती.

[www.himpub.com](http://www.himpub.com)

ISBN: 978-93-5495-605-8



9 789354 956058

ISBN: 978-93-5495-605-8

PHG 0200

₹ 225/-

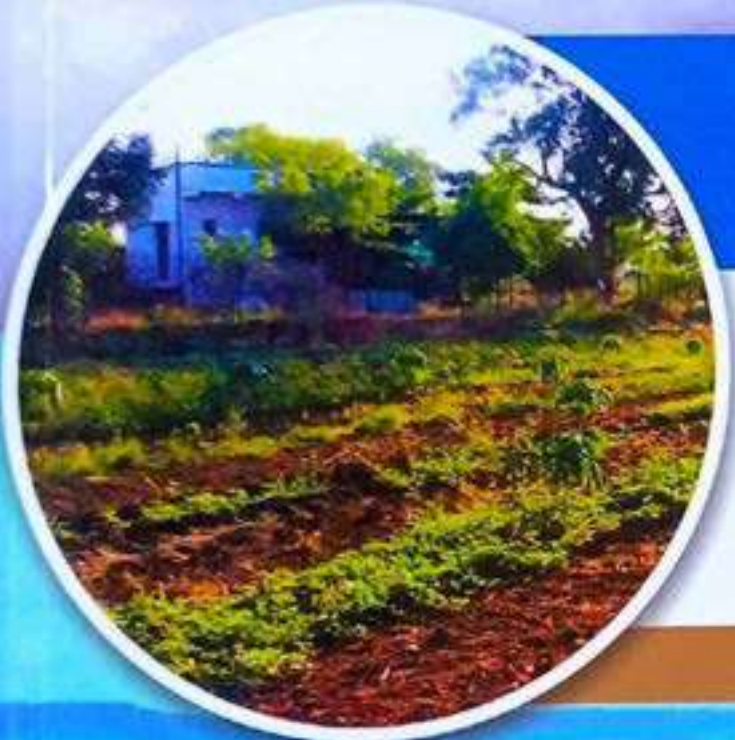


# भारताचा

# भूगोल

तृतीय वर्ष कला  
सत्र पाचवे  
स्पे. पेपर-3

भाग-१



प्रा. डॉ. राजेंद्र ओंकार परमार  
प्रा. डॉ. सुधाकर जगन्नाथ बोरसे  
प्रा. डॉ. महादेव श्रीधर जाधव  
प्रा. डॉ. नितीन नथुराम मुंढे

हिमालया पब्लिशिंग हाऊस

ISO 9001:2015 CERTIFIED



## लेखक परिचय



**प्रा. डॉ. राजेंद्र ओंकार परमार** (एम.ए., बी.एड., पीएच.डी.)

भूगोल विभाग, चांगु काना ठाकूर महाविद्यालय, नवीन पनवेल, येथे सहा प्राध्यापक म्हणून कार्यरत. एकूण अध्यापन 28 वर्षे, संशोधन मार्गदर्शक व मा. सदस्य, भूगोल अभ्यास मंडळ, मुंबई विद्यापीठ, पाच भूगोल संस्थांचे आजीव सभासद, राष्ट्रीय व आंतरराष्ट्रीय स्तरावरील जर्नल्स मध्ये 28 संशोधन लेख प्रकाशित, एकूण 16 पाठ्यपुस्तक व संदर्भ ग्रंथ प्रकाशित, विविध कार्यशाळा व वर्धासत्रांमध्ये 33 ठिकाणी सादरीकरण, 42 ठिकाणी सहभाग व 25 ठिकाणी साधन व्यक्ती म्हणून कार्य. राष्ट्रीय स्तरावरील तीन व राज्य स्तरावरील तीन पुरस्कार प्राप्त.



**प्रा. डॉ. सुधाकर जगन्नाथ बोरसे** (एम.ए., पीएच.डी., नेट)

भूगोल विभाग, आर.एन.सी. आर्ट्स, जे.डी.बी. कॉमर्स व एन.एस.सी. सायन्स कॉलेज, नाशिकरोड, येथे 12 वर्षांपासून सहा प्राध्यापक म्हणून कार्यरत. एका संस्थेचे आजीव सभासद, राष्ट्रीय व आंतरराष्ट्रीय स्तरावरील जर्नल्स मध्ये 30 संशोधन लेख प्रकाशित, विविध कार्यशाळा व वर्धासत्रांमध्ये 20 ठिकाणी सादरीकरण, 24 ठिकाणी सहभाग. राज्य स्तरावरील एक पुरस्कार प्राप्त.



**प्रा. डॉ. महादेव श्रीघर जाधव** (एम.ए., एम.एस्सी., बी.एड., पीएच.डी. नेट)

भूगोल विभाग, बी.पी.एच.ई. सोसायटीचे अहमदनगर कॉलेज, अहमदनगर येथे 20 वर्षांपासून सहा प्राध्यापक म्हणून कार्यरत. एका संस्थेचे आजीव सभासद, राष्ट्रीय व आंतरराष्ट्रीय स्तरावरील जर्नल्स मध्ये 25 संशोधन लेख प्रकाशित, विविध कार्यशाळा व वर्धासत्रांमध्ये 18 ठिकाणी सादरीकरण, 22 ठिकाणी सहभाग. विद्यापीठ स्तरावरील पुरस्कार प्राप्त.



**प्रा. डॉ. नितीन नथुराम मुंडे** (एम.ए., एम.एस्सी., पीएच.डी., पी.डी.एफ. नेट)

भूगोल विभाग, सर परशुराममाऊ महाविद्यालय, पुणे येथे 12 वर्षांपासून सहा प्राध्यापक म्हणून कार्यरत. तीन भूगोल संस्थांचे आजीव सभासद, राष्ट्रीय व आंतरराष्ट्रीय स्तरावरील जर्नल्स मध्ये 35 संशोधन लेख प्रकाशित, विविध कार्यशाळा व वर्धासत्रांमध्ये 32 ठिकाणी सादरीकरण, 40 ठिकाणी सहभाग व 30 ठिकाणी साधन व्यक्ती म्हणून कार्य. राष्ट्रीय स्तरावरील तीन पुरस्कार प्राप्त.

[www.himpub.com](http://www.himpub.com)

ISBN: 978-93-5495-483-2



9 789354 954832

ISBN: 978-93-5495-483-2

PHG 0198

₹ 250/-



# पर्यावरण भूगोल

भाग-१

द्वितीय वर्ष कला  
सत्र तिसरे  
पेपर-2

डॉ. राजेंद्र ओंकार परमार  
डॉ. सुधाकर जगन्नाथ बोरसे  
डॉ. चिंतामण भागुजी निगळे  
प्रा. बाबाजी मोतीराम आहिरे



हिमालया पब्लिशिंग हाऊस

ISO 9001:2015 CERTIFIED



# लेखक परिचय



**प्रा. डॉ. राजेंद्र आंकार परमार (एम.ए., बी.एड., पीएच.डी.)**

भूगोल विभाग, चांगू काना ठाकूर महाविद्यालय, नवीन पनवेल, येथे सहा प्राध्यापक म्हणून कार्यरत. एकूण अध्यापन 25 वर्षे, संशोधन मार्गदर्शक व मा. सदस्य, भूगोल अभ्यास मंडळ, मुंबई विद्यापीठ, पाच भूगोल संस्थांचे आजीव सभासद, राष्ट्रीय व आंतरराष्ट्रीय स्तरावरील जर्नल्स मध्ये 26 संशोधन लेख प्रकाशित, एकूण 17 पाठ्यपुस्तके व संदर्भ ग्रंथ प्रकाशित, विविध कार्यशाळा व वर्वासत्रामध्ये 33 ठिकाणी सादरीकरण, 42 ठिकाणी सहभाग व 25 ठिकाणी साधन व्यक्ती म्हणून कार्य. राष्ट्रीय स्तरावरील तीन व राज्य स्तरावरील तीन पुरस्कार प्राप्त.



**प्रा. डॉ. सुधाकर जगन्नाथ बोरसे (एम.ए., पीएच.डी., नेट)**

भूगोल विभाग, आर.एन.सी. आर्ट्स, जे.डी.बी. कॉमर्स व एन.एस.सी. सायन्स कॉलेज, नाशिक रोड, नाशिक, येथे 12 वर्षांपासून सहा प्राध्यापक म्हणून कार्यरत. एका शैक्षणिक संस्थेचे आजीव सभासद, राष्ट्रीय व आंतरराष्ट्रीय जर्नल्स मधून 30 संशोधन लेख प्रकाशित, एकूण 2 पाठ्यपुस्तके प्रकाशित, विविध कार्यशाळा व वर्वासत्रामध्ये 20 पेपरचे सादरीकरण व 24 ठिकाणी सहभाग, राष्ट्रीय स्तरावरील एक व राज्य स्तरावरील एक पुरस्कार प्राप्त.



**प्रा. डॉ. चिंतामण भागुजी निगळे (एम.ए., बी.एड., पीएच.डी., सेट)**

भूगोल विभाग, मराठा विद्या प्रसारक समाज संस्थेचे कर्मवीर गणपत दादा गोरे कला, वाणिज्य व विज्ञान महाविद्यालय निफाड, जि. नाशिक येथे सहा प्राध्यापक व भूगोल विभाग प्रमुख म्हणून कार्यरत. एकूण अध्यापन 14 वर्षे, राष्ट्रीय व आंतरराष्ट्रीय जर्नल्स मधून 18 संशोधन लेख प्रकाशित, विविध कार्यशाळा व वर्वासत्रामध्ये 24 ठिकाणी सहभाग तसेच राष्ट्रीय स्तरावरील एक व राज्य स्तरावरील एक पुरस्कार प्राप्त.



**प्रा. बाबाजी मोतीराम आहिरे (एम.ए., बी.एड.)**

भूगोल विभाग, मराठा विद्या प्रसारक समाजाचे कला व वाणिज्य महाविद्यालय सोयगाव, ता. मालेगाव, जि. नाशिक येथे सहाय्यक प्राध्यापक म्हणून कार्यरत, अध्यापनाचा 17 वर्षांचा अनुभव, पीएच.डी. संशोधन करीत असून राष्ट्रीय व आंतरराष्ट्रीय स्तरावरील जर्नल्स मध्ये चार संशोधन लेख प्रकाशित, विविध कार्यशाळा व वर्वासत्रात सहभाग.

[www.himpub.com](http://www.himpub.com)

ISBN: 978-93-5596-007-8



9 789355 960078

ISBN: 978-93-5596-007-8

PHG 0201

₹ 260/-



# आपत्ती व्यवस्थापनाचा भूगोल

Geography of Disaster Management



डॉ. नितीन मुंढे

डॉ. राजेंद्र पवार

डॉ. सुधाकर बोरसे

डॉ. चांगदेव कुदनर





सावित्रीबाई फुले पुणे विद्यापीठाच्या २०२१-२०२२ च्या कला शाखेच्या  
T.Y.B.A सुधारित अभ्यासक्रमानुसार डायमंड पब्लिकेशन्सची उपयुक्त पुस्तके

- |   |   |
|---|---|
| १. भारतीय आर्थिक विकास<br>Indian Economic Development                             | डॉ. संभाजी काळे, डॉ. एस. व्ही. दमढेरे<br>प्रा. अक्षय काळे                   |
| २. आंतरराष्ट्रीय अर्थशास्त्र<br>International Economics                           | डॉ. एस. व्ही. दमढेरे, डॉ. संभाजी काळे<br>प्रा. अक्षय काळे                   |
| ३. सार्वजनिक आर्यव्यय<br>Public Finance   | डॉ. एस. व्ही. दमढेरे, प्रा. अक्षय काळे<br>डॉ. दत्तात्रय चव्हाण              |
| ४. महाराष्ट्रातील स्थानिक स्वराज्य संस्था<br>Local Self Government in Maharashtra | डॉ. वैशाली पवार   |
| ५. लोकप्रशासन<br>Public Administration  | डॉ. वैशाली पवार, प्रा. आनंदराव कदम<br>डॉ. राजकुमार सुरवासे, डॉ. संजय लांडगे |
| ६. आधुनिक राजकीय विश्लेषण<br>Modern Political Analysis                            | डॉ. वैशाली पवार   |
| ७. प्रात्यक्षिक भूगोल<br>Practical Geography                                      | डॉ. श्रीकांत कार्लेकर<br>डॉ. तुषार शितोळे                                   |
| ८. पर्यटन भूगोल<br>Tourism Geography  | डॉ. सविता कुलकर्णी<br>प्रा. गणेश गांधीले                                    |
| ९. औद्योगिक व संघटनात्मक मनसशास्त्र<br>Industrial and Organisational Psychology   | प्रा. केशव गाडेकर, डॉ. रसाळ<br>डॉ. दरेकर, डॉ. डोरमारे                       |
| १०. भारतीय राष्ट्रीय चळवळ १८८५ ते १९४७ सत्र ५<br>Indian National Movement         | डॉ. भूषण फडतरे<br>प्रा. कल्याण चव्हाण                                       |
| ११. १९ व्या शतकातील महाराष्ट्र सत्र ५<br>Maharashtra in the 19th Century          | प्रा. सचिन कांबळे   |
| १२. इतिहास लेखनशास्त्र सत्र ५<br>Introduction to Historiography                   | डॉ. अंबादास मंजुळकर<br>डॉ. दिगंबर सोनावणे                                   |

₹ 250

भूगोल

ISBN 978-93-91948-42-9



## डायमंड

पब्लिकेशन्स



info@dpbooks.in www.dpbooks.in 9 789391 948429

1018



# Essential Immunology

## About the Author



**Dr. Vikram R. Kakulte** (M.Sc. B.Ed. Ph.D. F.S.L.Sc. F.S.E.Z.R.) is working as Head, Department of Zoology in Maratha Vidya Prasarak Samaj's K.R.T. Arts, B.H. Commerce and A.M. Science (K.T.H.M.) College, Gangapur Road, Nashik 422002. He has completed his Ph.D. degree in Zoology from Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, and has more than 28 years of teaching experience at undergraduate and postgraduate levels. He has published 6 Indian and 1 Australian Patents, 12 Reference books, 17 Research papers in international and national journals, and 14 Textbooks of undergraduate level. Dr. Kakulte has written several

scientific articles leading in Marathi newspapers and magazines. He has also presented his research papers at various international and national conferences and seminars



**Mrs. Priya R. Sonawani** Is working at Department of Biotechnology, G. E. Society's, RNC Arts JDB Comm. and NSC Sci. College, Nashik road with 17 years of teaching experience. She did M. Sc in Microbiology from Dept. of Microbiology, SPPU, Pune, SET (Life Sciences) and M. Phil (Envt. sci.) and currently pursuing Ph. D. Her research interests range from Emt. Sciences, Ind. Microbiology, Microbial Biotechnology and Immunology. She attended many National and international seminars, conferences

also published many research papers in different National and International journals. Recently she filed an Indian Patent and working on the second one. The present book writing is her new attempt prompted by the desire to help the students in their quest of knowledge in addition to teaching.

## Contents

Immunity: Definition and Types • Formation of Blood Cells (Hematopoiesis) • Organs and Tissues of Immune System • Immuno-hematology • Innate Immunity (Nonspecific) • Antigens • Immunoglobulin • Antibody Diversity • Antigen: Antibody Interactions • Adaptive /Acquired Immunity • Experimental Immunology • Antigen Presenting Cells (Mechanism of Antigen Processing and Presentation) • Major Histocompatibility Complex • Transplantation and Immunity • Cytokines • Active and Passive Immunisation • Hypersensitivity • Tumor Immunology • Hybridoma Technology • Public Health Immunology

Also available at :



**International Publications**

Publishers & Distributors

6A/540, Avas Vikas, Hanspuram  
Kanpur-208 021

Email : internationalpub09@yahoo.com  
Website : www.internationalpublication.in

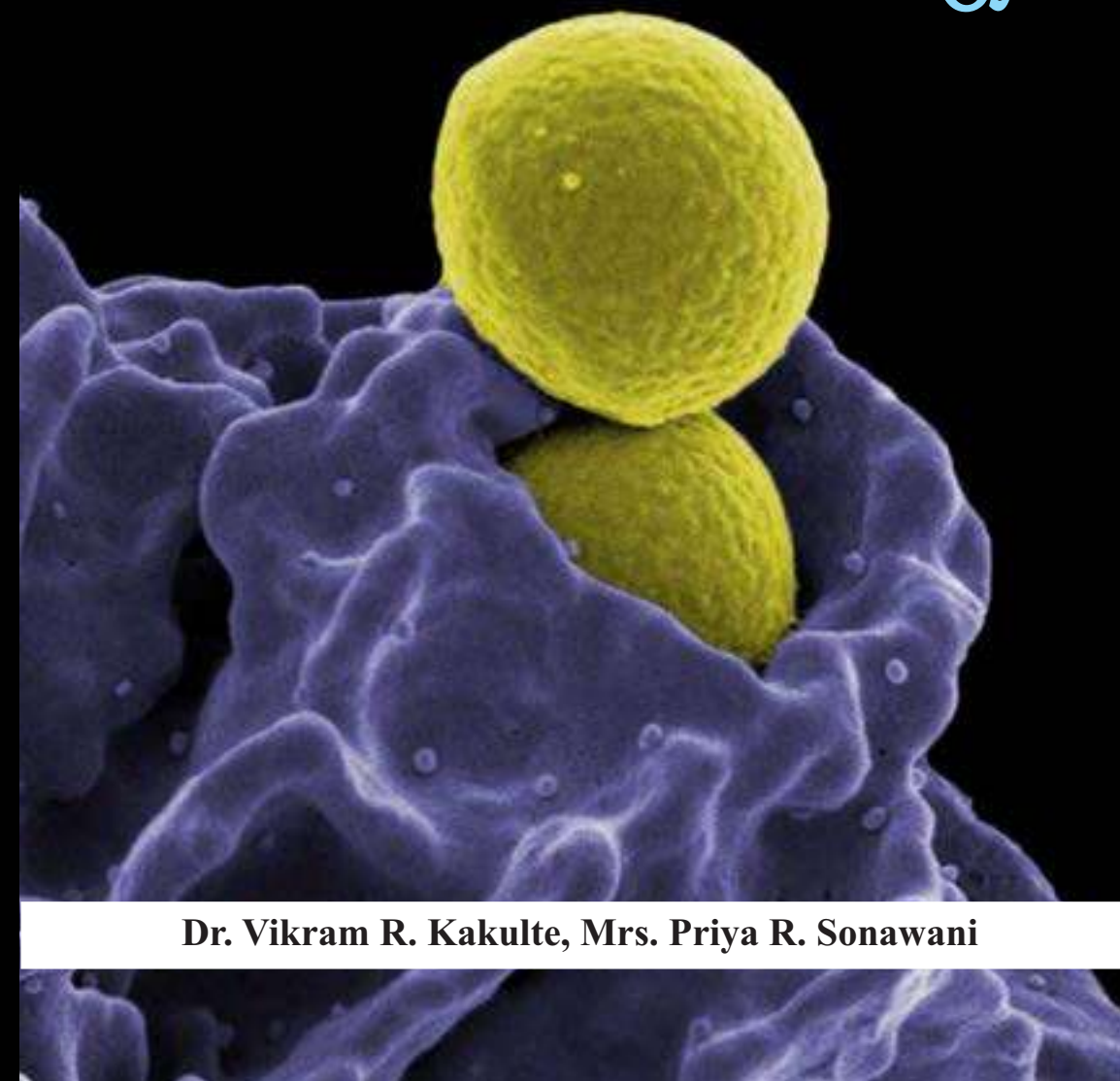


Essential Immunology

•  
Dr. Vikram R. Kakulte  
Mrs. Priya R. Sonawani



# Essential Immunology



Dr. Vikram R. Kakulte, Mrs. Priya R. Sonawani





# Chemistry Education and Miracles



**Dr. Sudesh B Ghoderao**



**Title of the Book:** Chemistry Education and Miracles

**Edition:** First-2022

**Copyright 2022 © Dr. Sudesh B. Ghoderao,** Associate professor,  
GE Society's RNC Arts, JDB Commerce and NSC Science College,  
Nashik Road, Nashik, Maharashtra, India.

No part of this book may be reproduced or transmitted in any form by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the copyright owners.

#### **Disclaimer**

The author is solely responsible for the contents published in this book. The publishers or editors do not take any responsibility for the same in any manner. Errors, if any, are purely unintentional and readers are requested to communicate such errors to the editors or publishers to avoid discrepancies in future.

ISBN: 978-1-68576-244-5

MRP: 159/-

**PUBLISHER & PRINTER: INSC International Publishers**

Pushpagiri Complex, Beside SBI

Housing Board, K.M. Road

Chikkamagaluru, Karnataka

Tel.: +91-8861518868

E-mail: info@iiponline.org

**IMPRINT: I I P**



# Environmental Chemistry

Semester 02

**Programs:**

**V135: Dip. in  
Environmental  
Science**

**&**

**V136: M.Sc. in  
Environmental  
Science**

**EVS022**

**Email: [director.ast@ycmou.ac.in](mailto:director.ast@ycmou.ac.in)**

**Website: [www.ycmou.ac.in](http://www.ycmou.ac.in)**

**Phone: +91-253-2231473**

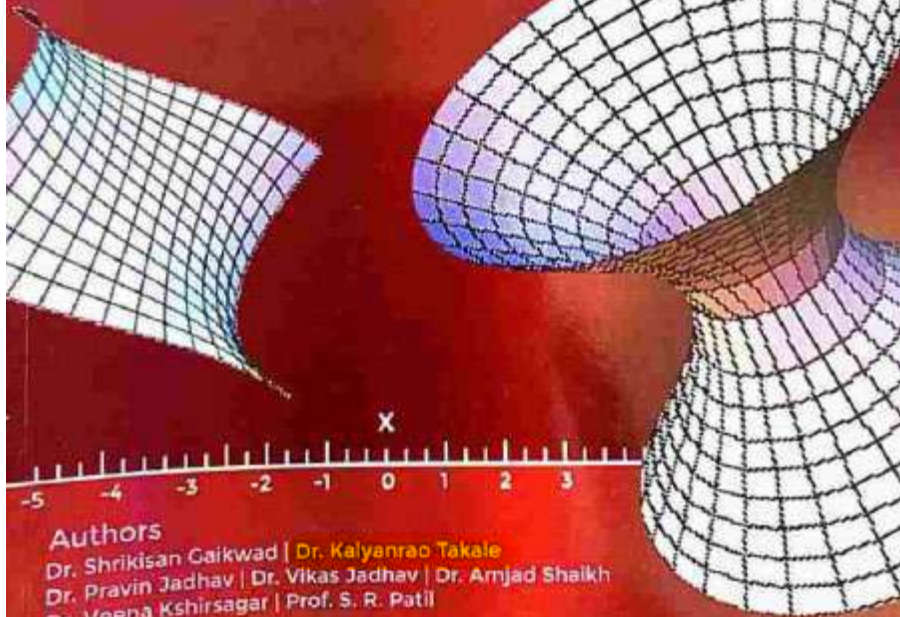


GOLDEN  
SERIES  
by NIRALI

A Textbook for  
S.Y.B.Sc Mathematics  
(2020 Pattern)  
As per CBCS : Credit 2

# CALCULUS OF SEVERAL VARIABLES

PAPER-I : MT-231



## Authors

Dr. Shrikisan Gaikwad | Dr. Kalyanrao Takale  
Dr. Pravin Jadhav | Dr. Vikas Jadhav | Dr. Amjad Shaikh  
Dr. Veena Kshirsagar | Prof. S. R. Patil

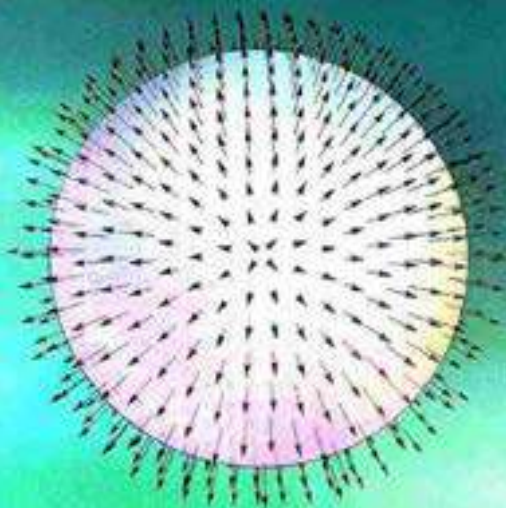


**GOLDEN  
SERIES**  
by NIRALI

A Textbook for  
**S.Y.B.Sc / S.Y.B.A.**  
**Mathematics (2020 Pattern)**  
As per CBCS - Credit 2

# VECTOR CALCULUS

PAPER-II : MT-242(A)



**AUTHORS**

Dr. Dinesh Chandra Gokhale | **Dr. Kapilendra Singh** | Dr. Vinay Chandra  
Dr. Vikas Jothani | Dr. Anand Shrivastava | Dr. V. S. Kulkarni | Dr. S. S. Kulkarni

 GOLDEN  
SERIES  
by NIRALI

A Manual for  
B.Sc / B.A. Mathematics

# Computational Mathematics using MAXIMA SOFTWARE III

## Authors

Dr. Kalyanrao Takate | Dr. Amjad Shaikh | Dr. Shrikisan Chikwad  
Dr. Veena Kshirsagar | Prof. S. P. Patil





A Textbook for  
S.Y.B.Sc / S.Y.B.A.  
Mathematics (2019 Pattern)  
© P. P. Publications

# DYNAMICAL SYSTEMS

PAPER: II : MT-242(B)



Authors:

Dr. Srikishan Galwad | **Dr. Kalyanrao Takur** | Dr. Pravin Tadhar  
Dr. Vikas Jadhav | Dr. Anand Shaikh | Dr. Veena Kulkarni | Prof. S. R. Patil

 **GOLDEN  
SERIES**  
by NIRALI

A Textbook for  
**S.Y.B.Sc (Computer Science)**  
**Mathematics**

As per CBCS - Credit 2



PAPER-I : MTC-231

# GROUPS CODING THEORY

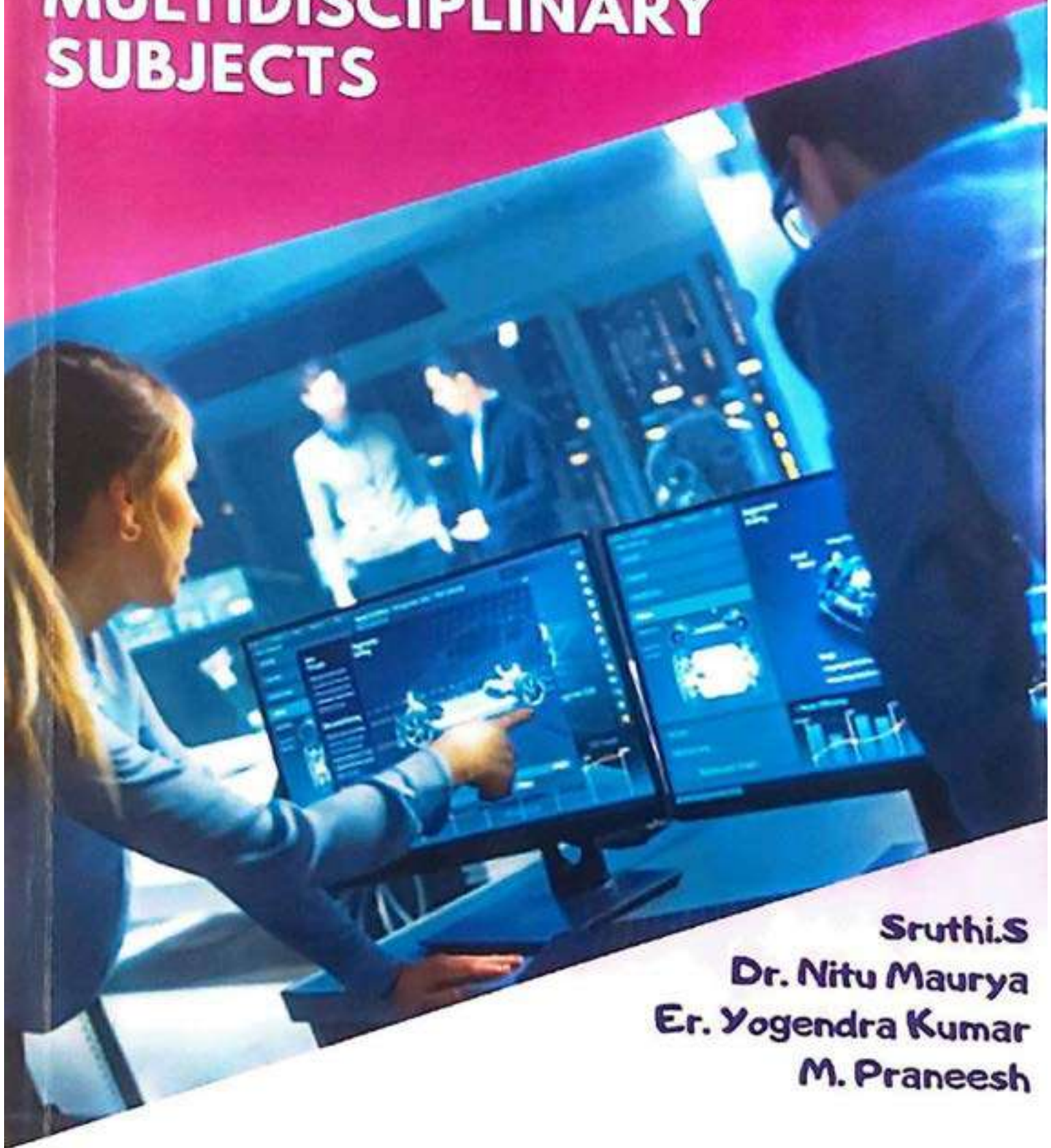
**Authors**

**Dr. Kalyanrao Takale** | Dr. Shrikisan Gaikwad | Dr. Mrs. Nivedita Mahajan  
Dr. Amjad Sheikh | Mrs. Shamal Deshmukh | Prof. S. R. Patil



**VOLUME-1**

# **RESEARCH TRENDS IN MULTIDISCIPLINARY SUBJECTS**



**Sruthi.S**  
**Dr. Nitu Maurya**  
**Er. Yogendra Kumar**  
**M. Praneesh**

**Archers & Elevators Publishing House**  
**[www.aeph.in](http://www.aeph.in)**

**ARCHERS & ELEVATORS PUBLISHING HOUSE**

No.54, MM Layout,

Hesaragatta Main Road,

Bangalore -560090

Mob: + 91 9164362263

E-mail: archerselevators@gmail.com

Website: www.aeph.in

**Research Trends in Multidisciplinary Subjects – Volume 1**

© Archers and Elevators Publishing House

First Edition 2021

**ISBN:** 978-93-90996-66-7

**Price: Rs 900/-**

All rights reserved. This book or parts therefore, may not be reproduced in any form or by any means, electronic or mechanical, including photocopying, recording or an information storage and retrieved system now known or to be invented, without written permission from copyright owners.

**PRINTED IN INDIA**

A& E printers, Bangalore-90.



## CONTENTS

S.NO	TITLE	PAGE NO
1	<b>PRESENT REGULATORS OF RURAL DEVELOPMENT IN INDIA: A REVIEW</b> Piyali Sarkar, Dr. Sonia Sharma	1
2	<b>BATTLE OF AFGHANISTAN AND ITS MARK ON INTERNATIONAL SECURITY AND TRADE OVER THE DECADES</b> Dr. Sumanta Bhattacharya	6
3	<b>BENEFITS AND PITFALLS OF WORK FROM HOME DURING PANDEMIC IN MANGALURU</b> Dr. Neetu Suraj, Asha Priya Dsouza	11
4	<b>ROLE OF WOMEN IN THE ENTREPRENEURSHIP CONTEXT: A BRIEF LITERATURE STUDY</b> Mahanish Panda	21
5	<b>BIOMEDICAL INFORMATICS AND TRANSLATIONAL MEDICINE</b> Ramshankar Varma	27
6	<b>HUMANITARIAN MECHANISM IN THE CONTEXT OF HUMAN RIGHTS</b> Moumita De, Mousumi Mukherjee	34
7	<b>ANCHORING OF FURAN RESIN: GREENER ROUTE</b> Satish M. Chavan, Manjusha M. Kulkarni	41
8	<b>STATUS OF INCLUSIVE EDUCATION IN NATIONAL EDUCATION POLICY 2020, MAJOR PROVISIONS, MISSES AND REAL BENEFIT TO LEARNING</b> Mr. Anchal Saxena	57
9	<b>SCIENTIFIC WRITING: TECHNICAL WRITING TO COMMUNICATE SCIENCE</b> Dr. Meenakshi V. Rathi	63
10	<b>ROLE OF PEACE IN REDUCING CONFLICTS WITHOUT VIOLENCE AND TO BUILD HARMONIOUS RELATIONSHIPS</b> Sunita Devi	68
11	<b>INTERNET OF THINGS -APPLICATIONS</b> Vidhula Thomas , Sruthy K B	72
12	<b>A STUDY ON PROBLEMS FACED BY THE DOMESTIC WOMEN WORKERS IN INDIA</b> Bijay Das, Rina Adak	80



**ANCHORING OF FURAN RESIN: GREENER ROUTE****<sup>1</sup>Satish M. Chavan****<sup>2</sup>Manjusha M. Kulkarni**

<sup>1</sup>Department of Chemistry, G. E. Society's R. N. Chandak Arts, J. D. Bytco Commerce and N. S. Chandak Science College, Nashik-Road, Nashik, Maharashtra, India;

<sup>2</sup>Department of Chemistry, G. E. Society's R. N. Chandak Arts, J. D. Bytco Commerce and N. S. Chandak Science College, Nashik-Road, Nashik, Maharashtra, India;

**ABSTRACT**

Furan resins are the polymers prepared from various monomers of furan compounds such as furan, furfuryl alcohol, furfural, various furfural containing compounds such as 5-hydroxymethylfurfural (HMF), 5-methylfurfural, 2-furfurylacrylate and 2,5-furandicarboxylic acid via chain polymerization or polymerization condensation using green approach. Furan resins are derived from vegetable cellulose. The sources of vegetable cellulose include are corn cobs, sugarcane bagasse, oat hulls, paper mill by-products, biomass refinery eluents, cottonseed hulls, rice hulls, and foodstuffs such as saccharides and starch. The furan resins could be obtained in various forms such as Furan resin (FA), urea-formaldehyde-furan resin (UF-FA), phenol-formaldehyde-furan resin (PF-FA), urea-formaldehyde-phenol-furan resin (UF-PF-FA), resorcinol-furan resin (R-FA). These furan resins could be broadly classified as Polyesters, Polyamides, Polyurethanes Hydrogels, Furan-urea resins. Due to special properties of furan resins like corrosion resistance, high carbon yield and stability at elevated temperature, low fire hazard, and excellent physical strength, they found suitable for number of industrial applications.

**Keywords:** Furan resins, chain polymerization, polymerization condensation, Diels Alder route, furan polyester, greener route

**INTRODUCTION**

**Furan resins** are the well-known polymers that could be produced from furfuryl alcohol and furfural as the common starting materials [1]. The furan rings are not conjugated both in the furan resins and cured polyfurfurol. The free-flowing furan resins could be obtained from furan monomers with mild acid catalyst [2]. The ability of furfural to form resins was discovered by Stenhou [3] in 1840. The first furan-based resin was prepared in 1923. Early patents on furan resins reported by Claessen [4] in 1921 and by Stokes [5] in 1925 for synthetic resins (actually mixed phenol furan resins) suitable for use in molding gramophone records. The main advantages of furan resins are that they could be produced from natural sources-vegetable cellulose. Sources of vegetable cellulose includes corn cobs, sugarcane bagasse, oat hulls, paper mill by-products, biomass refinery eluents, cottonseed hulls, rice hulls, foodstuffs materials like saccharides and starch.

Various furan monomers viz. furan, furfural, furfuryl alcohol, 5-hydroxymethylfurfural (HMF), 5-methylfurfural, 2-furfurylmethacrylate, 2, 5-furandicarboxylic acid (2, 5-FDCA), bis-2, 5-hydroxymethylfuran are commonly employed for the production of furan resins [6, 7, 8].



conjugated furan chromophores of 5-[2-(5-methyl furylene vinylene)] furan carboxyaldehyde. The graft polymer can be photo crosslinked.

#### x) Other applications:

Furan resins are mainly used as chemical-resistant and high turbidity materials.

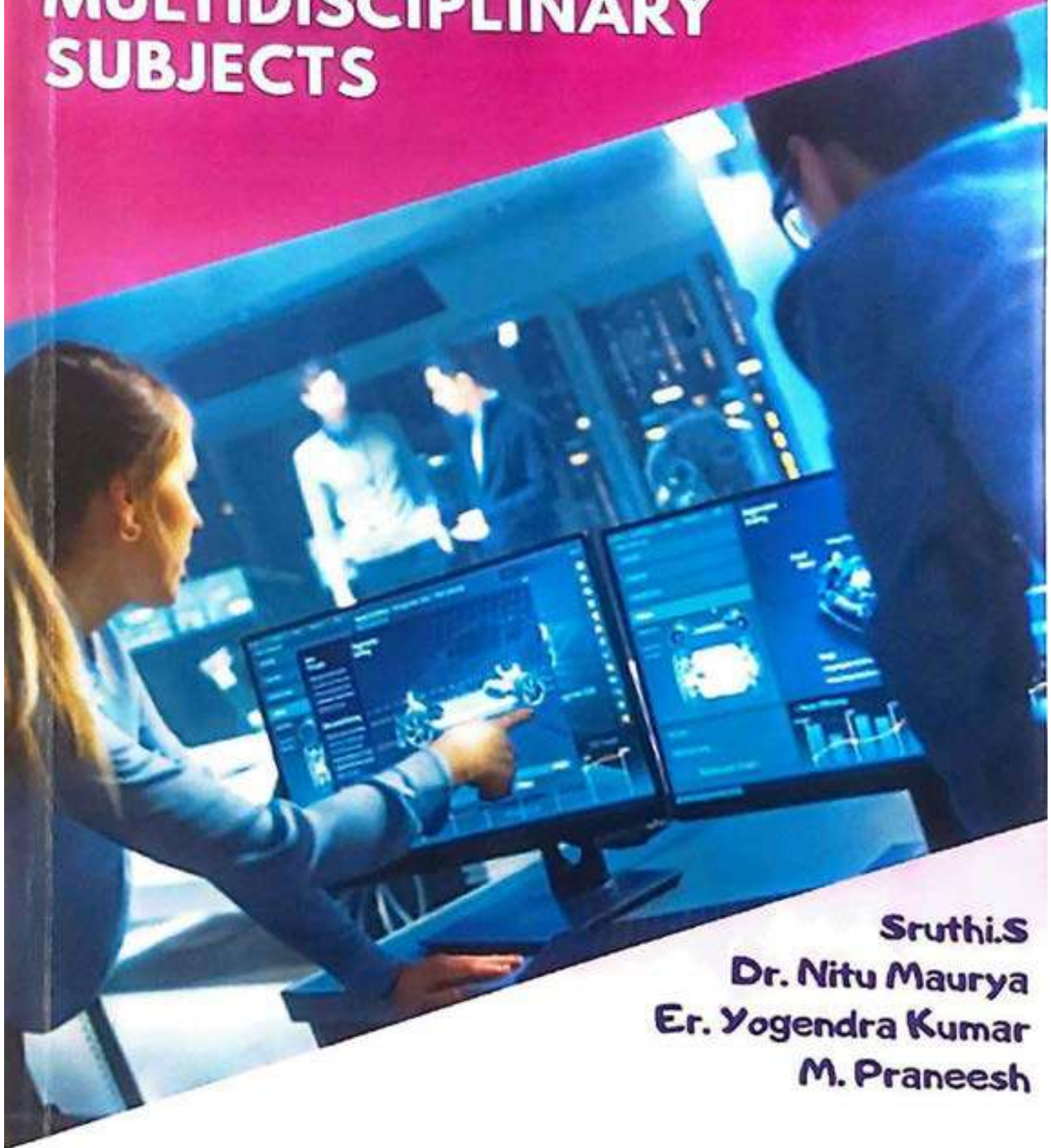
1. Chemical-resistant materials of furan resin available to prepare the corrosion resistant Putty used as lining or other corrosion-resistant material of chemical equipment.
2. Heat resistance of reinforced composites for furan glass fiber is higher than general phenol aldehyde glass fiber reinforced composites. Usually it can be the long-term use at about 150 °C.
3. Blending modification with epoxy or phenolic resin to make the furan resin mixed rest use with epoxy or phenolic resin. This improves furan glass fiber-reinforced composite material mechanical properties and process performance of preparation. This type of composite material has been widely used for the preparation of chemical reactor mixing devices, storage tanks, pipelines and other equipments.
4. Furan resins are widely used in the metallurgy and casting industries. It also applied to production of auto parts, plumbing, and tyre mould. The application of furan resin process modeling can access to good economic results.

#### REFERENCES

1. [Gandini, A. "Furans in polymer chemistry". Progress in Polymer Science. 1997, 22 (6), 1203–1379. doi:10.1016/S0079-6700(97)00004-X.
2. Choura, Mekki; Belgacem, Naceur M.; Gandini, Alessandro, *Macromolecules*, 1996, 29 (11), 3839–3850. doi:10.1021/ma951522f.
3. International Furan Chemicals B.V., Historical overview and industrial development. <<http://www.furan.com>>.
4. C. Claessen. Process for the treatment of wood or other substances containing cellulose for the purpose of obtaining cellulose and artificial resin, asphalt, lac and the like, GB Patent 160 482, March 17, 1921.
5. J.S. Stokes. Improvements in and relating to synthetic resin composition, GB Patent 243 470, December 3, 1925.
6. Taylor, T.J.; Kilmeyer, W.H.; Golino, C.M.; Rude, C.A. Emulsified furan resin based glass fiber binding compositions, process of binding glass fibers, and glass fiber compositions, US Patent 6077 883, Assigned to Johns Manville International, Inc., Denver, CO; QO Chemicals, Inc., West Lafayette, IN, June 20, 2000.
7. Fink, Johannes Karl, Ch.7 Furan Resins in *Reactive Polymers: Fundamentals and Applications: A Concise Guide to Industrial Polymers*, 3<sup>rd</sup> Edition, William Andrew, 2017, 203-215.
8. Goodman SH. *Handbook of thermoset plastics*. New Jersey, USA: William Andrew, 1998.
9. Chauhan, N.P.S. *J. Macromol. Sci. Pure Appl. Chem.* 2012, 49 (8), 655–665.
10. Mariusz Holtzer; Michal Kubecki; Rafal Dańko; Sylwia Żymankowska-Kumon. Research on the Influence of Moulding Sand with Furan Resin on the Environment, 4<sup>th</sup> International Symposium on High-Temperature Metallurgical Processing, TMS, 2013, 643-650. DOI: 10.1002/9781118663448.ch77
11. Amarasekara, Ananda S.; Ashfaqur Razaq, Paul Bonham. *ISRN Polymer Science*, 2013, Article ID 645169, 1-4. <http://dx.doi.org/10.1155/2013/645169>

**VOLUME-1**

# **RESEARCH TRENDS IN MULTIDISCIPLINARY SUBJECTS**



**Sruthi.S**  
**Dr. Nitu Maurya**  
**Er. Yogendra Kumar**  
**M. Praneesh**

**Archers & Elevators Publishing House**  
**www.aeph.in**



**ARCHERS & ELEVATORS PUBLISHING HOUSE**

No.54, MM Layout,

Hesaragatta Main Road,

Bangalore -560090

Mob: + 91 9164362263

E-mail: archerselevators@gmail.com

Website: www.aeph.in

**Research Trends in Multidisciplinary Subjects – Volume 1**

© Archers and Elevators Publishing House

First Edition 2021

**ISBN:** 978-93-90996-66-7

**Price: Rs 900/-**

All rights reserved. This book or parts therefore, may not be reproduced in any form or by any means, electronic or mechanical, including photocopying, recording or an information storage and retrieved system now known or to be invented, without written permission from copyright owners.

**PRINTED IN INDIA**

A& E printers, Bangalore-90.

## CONTENTS

S.NO	TITLE	PAGE NO
1	<b>PRESENT REGULATORS OF RURAL DEVELOPMENT IN INDIA: A REVIEW</b> Piyali Sarkar, Dr. Sonia Sharma	1
2	<b>BATTLE OF AFGHANISTAN AND IT'S MARK ON INTERNATIONAL SECURITY AND TRADE OVER THE DECADES</b> Dr. Sumanta Bhattacharya	6
3	<b>BENEFITS AND PITFALLS OF WORK FROM HOME DURING PANDEMIC IN MANGALURU</b> Dr. Neetu Suraj, Asha Priya Dsouza	11
4	<b>ROLE OF WOMEN IN THE ENTREPRENEURSHIP CONTEXT: A BRIEF LITERATURE STUDY</b> Mahanish Panda	21
5	<b>BIOMEDICAL INFORMATICS AND TRANSLATIONAL MEDICINE</b> Ramshankar Varma	27
6	<b>HUMANITARIAN MECHANISM IN THE CONTEXT OF HUMAN RIGHTS</b> Moumita De, Mousumi Mukherjee	34
7	<b>ANCHORING OF FURAN RESIN: GREENER ROUTE</b> Satish M. Chavan, Manjusha M. Kulkarni	41
8	<b>STATUS OF INCLUSIVE EDUCATION IN NATIONAL EDUCATION POLICY 2020, MAJOR PROVISIONS, MISSES AND REAL BENEFIT TO LEARNING</b> Mr. Anchal Saxena	57
9	<b>SCIENTIFIC WRITING: TECHNICAL WRITING TO COMMUNICATE SCIENCE</b> Dr. Meenakshi V. Rathi	63
10	<b>ROLE OF PEACE IN REDUCING CONFLICTS WITHOUT VIOLENCE AND TO BUILD HARMONIOUS RELATIONSHIPS</b> Sunita Devi	68
11	<b>INTERNET OF THINGS -APPLICATIONS</b> Vidhula Thomas , Sruthy K B	72
12	<b>A STUDY ON PROBLEMS FACED BY THE DOMESTIC WOMEN WORKERS IN INDIA</b> Bijay Das, Rina Adak	80



**ANCHORING OF FURAN RESIN: GREENER ROUTE****<sup>1</sup>Satish M. Chavan****<sup>2</sup>Manjusha M. Kulkarni**

<sup>1</sup>Department of Chemistry, G. E. Society's R. N. Chandak Arts, J. D. Bytco Commerce and N. S. Chandak Science College, Nashik-Road, Nashik, Maharashtra, India;

<sup>2</sup>Department of Chemistry, G. E. Society's R. N. Chandak Arts, J. D. Bytco Commerce and N. S. Chandak Science College, Nashik-Road, Nashik, Maharashtra, India;

**ABSTRACT**

Furan resins are the polymers prepared from various monomers of furan compounds such as furan, furfuryl alcohol, furfural, various furfural containing compounds such as 5-hydroxymethylfurfural (HMF), 5-methylfurfural, 2-furfurylacrylate and 2,5-furandicarboxylic acid via chain polymerization or polymerization condensation using green approach. Furan resins are derived from vegetable cellulose. The sources of vegetable cellulose include are corn cobs, sugarcane bagasse, oat hulls, paper mill by-products, biomass refinery eluents, cottonseed hulls, rice hulls, and foodstuffs such as saccharides and starch. The furan resins could be obtained in various forms such as Furan resin (FA), urea-formaldehyde-furan resin (UF-FA), phenol-formaldehyde-furan resin (PF-FA), urea-formaldehyde-phenol-furan resin (UF-PF-FA), resorcinol-furan resin (R-FA). These furan resins could be broadly classified as Polyesters, Polyamides, Polyurethanes Hydrogels, Furan-urea resins. Due to special properties of furan resins like corrosion resistance, high carbon yield and stability at elevated temperature, low fire hazard, and excellent physical strength, they found suitable for number of industrial applications.

**Keywords:** Furan resins, chain polymerization, polymerization condensation, Diels Alder route, furan polyester, greener route

**INTRODUCTION**

**Furan resins** are the well-known polymers that could be produced from furfuryl alcohol and furfural as the common starting materials [1]. The furan rings are not conjugated both in the furan resins and cured polyfurfurol. The free-flowing furan resins could be obtained from furan monomers with mild acid catalyst [2]. The ability of furfural to form resins was discovered by Stenhou [3] in 1840. The first furan-based resin was prepared in 1923. Early patents on furan resins reported by Claessen [4] in 1921 and by Stokes [5] in 1925 for synthetic resins (actually mixed phenol furan resins) suitable for use in molding gramophone records. The main advantages of furan resins are that they could be produced from natural sources-vegetable cellulose. Sources of vegetable cellulose includes corn cobs, sugarcane bagasse, oat hulls, paper mill by-products, biomass refinery eluents, cottonseed hulls, rice hulls, foodstuffs materials like saccharides and starch.

Various furan monomers viz. furan, furfural, furfuryl alcohol, 5-hydroxymethylfurfural (HMF), 5-methylfurfural, 2-furfurylmethacrylate, 2, 5-furandicarboxylic acid (2, 5-FDCA), bis-2, 5-hydroxymethylfuran are commonly employed for the production of furan resins [6, 7, 8].

conjugated furan chromophores of 5-[2-(5-methyl furylene vinylene)] furan carboxyaldehyde. The graft polymer can be photo crosslinked.

#### x) Other applications:

Furan resins are mainly used as chemical-resistant and high turbidity materials.

1. Chemical-resistant materials of furan resin available to prepare the corrosion resistant Putty used as lining or other corrosion-resistant material of chemical equipment.
2. Heat resistance of reinforced composites for furan glass fiber is higher than general phenol aldehyde glass fiber reinforced composites. Usually it can be the long-term use at about 150 °C.
3. Blending modification with epoxy or phenolic resin to make the furan resin mixed rest use with epoxy or phenolic resin. This improves furan glass fiber-reinforced composite material mechanical properties and process performance of preparation. This type of composite material has been widely used for the preparation of chemical reactor mixing devices, storage tanks, pipelines and other equipments.
4. Furan resins are widely used in the metallurgy and casting industries. It also applied to production of auto parts, plumbing, and tyre mould. The application of furan resin process modeling can access to good economic results.

#### REFERENCES

1. [Gandini, A. "Furans in polymer chemistry". Progress in Polymer Science. 1997, 22 (6), 1203–1379. doi:10.1016/S0079-6700(97)00004-X.
2. Choura, Mekki; Belgacem, Naceur M.; Gandini, Alessandro, *Macromolecules*, 1996, 29 (11), 3839–3850. doi:10.1021/ma951522f.
3. International Furan Chemicals B.V., Historical overview and industrial development. <<http://www.furan.com>>.
4. C. Claessen. Process for the treatment of wood or other substances containing cellulose for the purpose of obtaining cellulose and artificial resin, asphalt, lac and the like, GB Patent 160 482, March 17, 1921.
5. J.S. Stokes. Improvements in and relating to synthetic resin composition, GB Patent 243 470, December 3, 1925.
6. Taylor, T.J.; Kilmeyer, W.H.; Golino, C.M.; Rude, C.A. Emulsified furan resin based glass fiber binding compositions, process of binding glass fibers, and glass fiber compositions, US Patent 6077 883, Assigned to Johns Manville International, Inc., Denver, CO; QO Chemicals, Inc., West Lafayette, IN, June 20, 2000.
7. Fink, Johannes Karl, Ch.7 Furan Resins in *Reactive Polymers: Fundamentals and Applications: A Concise Guide to Industrial Polymers*, 3<sup>rd</sup> Edition, William Andrew, 2017, 203-215.
8. Goodman SH. *Handbook of thermoset plastics*. New Jersey, USA: William Andrew, 1998.
9. Chauhan, N.P.S. *J. Macromol. Sci. Pure Appl. Chem.* 2012, 49 (8), 655–665.
10. Mariusz Holtzer; Michal Kubecki; Rafal Dańko; Sylwia Żymankowska-Kumon. Research on the Influence of Moulding Sand with Furan Resin on the Environment, 4<sup>th</sup> International Symposium on High-Temperature Metallurgical Processing, TMS, 2013, 643-650. DOI: 10.1002/9781118663448.ch77
11. Amarasekara, Ananda S.; Ashfaqur Razaq, Paul Bonham. *ISRN Polymer Science*, 2013, Article ID 645169, 1-4. <http://dx.doi.org/10.1155/2013/645169>





# MULTIDISCIPLINARY RESEARCH

## VOLUME-3

Sruthi S  
Er. Harshwardhan Chandrakant Pandit,  
Dr. Pushpinder Kaur, Dr Anil Prakash Shrivastava,  
E. Fantin Irudaya Raj, **Dr. Satish M. Chavan**

real shine  
PUBLICATION



## ABOUT THE EDITORS



**Sruthi S.**, M.Com., NET, SET is working as Assistant Professor in Commerce at Gregorian College of Advanced Studies, Trivandrum. She had participated in more than 150 National and International Conferences and presented Research papers in 102 International/ National Conferences. She had published many Research Papers in National and International Books having ISBN and also in many International Peer Reviewed and Refereed Journals including UGC CARE listed and Scopus indexed Journals. She authored 3 academic books with ISBN. She received Global Educational Awards 2020 titled "Best Researcher" for remarkable achievements in the field of Research and Publications and also received Global Professionals- Educationalist Awards titled "International Star Excellence Award" in the year 2020 from Sarojini Research and Development Council, New Delhi. She edited more than 41 International and National Books having ISBN.



**Er. Harshwardhan Chandrakant Pandit** is educator, writer, researcher, engineer, policy maker and a management enthusiast. Currently working as Assistant Professor at Department of Technology, Shivaji University, Kolhapur. (Maharashtra). He works to promote innovation and entrepreneurship culture with design thinking amongst students through interdisciplinary research, quality education and innovative teaching- learning practices to address challenging issues and problems faced by different sectors of society by the application of efficient tools of engineering and technology.



**Dr. Pushpinder Kaur** is working as Assistant Professor in Chemistry at Sri Guru Gobind Singh College, Chandigarh. She did her PhD in Chemistry from CSIR-Institute of Himalayan Bioresource Technology, Palampur, Himachal Pradesh and post doctorate form CSIR-Institute of Microbial Technology, Chandigarh. Her area of specialization is chemical characterization of bioactive compounds from medicinal plants and the value addition of naturally abundant molecules. She has published 16 research papers in International journals and present her work in various national and international conferences. She has also been sanctioned three research projects from DST.



**Dr. Anil Prakash Shrivastava** has Doctorate in Education and NET in History. His area of expertise are Elementary Education, Teacher Education, History and Gandhian studies. He has awarded with Dharpal Senior Fellowship by Dharpal Shod pith, Dept. of Culture Govt, of MP. Earlier, to this he has worked as consultant for Teacher Education at EdCIL and represented MHRD in JRM Teacher Education. He also served as State Training officer MP for TESS India Project, Supported by MHRD and led by The Open University UK. Presently he is an Assistant Professor at IES College of Education, Bhopal MP



**E. Fantin Irudaya Raj** completed his BE degree in Electrical and Electronics Engineering, ME degree in Power Electronics and Drives, and currently pursuing his PhD degree from Anna University, Chennai. Presently, He is working as an Assistant Professor at Dr. Sivanthi Aditanar College of Engineering, Tamilnadu, India, and has more than ten years of teaching experience. He participated and presented his research ideas in more than 50 national and international conferences, published one book in the engineering series, contributed so many book chapters with various international publishers, and published more than 25 research articles in various international reputed journals. He is also acting as a reviewer for various international journals. Added to his credit, he is having five Indian patents and one International Patent. Furthermore, he received the Emerging Scientist Award, Research Excellence Award, and Young Researcher Award from reputed international organizations. His area of research includes Power Electronic Drives, the Internet of Things, Image Processing and Artificial Intelligence.



**Dr. Satish Chavan** is working as Associate Professor in Organic Chemistry at Gokhale Education Society's R.N.C. Arts, J.D.B. Commerce and N.S.C. Science College for over 16 years. He has over 20 years of teaching experience at undergraduate and 8 years of post-graduate teaching. He also has 5-6 years of research experience. He has completed two minor research projects and presented 10 papers in national and international conferences. He is recognized M.Phil. And Ph.D. research guide of Savitribai Phule Pune University. He has published more than 34 research papers in peer reviewed, refereed international journals devoted to organic synthesis.

red'shine  
Publication  
INDIA

RED'SHINE Publication Pvt. Ltd  
88-90 REDMAC, Navamuvada,  
Lunawada, Gujarat-389230  
Website: [www.redshine.co.in](http://www.redshine.co.in)  
Email: [info@redshine.in](mailto:info@redshine.in)  
Helpline: 0-76988 26988

₹ 800/-

eBook

ISBN 978-93-93239-23-5



Available on

kindle amazon goodreads Google Books



# MULTIDISCIPLINARY RESEARCH

VOLUME - 3

**Sruthi S**

**Er. Harshwardhan Chandrakant Pandit,  
Dr. Pushpinder Kaur, Dr Anil Prakash Shrivastava,  
E. Fantin Irudaya Raj, Dr. Satish M. Chavan**

**red'shine**  
Publication  
INDIA

## **MULTIDISCIPLINARY RESEARCH, VOLUME-3**

*by: Sruthi S, Er. Harshwardhan Chandrakant Pandit,*

*Dr. Pushpinder Kaur, Dr Anil Prakash Shrivastava, E. Fantin Irudaya Raj,*

*Dr. Satish M. Chavan*

### **RED'SHINE PUBLICATION PVT. LTD.**

Headquarters (India): 88-90 REDMAC, Navamuvada,

Lunawada, India-389 230

Contact: +91 76988 26988

Registration no. GJ31D0000034

*In Association with,*

**RED'MAC INTERNATIONAL PRESS & MEDIA. INC**

India | Sweden | UK

Text © *EDITOR*, 2021

Cover page ©RED'SHINE Studios, Inc, 2021

All rights reserved. No part of this publication may be reproduced or used in any form or by any means- photographic, electronic or mechanical, including photocopying, recording, taping, or information storage and retrieval systems- without the prior written permission of the author.

ISBN: 978-93-93239-23-5

ISBN-10: 9-39-323923-1

DIP: 18.10.9393239231

DOI: 10.25215/9393239231

Price: ₹ 800

December, 2021 (First Edition)

The views expressed by the authors in their articles, reviews etc. in this book are their own. The Editor, Publisher and owner are not responsible for them. All disputes concerning the publication shall be settled in the court at Lunawada.

[www.redshine.co.in](http://www.redshine.co.in) | [info@redshine.in](mailto:info@redshine.in)

Printed in India | Title ID: 9393239231





According to the New Revised Choice Based Credit System (CBCS) Syllabus of Savitribai Phule Pune University from June 2020

# INORGANIC & ORGANIC CHEMISTRY

**Dr. Satish Chavan, Dr. Meenakshi Rathi**



S.Y.B.Sc.

PAPER-II [CH-302] Semester-III

**Copyright © 2021 by Satish M. Chavan**

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted, in any form by any means, electronic, mechanical, magnetic, optical, chemical, manual, photocopying, recording or otherwise, without the prior written consent of its copyright holder indicated above.

**ISBN:** 978-93-90720-44-6

**Price:** ₹ 200.00

Publishing Year 2021

Published by:

**Sankalp Publication**

Head Office: Ring Road 2 Gaurav Path, Bilaspur,  
Chhattisgarh – 495001

Phones: +91 9111395888 +91 9111396888

Email: [support@sankalppublication.com](mailto:support@sankalppublication.com)

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



# Inorganic and Organic Chemistry

S.Y.B.Sc. PAPER-II [CH-302] Semester-III

**Dr. Satish M. Chavan**

**Dr. Meenakshi V. Rathi**



# Contents

<b>Sr.</b>	<b>Title</b>	<b>Page</b>
	Section I: Inorganic Chemistry	
<b>1</b>	Molecular Orbital Theory of Covalent Bonding	
<b>2</b>	Introduction to Coordination chemistry	
	Section II: Organic Chemistry	
<b>3</b>	Aromatic hydrocarbons	
<b>4</b>	Alkyl and Aryl Halides	
<b>5</b>	Alcohols, Phenols and Ethers	



This is the text book of Inorganic and Organic Chemistry S.Y.B. Sc PAPER-II [CH-302] Semester-III written for Second year B.Sc. students of Savitribai Phule Pune University according to New Revised Choice Based Credit System (CBCS) syllabus implemented from June 2020. This book written in easy and Lucid language to understand all concepts included in the syllabus. For self-study, exercise with short answer, brief answer, multiple choice questions (MCQs) are included.



**Dr. Satish Chavan (M.Sc. B.Ed. Ph.D. SET, NET)** is working as Associate Professor in Organic Chemistry at the G.E. Society's R.N.C. Arts, J.D.B. Commerce & N.S.C. Science College, Nashik-Road, Nashik. He has over 21 years of teaching experience to UG and PG classes with 6 years research experience. He has completed 2 research projects and published 34 research papers in peer reviewed, refereed international journals devoted to Organic Synthesis. He has presented more than 11 research papers in national and international conferences.



**Dr. Meenakshi Rathi (M.Sc. B.Ed. Ph.D. SET)** is working as Associate Professor in Organic Chemistry at the G.E. Society's R.N.C. Arts, J.D.B. Commerce & N.S.C. Science College, Nashik-Road, Nashik. She has over 21 years of teaching experience to UG and PG classes with 6 years research experience. She has completed 2 research projects and published 12 research papers in peer reviewed, refereed international journals devoted to Solution Chemistry. She has presented more than 11 research papers in national and international conferences.



[www.sankalppublication.com](http://www.sankalppublication.com)

Also available as an eBook

**ACADEMIC**

**INR 200/-**

ISBN 978-93-02220-44-4



9 789390 720448 >

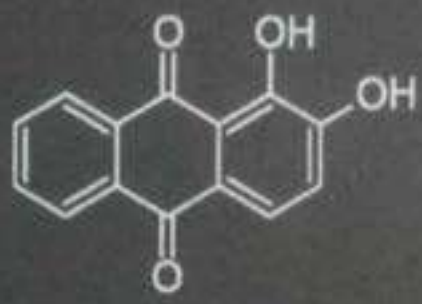
also available on



Google



# Modern Research in Chemical Studies



CHIEF EDITOR -  
DR. DHONDIRAM TUKARAM SAKHARE



*Volume - 1*



**Scripown**  
Publications



**Published by**  
**Scripown Publications,**  
**2nd Floor, 304 and 305,**  
**Pocket - 4 Sector - 22, Rohini,**  
**Delhi, 110086, India**  
**Email: scripownbooks@gmail.com**



# Modern Research in Chemical Studies

*(Volume - 1)*

**Chief Editor**

**Dr. Dhondiram Tukaram Sakhare**

Assistant professor & Research Guide, UG, PG & Research Centre,  
Department of Chemistry, Shivaji Arts, Comm. & Science College Kannad  
Dist. Aurangabad, Maharashtra, India.

**Scripown Publications**  
**New Delhi**



***Published By: Scripown Publications***

*Scripown Publications  
2nd Floor, 304 and 305, Pocket - 4,  
Sector - 22, Rohini, North West Delhi,  
Delhi, 110086, India*

***Chief Editor: Dr. Dhondiram Tukaram Sakhare***

*The author/publisher has attempted to trace and acknowledge the materials reproduced in this publication and apologize if permission and acknowledgements to publish in this form have not been given. If any material has not been acknowledged please write and let us know so that we may rectify it.*

***© Scripown Publications***

***Publication Year: 2021***

***Pages: 130***

***ISBN: 978-93-90833-47-4***

***Price: ₹930/-***

# Contents

S. No.	Chapters	Page No.
1.	The Importance of Computational Chemistry in Drug Discovery <i>Mahesh Vasava, Shital Thacker and Hitesh Patel</i>	01-14
2.	Synthesis of Schiff Bases and Biological Importance of Transition Metal Complexes <i>D. T. Sakhare</i>	15-30
3.	Bioactivity of Coumarin Derivatives and Its Methods of Composition <i>Dr. Y. Christabel Shaji, Dr. S. Ajith Sinthuja and B Jone Magadelin</i>	31-47
4.	Principles of Molecular Docking: An Overview of Diverse Toolkits and Their Functions <i>Dr Somashekhar Metri*, Basavraj Dashyal, Sammed Melvanki, Maharani B, Md Iliyas and Dr. R B Kotnal</i>	48-69
5.	Recent Development in Green Synthesis of Zinc Oxide and Titanium Dioxide Nanoparticles from Fruit Extracts: A Review <i>Sabhya Singh and Mahesh Vasava*</i>	70-90
6.	<b>Green Synthesis of 4-amino-2-oxo/thioxo-6-(substituted phenyl)-1,2-dihydropyrimidine-5-carbonitriles by using Triethylamine Hydrogen Sulfate [Et<sub>3</sub>NH] [HSO<sub>4</sub>] As an Efficient Ionic Liquid Catalyst</b> <i>Vishal U. Mane and Dhananjay V. Mane</i>	91-101
7.	Advancement of Nanotechnology in Smart Farming: A Review <i>Dr. Kamala Mitra</i>	102-113
8.	<b>Ayurvedic Perspective of Drug Action: A Review</b> <i>Beg Waseem Ahamad</i>	114-120
9.	The Impact of Rabeprazole drug as Corrosion Inhibitor on Mild Steel 1 M H <sub>2</sub> SO <sub>4</sub> <i>Pratap P. Kamble</i>	121-130



# Chapter - 6

## **Green Synthesis of 4-amino-2-oxo/thioxo-6-(substituted phenyl)-1,2-dihydropyrimidine-5-carbonitriles by using Triethylamine Hydrogen Sulfate [Et<sub>3</sub>NH] [HSO<sub>4</sub>] As an Efficient Ionic Liquid Catalyst**

**Vishal U. Mane**

Department of Chemistry, RNC Arts, JDB Commerce & NSC Science College, Nashik,  
Maharashtra, India  
Department of Chemistry, Shri Chhatrapati Shivaji College, Omerga, Dist. Osmanabad,  
Maharashtra, India

**Dhananjay V. Mane**

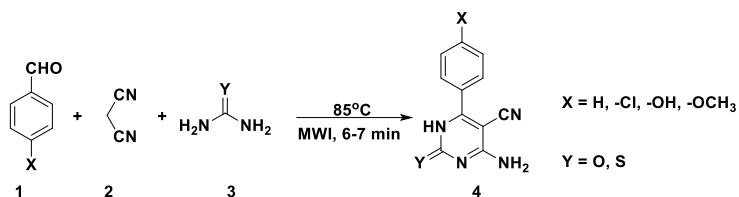
Department of Chemistry, Shri Chhatrapati Shivaji College, Omerga, Dist. Osmanabad,  
Maharashtra, India  
Yashwantrao Chavan Maharashtra Open University, Nashik, Maharashtra, India

### **Abstract**

The efficacy of Ionic Liquids (ILs) for the environmentally benign synthesis of heterocyclic compounds found important for due to their unique chemical and physical properties viz. low vapor pressure, recyclability, controlled miscibility, high thermal and chemical stability. The synthesis of 4-amino-2-oxo/thioxo-6-(substituted phenyl)-1, 2-dihydropyrimidine-5-carbonitriles were successfully synthesized from aromatic aldehydes, malononitrile and urea or thiourea by using triethylamine hydrogen sulphate [Et<sub>3</sub>NH] [HSO<sub>4</sub>] as ionic liquid catalyst under solvent free and microwave irradiation method. It was observed that the reaction was best finished when 20 mol% of [Et<sub>3</sub>NH] [HSO<sub>4</sub>] ionic liquid catalyst, solvent free and MWI conditions are utilized. Our method represents highly efficient, cheap reusable catalyst and environmentally benign greener protocol for the 4-amino-2-oxo/thioxo-6-(2-substituted phenyl) -1, 2- dihydropyrimidine-5-carbonitriles under solvent-free conditions.

**Keywords:** [Et<sub>3</sub>NH] [HSO<sub>4</sub>], environmentally benign, Solvent Free, oxo-pyrimidine thioxo-pyrimidine Microwave irradiation

## Graphical Abstract:



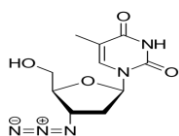
### Scheme 1: Synthesis of 4-amino-2-oxo/thioxo-6-(substituted phenyl)-1,2-dihydropyrimidine-5-carbonitriles

#### Introduction

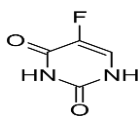
Ionic liquids (ILs) have taken the attention of the chemical community all over the globe as a green substitute option to traditional eco-friendly media for synthesis, catalysis, separation, and other several chemical tasks [1-7]. ILs include abundant exclusive properties, such as, nonvolatility, low toxicity, extensive liquid range, non-combustible, high thermal stability, excellent solubility, and recyclability [8]. ILs act as “neoteric solvents” for a wide range of industrial and chemical processes. In recent times, ILs have been formulating to be appreciated as environment friendly media for infinite organic revolutions [9, 10]. Moreover, multicomponent reactions (MCRs) are one of the more leading and practical challenges in organic synthesis for the formation of pharmacologically applicable frameworks from the point of view of green chemistry. MCRs give benefits of high yields, target specificity, atom economy, flexibility and specifically one-pot operation [11-13].

Pyrimidine derivatives have a great importance due to their different biological properties such as anticancer [14, 15] antitumor [16] analgesic [17] anti-inflammatory [18, 19] etc. The method commonly used for the synthesis of pyrimidines is the Biginelli reaction, which is a direct condensation of an aldehyde, keto ester, and thiourea/urea. This condensation is usually done by using heat in different solvents and in the presence of a catalyst [20-25]. Thus, the introduction of inexpensive, mild, dynamic and environmental friendly catalyst for significant MCRs superior to analogues of pharmaceutical and biological importance is in demand. In this paper, we have established [Et<sub>3</sub>NH] [HSO<sub>4</sub>] as ionic liquid catalysed the efficient Synthesis of 4-amino-2-oxo/thioxo-6-(substituted phenyl)-1,2-dihydropyrimidine-5-carbonitriles derivatives via one-pot multicomponent reactions under eco-friendly reaction conditions (Schemes 1)

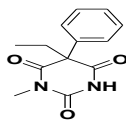




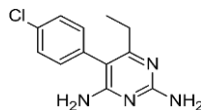
Zidovudine (ZDV)  
Azidothymidine (AZT)  
HIV/AIDS  
treatment



5  
Fluorouracil  
1  
(5-FU)  
(Adrucil)  
Anti-cancer



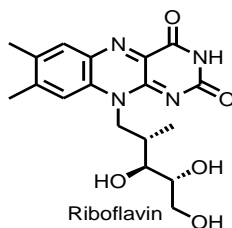
Methylphenobarbital  
(Mebaral, Mephyltaleten,  
Pemiton, Prominal)  
Anti-malarial



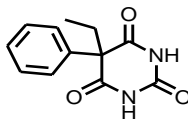
Pyrimethamine  
(Daraprim)  
Anti-malarial

**Fig 1:** Chemical structure of active pharmaceutical ingredients having pyrimidine pharmacophore

A vast number of titled heterocycles with significant pharmaceutical potential have been derived from usual sources. Few of them are currently used in clinical trials or as effective drugs. **(Fig.1) & (Fig.2)**



Riboflavin



Phenobarbital

**Fig 2:** Chemical structure of active pharmaceutical ingredients having pyrimidine pharmacophore

## Results and Discussion

To achieve optimized conditions protocol based on the reaction of aromatic aldehydes, (1) (1 mmol) malononitrile (2) (1 mmol) and urea or thiourea (3) (1 mmol) as model substrates, we checked different catalysts, solvents and, temperatures, and the results of this study are summarized in Table 1.

**Table 1:** Optimization of solvent<sup>a</sup>

Entry	Solvent	Time	Yield (%) <sup>b</sup>
1	Acetonitrile	40 min	50
2	DMF	40 min	62
3	Water	25 min	74
4	Ethanol	20 min	81
5	Solvent free	7 min	90

**<sup>a</sup>Reaction conditions:** Aldehyde (1mmol), malononitrile (1mmol), Urea/Thiourea (1mmol), and 20 mol% [Et<sub>3</sub>NH][HSO<sub>4</sub>] in MW at 85°C.  
<sup>b</sup>Isolated yield.

**Table 2:** Optimization of catalyst amount

Entry	Solvent	Time	Yield (%) <sup>b</sup>
1	Acetonitrile	40 min	50
2	DMF	40 min	62
3	Water	25 min	74
4	Ethanol	20 min	81
5	Solvent free	7 min	90

**Reaction conditions:** Aldehyde (1mmol), Malononitrile (1mmol), Urea/Thiourea (1mmol), and 20 mol% [Et<sub>3</sub>NH][HSO<sub>4</sub>] in MW at 85°C.

The model reaction was performed in various solvents to optimize the solvent model reaction. It was observed the excellent yield of products formed under solvent-free condition (Table 2).

Preliminary investigations showed that reaction best finished when 20 mol% [Et<sub>3</sub>NH][HSO<sub>4</sub>] catalyst was used under MWI. The model reaction was tried with 5, 10, 15, 20 and 25 mol% of catalyst and it was found that 20 mol% of catalyst sufficient to afford product in good yield (Table 2).

Moreover, we also studied the temperature effect on model reactions conferring to these study better results of the desired product when reaction carried at 85 °C (Table 3, entry 4). Detailed reaction conditions are shown in Table 3.

**Table 3:** Effect of temperature on the synthesis of **4** under solvent-free condition<sup>a</sup>

Entry	Solvent	Time	Yield (%) <sup>b</sup>
1	70	15	62
2	75	12	70
3	80	8	87
4	85	7	90

<sup>a</sup>Reaction conditions Aldehyde(1mmol), Malononitrile(1mmol), Urea/Thiourea(1mmol), and 20 mol% [Et<sub>3</sub>NH][HSO<sub>4</sub>] in MW at 85°C. <sup>b</sup>Reaction progress monitored by TLC. <sup>c</sup>Isolated yield.

A really excellent method to economic and greener preparation is recovery and recyclability of an ionic liquid. Therefore, we have to check the efficiency of catalyst after recover from the reaction media during the work-up procedure. When reaction is completed, then reaction mass was poured on ice cold water to obtained fine crystal of final 4-amino-2-oxo/thioxo-6-

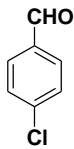
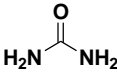
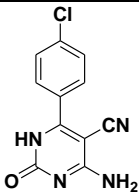
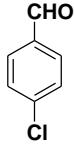
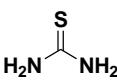
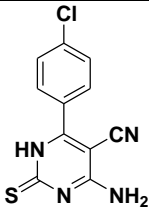
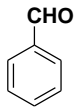
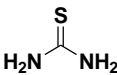
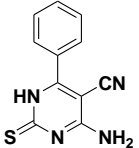
(substituted phenyl)-1,2-dihydropyrimidine-5-carbonitriles derivatives. In the last step removal of H<sub>2</sub>O from filtrate using reduced pressure to give viscous liquid, which is on cooling to give pure ionic liquid. Recovered catalysts were recycled for next four frequent cycles without significant loss in catalytic efficiency (Table 4).

**Table 4.** Reusability of [Et<sub>3</sub>NH][HSO<sub>4</sub>] ionic liquid for model reaction

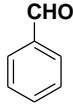
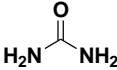
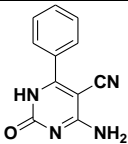
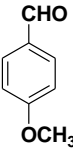
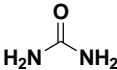
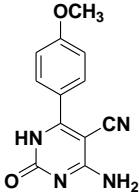
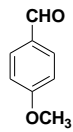
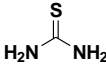
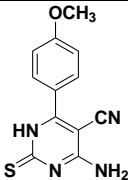
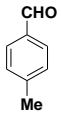
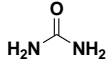
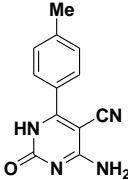
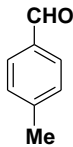
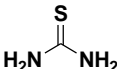
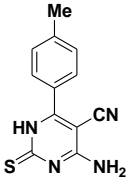
Entry	Run	Time <sup>a</sup> (min)	Yield <sup>b</sup>
1	fresh	7	90
2	2	7	90
3	3	7	87
4	4	7	85
5	5	7	82

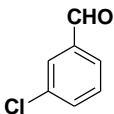
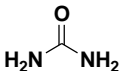
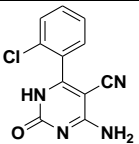
<sup>a</sup>Reaction progress monitored by TLC. <sup>b</sup>Isolated yield.

**Table 5:** Synthesis of 4-amino-2-oxo/thioxo-6-(substituted phenyl)-1,2-dihydropyrimidine-5-carbonitriles

Compound	Aldehyde	Urea/Thiourea	Product	Yield %	M.P.(°C)
4a				89	220-222 [21]
4b				90	218-220
4c				93	190-192



4d				90	212-214
4e				91	228-230
4f				87	206-208
4g				88	208-210
4h				87	220-222

4i				82	190-192
----	--	---	--	----	---------

<sup>a</sup>Reaction conditions: Aldehyde(1mmol), Malononitrile(1mmol), Urea/Thiourea(1mmol), and 20 mol% [Et<sub>3</sub>NH][HSO<sub>4</sub>] in MW at 85°C.

<sup>b</sup>Reaction progress monitored by TLC, <sup>c</sup>melting points.

## Experimental Section

**Materials and Methods.** All of the reagents used were of laboratory grade. Melting points of all of the synthesized analogues were taken in an open capillary tube and are uncorrected. The progress of the reaction was monitored by thin-layer chromatography on Merck's silica plates, and imaging was accomplished by iodine/ultraviolet light. <sup>1</sup>H NMR spectra were recorded with a Bruker AvIII HD-400 MHz spectrometer operating at 400 MHz using DMSO solvent and tetramethyl silane (TMS) as the internal standard and chemical shift in δ ppm. Chemical shifts (δ) are reported in parts per million using TMS as an internal standard. The splitting pattern abbreviations are designed as singlet (s); doublet (d); double doublet (dd); bs (broad singlet), triplet (t); quartet (q); and multiplets (m).

### General Procedure for Preparation of Triethylammonium Hydrogen Sulfate [Et<sub>3</sub>NH][HSO<sub>4</sub>]

Sulfuric acid (98%) (9.8 g, 0.1 mmol) was added dropwise into the triethylamine (10.1 g, 0.1 mmol) at 60 °C in 1 h. After the addition, the reaction mixture was stirred for an additional period of 1 h at 70 °C to ensure that the reaction had proceeded to completion. Then, the traces of water were removed by heating at 80 °C in a high vacuum until the weight of the residue remained constant. The yield of [Et<sub>3</sub>NH] [HSO<sub>4</sub>] was 99% (19.8 g). <sup>1</sup>H NMR (DMSO): δ (ppm) 1.17 (t, 3H), 3.11 (m, 2H), 8.90 (s, 1H).

### General Procedure for Synthesis 4-amino-2-oxo/thioxo-6-(substituted phenyl)-1,2-dihydropyrimidine-5-carbonitriles

A mixture of Aldehyde (1mmol), Malononitrile (1mmol), Urea/Thiourea (1mmol), and 20 mol% [Et<sub>3</sub>NH] [HSO<sub>4</sub>] in MW at 85°C. under microwave irradiations; the progress of reaction was supervised by thin-layer chromatography [ethyl acetate/*n*-hexane (3:7)] as a solvent after a stirring reaction mixture was cooled for 15 min and a poured on crushed ice. (Table

- accumulation of plastid pigments and phenolic compounds of scots pine seedlings (*Pinus sylvestris* L.). *Biotechnologia Acta*. 2017; 10 (5). <https://doi.org/10.15407/biotech10.05.063>.
21. Lin, S.S., Shen, S.L., Zhou, A., Lyu, H.M., 2020. Assessment and management of lake eutrophication: a case study in Lake Erhai, China. *Science of the Total Environment*. 141618. <https://doi.org/10.1016/j.scitotenv.2020.141618>.
  22. Kah, M., 2015. Nanopesticides and nanofertilizers: emerging contaminants or opportunities for risk mitigation? *Front. Chem.* 3, 64. <https://doi.org/10.3389/fchem.2015.00064>.  
(Ali *et al.*, 2021b, 2021c).repeat
  23. Dhewa, T., Nanotechnology applications in agriculture: an update. *Octa Journal of Environmental Research*. 2015. 3, 204–211.
  24. Ma, X., Geiser-Lee, J., Deng, Y., Kolmakov, A., Interactions between engineered nanoparticles (ENPs) and plants: phytotoxicity, uptake and accumulation. *Science of the Total Environment*. 2010; 408 (16), 3053–3061. <https://doi.org/10.1016/j.scitotenv.2010.03.031>.
  25. Subramanian, A., Irudayaraj, J., Ryan, T., A mixed self-assembled monolayer-based surface plasmon immunosensor for detection of *E. coli* O157: H7. *Biosensors and Bioelectronics*. 2006; (7), 998–1006 <https://doi.org/10.1016/j.bios.2005.03.007>
  26. Yuan, J., Chen, Y., Li, H., Lu, J., Zhao, H., Liu, M., Nechitaylo, G.S., Glushchenko, N.N., New insights into the cellular responses to iron nanoparticles in *Capsicum annuum*. *Scientific Reports*. 2018; 8, 3228. <https://doi.org/10.1038/s41598-017-18055-w>.
  27. Srivastava, G., Das, C.K., Das, A., Singh, S.K., Roy, M., Kim, H., Sethy, N., Kumar, A., Sharma, R.K., Singh, S.K., Philip, D., Seed treatment with iron pyrite (FeS<sub>2</sub>) nanoparticles increases the production of spinach. *RSC Advances*. 2014; 4, 58495–58504. <https://doi.org/10.1039/c4ra06861k>.
  28. Jangir, H., Das, C.K., Kumar, J., Mahapatra, S.S., Srivastava, G., Bhardwaj, A., Das, M., Nano pyrite (FeS<sub>2</sub>) root priming enhances chilli and marigold production in nutrients-deficient soil: a nano strategy for fertiliser tuning. *Applied Nanoscience*. 2019; 9, 327–340. <https://doi.org/10.1007/s13204-018-00943-w>.
  29. Damalas, C.A., Koutroubas, S.D., Current status and recent



- developments in biopesticide use. *Agriculture* 2018; 8, 13. <https://doi.org/10.3390/agriculture8010013>.
30. Nuruzzaman, M., Liu, Y., Rahman, M.M., Dharmarajan, R., Duan, L., Uddin, A.F.M.J., Naidu, R., Nanobiopesticides: composition and preparation methods. *Nanobiopesticides Today and Future Perspectives*. Academic Press, 2019. 69–131 <https://doi.org/10.1016/B978-0-12-815829-6.00004-8>.
  31. Gašić, S., Tanović, B., Biopesticide formulations, possibility of application and future trends. *Pesticidi i fitomedicina*. 2013; 28 (2), 97–102. <https://doi.org/10.2298/PIF1302097G>.
  32. Balaure, P.C., Gudovan, D., Gudovan, I., Nanopesticides: a newparadigmin crop protection. *New Pesticides and Soil Sensors*. Academic Press, 2017. 129–192 <https://doi.org/10.1016/B978-0-12-804299-1.00005-9>.
  33. Athanassiou, C.G., Kavallieratos, N.G., Benelli, G., Losic, D., Rani, P.U., Desneux, N., Nanoparticles for pest control: current status and future perspectives. *Journal of Pest Science*. 2018; 91, 1–15. <https://doi.org/10.1007/s10340-017-0898-0>.
  34. Bhan, S., Mohan, L., Srivastava, C.N., Nanopesticides: a recent novel ecofriendly approach in insect pest management. *Journal of Entomological Research*. 2018; 42 (2), 263–270. <https://doi.org/10.5958/0974-4576.2018.00044.0>.
  35. Le, V.T., Bach, L.G., Pham, T.T., Le, N.T.T., Ngoc, U.T.P., Tran, D.H.N., Nguyen, D.H., 2019. Synthesis and antifungal activity of chitosan-silver nanocomposite synergize fungicide against *Phytophthora capsici*. *Journal of Macromolecular Science, Part A*. 56, 522–528. <https://doi.org/10.1080/10601325.2019.1586439>.
  36. Gomathi, T., Rajeshwari, K., Kanchana, V., Sudha, P.N., Parthasarathy, K., Impact of nanoparticle shape, size, and properties of the sustainable nanocomposites. *Sustainable Polymer Composites and Nanocomposites*. Springer, Cham, 2019. 313–336 [https://doi.org/10.1007/978-3-030-05399-4\\_11](https://doi.org/10.1007/978-3-030-05399-4_11).
  37. Jafarizadeh, H., Sayyar, Z., Anarjan, N., Berenjian, A., *Nanobiotechnology in Food: Concepts, Applications and Perspectives*. Springer. 2019.
  38. Inbaraj, B.S., Chen, B.H., Nanomaterial-based sensors for detection of foodborne bacterial pathogens and toxins as well as pork adulteration in

- meat products. *Journal of Food and Drug Analysis*. 2016.; 24, 15–28. <https://doi.org/10.1016/j.jfda.2015.05.001>.
39. Omanović-Miklićanina, E., Maksimović, M., Nanosensors applications in agriculture and food industry. *Bulletin of the Chemists and Technologists of Bosnia and Herzegovina* 2016; 47, 59–70.
  40. Bishnoi, A., Rajaraman, T.S., Dube, C.L., Ambegaonkar, N.J., Smart nanosensors for textiles: an introduction. *Nanosensors and Nanodevices for Smart Multifunctional Textiles*. Elsevier, 2021. 7–25 <https://doi.org/10.1016/B978-0-12-820777-2.00002-9>.
  41. Ganeshkumar, R., Sopiha, K.V., Wu, P., Cheah, C.W., Zhao, R., Ferroelectric  $\text{KNbO}_3$  nanofibers: synthesis, characterization and their application as a humidity nanosensor. *Nanotechnology* 2016; 27, 395607.
  42. Norouzi, P., Shahabi, S., Aghazadeh, M., Larijani, B., Ghaheri, N., A novel admittometric sensor for determination of theophylline using FFT coulometric admittance voltammetry and flow injection analysis. *International Journal of Electrochemical Science*. 2017; 12 (11),10057–10070. <https://doi.org/10.20964/2017.11.90>.
  43. Ghodsi, J., Rafati, A.A., A novel molecularly imprinted sensor for imidacloprid pesticide based on poly (levodopa) electro-polymerized/ $\text{TiO}_2$  nanoparticles composite. *Analytical and Bioanalytical Chemistry*. 2018; 410, 7621–7633. <https://doi.org/10.1007/s00216-018-1372-4>.
  44. Onaga, G., Wydra, K., 2016. Advances in plant tolerance to abiotic stresses. In: Abdurakhmonov, I.Y. (Ed.), *Plant Genomics*. InTech, Rijeka, Croatia, pp. 167–228.
  45. Torabian, S., Zahedi, M., Khoshgoftar, A.H., Effects of foliar spray of nano-particles of  $\text{FeSO}_4$  on the growth and ion content of sunflower under saline condition. *Journal of Plant Nutrition*. 2017; 40 (5), 615–623. <https://doi.org/10.1080/01904167.2016.1240187>.
  46. Shalaby, T.A., Bayoumi, Y., Abdalla, N., Taha, H., Alshaal, T., Shehata, S., Amer, M., Domokos-Szabolcsy, É., El-Ramady, H., Nanoparticles, soils, plants and sustainable agriculture. *Nanoscience in Food and Agriculture*. vol. 1. Springer, Cham, 2016. 283–312. [https://doi.org/10.1007/978-3-319-39303-2\\_10](https://doi.org/10.1007/978-3-319-39303-2_10).
  47. Lu, L., Huang, M., Huang, Y., Corvini, P.F.X., Ji, R., Zhao, L.,  $\text{Mn}_3\text{O}_4$  nanozymes boost endogenous antioxidant metabolites in cucumber

(Cucumis sativus) plant and enhance resistance to salinity stress.  
Environmental Science: Nano. 2020; 7 (6), 1692–1703.  
<https://doi.org/10.1039/d0en00214c>.



# Chapter - 8

## Ayurvedic Perspective of Drug Action: A Review

Beg Waseem Ahamad

Department of Chemistry, RNC Arts, JDB Commerce & NSC Science College, Nashik,  
Maharashtra, India

### Abstract:

Natural products have played an important role in the development of the current level of knowledge about drugs used in medicine with the help of chemical sciences. Ayurveda is an ancient science of medicine which mainly uses natural products as medicine. Like medicinal chemistry, Ayurveda also believes that action of drug is completely dependent on its constitutional structure. Without any advanced technology, Ayurveda is able to treat a variety of conditions with the method of drug selection with only limited knowledge resources. Ayurveda also uses methods to change the action of drug positively to enhance the action and to minimise the adverse effects. Though a lot of work has been done regarding the action of natural products, some areas remain untouched. Hence it is an effort to review drug action as per Ayurveda.

**Keywords:** Ayurveda, Chemistry, Drug Action, Guna

### Introduction

Chemistry has made major contributions to the modern health care system as the activity of any compound is reflected in their molecular structure. We can see that similar molecules have similar activities. Medicinal chemistry has passed the long journey from the retrospective study of natural products to development of completely new target specific molecules. Throughout our evolution, the importance of natural products for medicine & health has been enormous. Ayurveda, the ancient Indian system of medicine, is well known for its use of natural products. Ayurvedic texts describe hundreds of drugs of different origins like plants, animals, mineral & marine <sup>[1]</sup>. Their medicinal uses, properties, uses, toxicology are also described in some details. Ayurveda also has also tried to describe the rationale behind their properties. It is interesting to see that Ayurveda also believes that properties of drugs are a product of its constitutional structure <sup>[2]</sup>.

## **Basic principle of Drug action:**

The most basic principle for drug action as per Ayurveda is Samanya Vishesh Sidhanta <sup>[3]</sup> (Principle of similarity and difference). It simply says that when two same substances come together they will increase the effective volume. Similarly when two different substances with same property or function come together, it will result in an increase in the effective property or function. On the other hand, when two opposite substances come together it will result in decrease in effective volume and when two different substances with opposite properties or function come together, it will result in a complete or partial loss of effective property or function. So on what basis similarity and difference are calculated?

Ayurveda says that all substances including living and non-living things in the universe are made up of only 5 basic elements. Those are Aakash, Vayu, Teja, Jala, Prithvi. They all have their particular properties and functions. Hence when two or more substances merged, similarity or difference in their elements, properties and functions will be altered accordingly.

## **Constitution of substance according to Ayurveda:**

Five subtle particles, come together to form five elements i.e. Panchamahabhuta namely Aakash, Vayu, Teja, Jala, Prithvi. These five elements again combine together to form the basic unit of any object or drug. The proportion of elements is different in different drugs. The drug shows properties of element or elements which are present in larger amounts. Infinite permutation & combinations of elements can produce infinite drugs with different properties <sup>[4]</sup>.

Like drugs, our body is also composed of these five elements only [5]. Hence due to this similarity drugs can affect the body positively or negatively depending on the use. Hence it is advised to use drugs judiciously to avail positive effects only or with minimum adverse effects. The combination of elements gives rise to unique physical and biological properties of the drug. For example, drugs with Prithvi Mahabhuta as a major constituent show heavy, hard, dry, properties And will increase similar properties in the body. In a way the drugs will target the organs or systems that are made of mainly Prithvi Mahabhuta like muscles & bones. Below chart will give more details about what properties each element can show and body parts with similar elemental constitution.

**Table 1:** Mahabhuta, their properties, body constituents and functions:

<b>Mahabhuta</b>	<b>Properties</b> <sup>[6]</sup>	<b>Body Constituents and Functions</b> <sup>[6, 7]</sup>
Akash	Clear, light, subtle, soft, smooth	Sound, auditory sensation, lightness, fineness and space, hollow parts, Vaata Dosha
Vayu	Light, Cold, Dry, Rough, Non-slimy, Fine, subtle, Unstable	Tangibility, sense of touch, roughness, impulsion, structuring of body tissues and maintaining of movements of the body, Vaata Dosha
Teja	Hot, Sharp, Subtle, Light, Dry, Rough, non-slimy,	Visible form, vision, brightness, digestion and heat, Pitta Dosha
Jala	Liquid, Cold, Unctuous, Slow, Soft, thick, Slimy, Flowy	Taste, sense of taste, coldness, softness, unctuousness and moisture, Kapha And Pitta Dosh
Prithvi	Heavy, Hard, Rough, Stable, Thick, Gross	Odor, sensation of smell, heaviness, steadiness and material form, Kapha Dosh

### **Tridosha Theory**

For some reasons Ayurveda does not directly talk in the language of Mahabhuta while describing disease process or drug action. It mainly speaks in the Language of TriDosh (Three Offenders of Body). They are namely Vaata Dosh, Pitta Dosh, Kapha Dosh. These are again made up of combinations of Mahabhuta only. They also show properties similar to their constitution only.

**Table 2:** Mahabhuta Constitution and properties of Dosh

<b>Dosha</b>	<b>Mahabhuta constitution</b> <sup>[8]</sup>	<b>Properties</b> <sup>[9]</sup>
Vaata	Akash and Vayu	Dry, Light, Cold, Rough, Subtle, Unstable
Pitta	Agni and Jala	Hot, Sharp, Some Slimy, Flowy, Subtle, Stinky, Light, Liquid
Kapha	Prithvi and Jala	Slimy, Cold, Heavy, Slow, Smooth, Stable

### **Guna (Properties) Theory:**

In the above discussion we already see that properties play an important role in understanding action of substance, because only properties are perceptible. And we know or identify any substance only through its properties like color, shape and other physical and chemical properties. Hence understanding the constitution of a drug is only possible with the knowledge of its properties. So we mainly relate properties with their functions which are solely dependent on the constitution of the substance.

For diagnosis and etiopathogenesis also Ayurveda uses language of Guna



# कृषी विपणन

Agricultural Marketing



प्रा. डॉ. साहेबराव दौलतराव निकम

# लेखक परिचय



प्रा. डॉ. साहेबराव दौलतराव निकम

(M.Com, B.Ed, S.E.T, G.D.C & A, Ph.D)

प्रा. डॉ. साहेबराव दौलतराव निकम आर . एन . सी . कला, जे. डी. बी. वाणिज्य आणि एम . एस . सी . विज्ञान महाविद्यालय, नाशिक रोड, नाशिक येथे अकॅडन्सी विभागाचे विभागप्रमुख म्हणून कार्यरत.

वरिष्ठ महाविद्यालयातील अध्यापनाचा २१ वर्षांचा अनुभव यापैकी १७ वर्षे महाराष्ट्रातील नामांकित अशा बी. वाय. के. कॉलेज ऑफ कॉमर्स, नाशिक येथे वाणिज्य विद्याशाखेतील विविध विषयांच्या अध्यापनाचा अनुभव.

वाणिज्य विद्याशाखेअंतर्गत 'नाशिक जिल्ह्यातील टोमॅटो विपणन प्रक्रियेचे विश्लेषणात्मक अध्ययन' या विषयावर प्रा. डॉ. एस. एम. जोशी यांच्या मार्गदर्शनाखाली सावित्रीबाई फुले पुणे विद्यापीठ, पुणे यांचे मार्फत विद्यावाचरपती (Ph-D) पदवी प्रदान. राष्ट्रीय व आंतरराष्ट्रीय पातळीवर विविध संशोधन जर्नल्समध्ये ३२ पेक्षा अधिक शोधनिबंध प्रकाशित, राष्ट्रीय व आंतरराष्ट्रीय पातळीवर अनेक वर्धासत्र, परिषदा कार्यशाळा यातून सहभागी आणि अनेक शोधनिबंधांचे सादरीकरण.

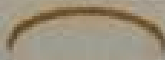
डॉ. निकम यांचे कट्टे 'सेट-नेट' चे मार्गदर्शन घेऊन अनेक विद्यार्थी या परीक्षा उत्तीर्ण झाले. बी. वाय. के. कॉलेज ऑफ कॉमर्सच्या राष्ट्रीय सेवा योजनेचे मुख्य कार्यक्रमाधिकारी म्हणून ०९ वर्षे कामाचा अनुभव. या माध्यमातून १० रत्नदान शिबिरांचे आयोजन, ४५०० पेक्षा अधिक वृक्षांचे वृक्षारोपण, विद्यार्थ्यांसाठी सुमारे ०९ व्याख्यानमालांचे आयोजन. योगा प्रशिक्षण कार्यक्रम, मोफत झोळे तपासणी शिबिरांचे आयोजन, विविध विषयांवरील व्याख्यानांचे आयोजन याशिवाय परिसर स्वच्छता तसेच लोकप्रबोधनासाठी विविध सांस्कृतिक कार्यक्रमांसह सामाजिक व राष्ट्रीय विकासाच्या विविध कार्यक्रमांचे मोठ्या प्रमाणावर आयोजन तसेच राष्ट्रीय शिबिरात टिम लिडर म्हणून पुणे विद्यापीठाचे प्रातिनिधित्व केले.

आजतागायत केलेल्या सामाजिक, शैक्षणिक व राष्ट्र हिताच्या कार्यांमुळे युवाशक्ती सामाजिक संस्थेच्या वतीने 'राष्ट्रीय प्रबोधन पुरस्कार २०१२' ने सन्मानित, वृत्तपत्र लेखक संघटना नाशिक यांच्या वतीने राज्यपातळीवरील 'गोदारत्न' पुरस्काराने सन्मानित, श्री कालिका मंदीर संस्थान ट्रस्ट यांच्या वतीने दिल्या जाणाऱ्या 'आदर्श शिदाक' पुरस्काराने सन्मानित.

विविध महाविद्यालये, सामाजिक व इतर कार्यक्रमांतून विद्यार्थीहित तसेच समाज प्रबोधन पर ३० पेक्षा अधिक व्याख्याने दिली.

इंडियन इकॉनॉमिक असोसिएशन, मराठी अर्थशास्त्र परिषद या संस्थांचे आजीव सदस्य.

Published by



.com

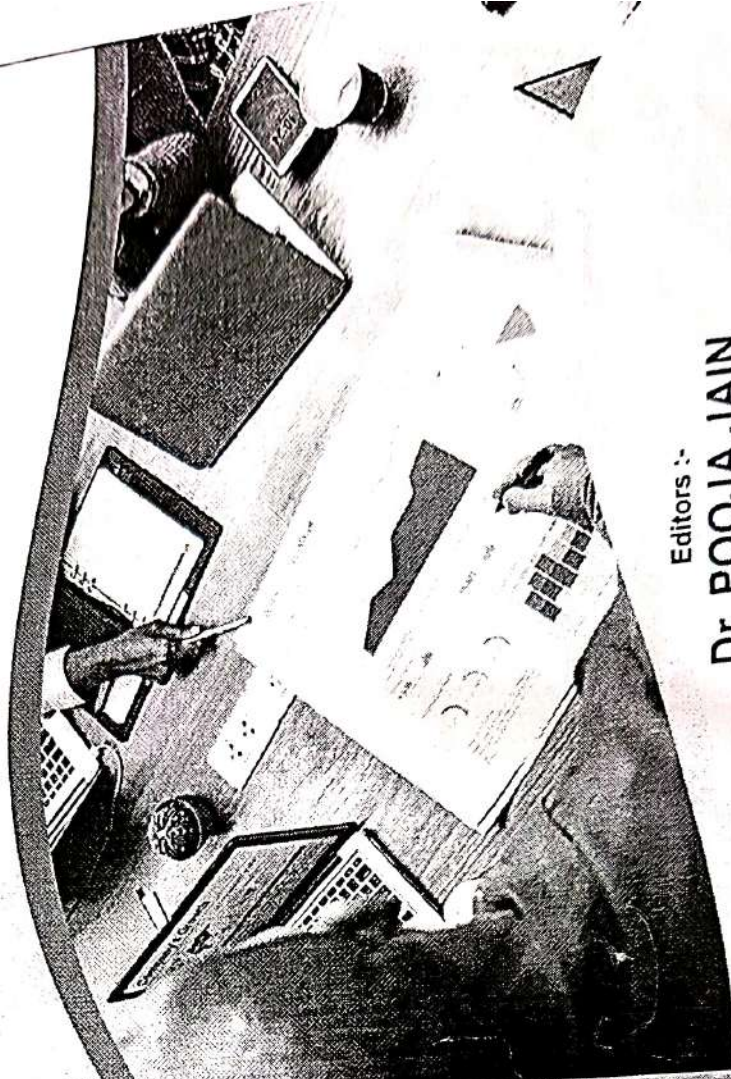
3181, Hillsborough St.  
Raleigh, NC 27607,  
United States



9 781716 200762



# EMERGING PARADIGM IN MANAGEMENT RESEARCH-INDUSTRY 4.0



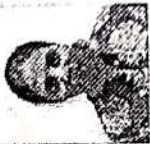
Editors :-

**Dr. POOJA JAIN**  
**Dr. KULDEEP AGNIHOTRI**

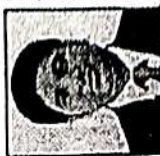
EMERGING PARADIGM IN MANAGEMENT RESEARCH-INDUSTRY 4.0

Editors :- Dr. POOJA JAIN, Dr. KULDEEP AGNIHOTRI

## About the Author



Dr. Pooja Jain is currently working as Asst. Professor in International Institute of Professional Studies, Devi Ahilya Vishwavidyalaya, Indore, India. She has earned a Ph.D. Degree in Management and Master's Degrees in Marketing Management as well as is Advertising and Public Relations Management. She has academic experience of 17 years. Her Areas of Interest are Marketing Management, Consumer Behavior, Marketing Research, Workplace Spirituality and Indian Ethos in Management. She has a number of Indian Patents, research publications in various reputed journals and also best research awards to her credit. She has also been a professional trainer and has imparted training at various organizations such as MP Police and Army War Colleges.



Dr. Kuldeep Agnihotri, is an Associate Professor & HoD in the Department of Management and Commerce at Modern Group of Institutions, Indore (M.P.). His Area of Expertise is Accounting, Finance, Corporate Law's and Taxation. He is Having More Than 16 Years of Work Experience Including 14 Years of Academics in Post Graduate and Undergraduate Courses and 02 Years of Corporate Experience as well. He has done his Ph.D. in Commerce From Devi Ahilya University, Indore (M.P.), MBA With Specialization in (Finance & Marketing), M.Com. with Specialization in Accounting From Dr. H.S. Gour Central University, Sagar (M.P.), B.Ed., COA From ICWAI Kolkata, FDP (IIT-Delhi). He has Participated and Presented Research Papers in Many International and National Conferences/Seminars. He has more than 30 Publications to his credit and his Research Papers Published in Research Journals of National and International Repute. He has Authored of 08 Text Books and 06 Edited Books. He has 20 (Twenty) Indian Patents Published in his credit including a German (International) Patent Granted. He is a Registered Ph.D. Research Guide at Devi Ahilya University, Indore. He has Attended Many National and International Level Workshops/Seminars /FDP's etc. He has been Honored with various prestigious awards by RFI & WFST California (USA) and other Academic Institutions for his Academic Achievements. He is Editorial Board Member of Many National & International Journals.

Published & Printed By :-

**NITYA**  
PUBLICATIONS

Copyright © Dr. Pooja Jain

Nitya Publications, Bhopal MP India  
Web: [www.nityapublications.com](http://www.nityapublications.com)  
Email: [info@nityapublications.com](mailto:info@nityapublications.com)  
Mob.: +91-9009291840

MRP Rs. 299.00





**EMERGING PARADIGM IN  
MANAGEMENT RESEARCH-INDUSTRY  
4.0**

**Editors**

**Dr. POOJA JAIN  
Dr. KULDEEP AGNIHOTRI**

**Nitya Publications, Bhopal**

# List of Contents

1	<b>Banking Industry 4.0 - Study Of E-Banking Service Quality In Private Sector Banks</b>	01
	<i>Anamika Agrawal, Mohit Surana,</i>	
2	<b>Industry 4.0 - A Case Study Of Kalisindh Thermal Power Project</b>	16
	<i>Dr. Reeta, Dr. Pooja Jain</i>	
3	<b>Hologram Technology Effective For Live Advertising</b>	25
	<i>Priyanshi Bairagi, Dr. Kirti Mathur</i>	
4	<b>Supply Chain Disruptions In A Globalized World</b>	38
	<i>Nabhjyot Arora</i>	
5	<b>A Study of the Efficacy of Financial System in India for Inclusive Economy in Fourth Industrial Revolution</b>	47
	<i>Ms. Ashvini Tomar, Dr. Neha Chouhan</i>	
6	<b>Economic Feasibility Of Private Health Care Services In India- A Case Study</b>	59
	<i>Ms. Ashvini Tomar, Dr. Kuldeep Agnihotri</i>	
7	<b>New Strategies Used In Business And Management</b>	81
	<i>Vijay M. Sukate</i>	
8	<b>"Human Resource Management Behavior And Employee Satisfaction Level Towards Private Banking Sector"</b>	88
	<i>(With Special Reference To Indore City Of Madhya Pradesh)</i>	
	<i>Dr. Pawan Tiwari</i>	
9	<b>Factors Affecting Employee Retention In It Industry</b>	100
	<i>Dr. Meenal Agrawal , Dr. Preeti Naik</i>	
10	<b>MSME in India : Post Covid Impact</b>	108
	<i>Dr. (CA) Ankita Jain</i>	



# NEW STRATEGIES USED IN BUSINESS AND MANAGEMENT

Vijay M. Sukate

Asst. Professor. Department of Commerce UG and PG , RNC  
Art's, JDB commerce and NSC Science College, Nashik.  
Affiliated to Savitribai Phule Pune University ,Pune (M.H.)

## ABSTRACT

This research paper is based on the secondary information material. This research paper provides nautical analysis of the various types of new strategies and how they are managed or attempts to conduct descriptive or theoretical studies. Buying and selling goods is a trade or a business. The type of trade and its management before the industrial revolution was very different from modern times, and the development of technology after the industrial revolution led to major changes in the form and method of trade and its management, and in the 21<sup>st</sup> century the development of technology thus varies fast change of business Strategies and management. The main objective of this research paper is to explore recent trends in business strategies and management strategies

**KEY WORDS:** Business Strategy, Descriptive Studies, Industrial Revolution, Secondary Information, Technology,

## INTRODUCTION:

Humans have been able to develop a large number of technologies on the strength of their intellect. The development of this technology has led to a great deal of change in trade and management as per experience. In the present age, the nature of trade and management has changed drastically. Human resources are one of the most important factors behind these technological changes and changes in trade and management conditions. There are two main types of human resources: quantitative and qualitative. This quality of life belief has led to major changes in business and its management, respectively. In this age, due to the development of technology, various new branches such as e-learning, marketing and marketing have emerged. There are five main types of human economic activity, but trade is a third type economic activity and business activity is also known as Pink Color Workers. This research paper is based on secondary data. This research paper studies the Business strategies and Management Strategies as also the work is