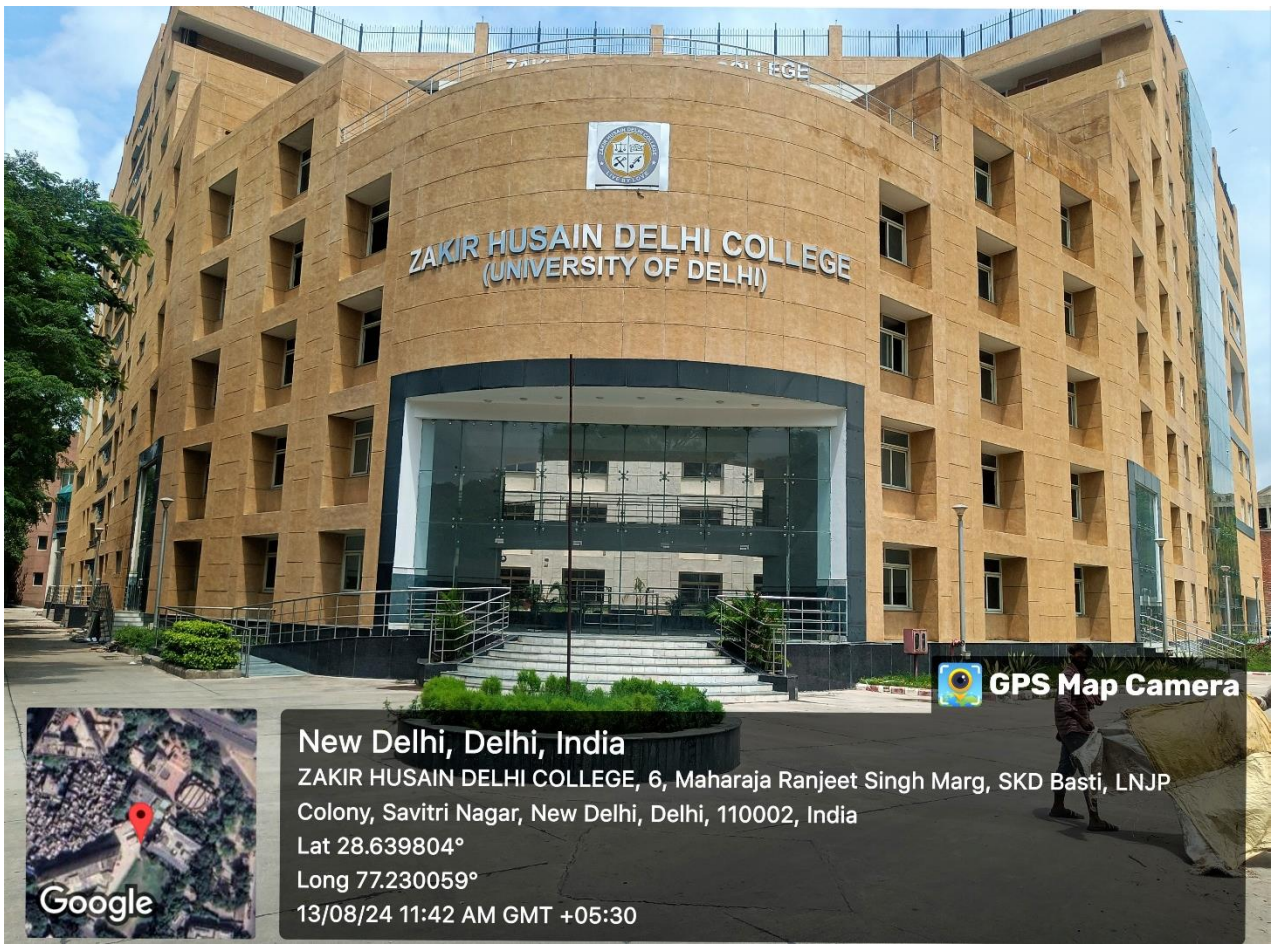
ZAKIR HUSAIN DELHI COLLEGE
UNIVERSITY OF DELHI



SUPPORTING DOCUMENT: 3.5.1 (2023-24)

Number of functional MoUs/linkages with institutions/ industries in India and abroad for internship, on-the-job training, project work, student / faculty exchange and collaborative research during the academic year 2023-24.

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Certificate No.	:	IN-DL673465230327l6U
Certificate Issued Date	:	29-Jul-2022 04:25 PM
Account Reference	:	IMPACC (IV)/ dl908703/ DELHI/ DL-DLH
Unique Doc. Reference	:	SUBIN-DLDL908703168141502574 67U
Purchased by	:	SAKSHAM INDERPRASTHA
Description of Document	:	Article 58 Memorandum of Settlement
Property Description	:	Not Applicable
Consideration Price (Rs.)	:	0 (Zero)
First Party	:	ZAKIR HUSAIN DELHI COLLEGE
Second Party	:	SAKSHAM INDERPRASTHA
Stamp Duty Paid By	:	SAKSHAM INDERPRASTHA
Stamp Duty Amount(Rs.)	:	100 (One Hundred only)

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116

Please write or type below this line

MEMORANDUM OF UNDERSTANDING

This Memorandum of understanding/Association is executed on this 29th day of July, 2022

BETWEEN

ZAKIR HUSAIN DELHI COLLEGE, JAWAHARLAL NEHRU MARG, NEW DELHI-110002 UNIVERSITY OF DELHI, hereinafter referred to as the '*First Party*'

Statutory Alert:
1. The authenticity of this Stamp certificate should be verified at 'www.shcilestamp.com' or using e-Stamp Mobile App of Stock Holding. Any discrepancy in the details on this Certificate and as available on the website / Mobile App renders it invalid.
2. The onus of checking the legitimacy is on the users of the certificate.
3. In case of any discrepancy please inform the Competent Authority.

AND

SAMDRUSHTI KSHAMTA VIKAS EVAM ANUUSANDHAN MANDAL (SAKSHAM INDERPRASTHA) NUTAN SHIKSHA SADAN, 603/8, MOTI RAM ROAD, SHAHDARA, DELHI-110032; hereinafter referred to as the '*Second Party*'.

(Hereinafter collectively referred to as "The Parties")

WHEREAS, The first party is a reputed college running under the affiliation of Delhi University, which is interested to modify its premises to make it easy accessible and to create a comfortable atmosphere for specially challenged persons who are suffering with different physical & mental disabilities,

WHEREAS, The second party is a well-known NGO have been engaged in the service of specially challenged persons since long time and working for creating awareness off the rights of disabled persons everywhere including educational institutions and extending their support in creating infrastructure required,

WHEREAS, both the parties having similar ideas came to an understanding to work together for the betterment of specially challenged persons mobility, to empower the Persons with disabilities (PwD's).

AND WHEREAS, both the parties agreed to jointly organize programs, camps seminars etc. in the field of disability and to modify the college premises easily accessible to Persons with disabilities (PwD's).

AND WHEREAS, both the parties agreed that they will abide by all the conditions mentioned herein and committed to implement them without any deviations and violations.

AND WHEREAS, none of the provisions to this MOU shall be deemed to constitute a partnership in commerce in between the parties here but they both just partners in service, hence no contractual obligations will arise,

WHEREAS, the 1st party agreed to implement the rights of disabled persons as per law and the second party agreed to guide them while implementing the same, A detailed implementation plan may be drawn by both the parties to this MOU.

AND WHEREAS, both the parties mutually agreed to alter the conditions any time as per the circumstances required for further expansion.

AND WHEREAS, it is being agreed and understood by the parties that data, know-how and any other such proprietary information that was provided or agreed to be provided by either party, will remain confidential.

AND WHEREAS, this MOU is at-will and may be modified by mutual consent of authorized officials of the parties. This MOU shall become effective upon signature by the authorized officials from both the parties and will remain in effect for two years until modified or terminated by any one of the parties by mutual consent. After this period, it may be extended by the parties on mutual agreement in writing until it is rescinded.

NOW THIS MEMORANDUM OF UNDERSTANDING/ AGREEMENT WITNESSETH AND IT IS HERE BY AGREED BY AND BETWEEN THE PARTIES HERE TO AS FOLLOWS:-

1. That both the parties agreed to jointly promote the quality of academic research for policy making in respect of Persons with Disabilities (PwD's).
2. That both the parties to this MOU will jointly work for making college campus into a Divvying friendly environment and it is agreed between both parties that this Memorandum of Understanding is meant and agreed for the staff and students of Zakir Husain Day College and it shall not

involve/incurred any financial liability on the First Party (i.e. Zakir Husain Delhi College).

3. That both the parties to this MOU will jointly organize academic, cultural, social and sport related activities and for enhancing intellectual awareness & sensibility for PWD persons for their multi-faceted development.

4. That both the parties agreed to work jointly for providing quality reading material, stationary and innovative technological access for Persons with disabilities (PwD's)

5. That both the parties to this MOU will work together to spread awareness between the masses for eye donation, blood donation, organ donation etc. to minimize eradicate disability.

6. That both the parties to this MOU will help each other to provide the best academic research and services to encourage and improve the professional and technical skills in Persons with disabilities (PwD's).

7. That both the parties to this MOU will jointly work for making Persons with disabilities (PwD's) self-dependent (Atma Nirbhar) through providing skill training including improvement and cherishment of various traditional Hunar (skill), etc.

8. That the first party further agreed to undertake the following responsibilities:-

   a. The first party shall provide recording studio for preparing, updation, maintenance and preservation and upgradation of audio books of various academic/ non-academic resources for Persons with disabilities (PwD's).

   b. The first party shall arrange volunteers from college for recording audio books for Persons with disabilities (PwD's).

   c. The first party shall provide space in college premises for organizing disability awareness and sensitization programs.

d. The first party shall organize the eye donation, organ donation and blood donation camps with the help of second party.

e. The first party shall include in their college guidelines that making short films documentaries as a project upon various disability related issues to the students as obligatory with special incentives.

f. The first party shall provide refreshment and assistance to doctors and other professionals, various resource persons, volunteers and other working personnel's including attendees during various awareness/ sensitization programs and recording sessions

9. That the second party through its authorized personnel shall undertake the following responsibilities :-

a. The second party shall provide public awareness and support with the help of concerned professionals/experts in all disability related issues.

b. The second party shall co-ordinate with Persons with disabilities (PWD's) to assist them in acquiring reading material, stationary and technological access on time.

c. The second party shall provide certificates to those students/ volunteers which are working for Diyangjan's welfare.

d. The second party shall preserve and maintain the audio recording of various academic/ non- academic resources for their future and sustainable use for visually impaired persons.

e. The second party shall ensure that all recordings of various academic/ non-academic resources will be easily accessible and provided free of cost to Persons with disabilities (PwD's). No one will be allowed to use these recordings for commercial purposes

f. The second party shall provide volunteer support for organizing disability awareness programs.

g. The second party shall organize time to time career guidance and employment programs including assistance for various competitive exams to Persons with disabilities (PwD's).

h. The second party shall try to cure and provide assistive devices to make the PWD PERSONS self-dependent, if any disability detected in any of college students.

i. The second party shall help for promoting and adapting of new and emerging sciences, technological innovations such as Artificial Intelligence (AI), Robotics and edge computing, etc.

IN WITNESS WHEREOF the parties hereto have set their respective hands on these presents on the day, month and year first written above in the presence of the following witnesses.

WITNNESSES:

AUTHORISED SIGNATORY
FIRST PARTY

1. Prof. Narendra Singh
Zakir Husain Delhi College

2. **AUTHORISED SIGNATORY**
SECOND PARTY

Sh. Tribhuvan Singh Rawat
State Sr. Vice President
Saksham Inderprastha

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Certificate No.	:	IN-DL96015442377948U
Certificate Issued Date	:	25-Feb-2022 02:04 PM
Account Reference	:	IMPACC (IV)/ dl734003/ DELHI/ DL-DLH
Unique Doc. Reference	:	SUBIN-DLDL73400381485632495487U
Purchased by	:	ZAKIR HUSAIN DELHI COLLEGE
Description of Document	:	Article 5 General Agreement
Property Description	:	MEMORANDUM
Consideration Price (Rs.)	:	0 (Zero)
First Party	:	ZAKIR HUSAIN DELHI COLLEGE
Second Party	:	GANDHI SMRITI AND DARSHAN
Stamp Duty Paid By	:	ZAKIR HUSAIN DELHI COLLEGE
Stamp Duty Amount(Rs.)	:	100 (One Hundred only)

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THE SEAL OF NOTARY PUBLIC ★ ADVOCATE ★ Abhinay Gupta Appointed by Govt. of India

THE SEAL OF NOTARY PUBLIC ★ ADVOCATE ★ Abhinay Gupta Appointed by Govt. of India

PRINCIPAL ZAKIR HUSAIN DELHI COLLEGE JAWAHAR LAL NEHRU MARG NEW DELHI-110002

दीपंकर श्री ज्ञान/Dipankar Shri Gyan, IAS
निदेशक/Director
गांधी स्मृति एवं दर्शन समिति
Gandhi Smriti and Darshan Samiti

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2. The onus of checking the legitimacy is on the users of the certificate.
3. In case of any discrepancy please inform the Competent Authority.

Memorandum of Understanding

This Memorandum of Understanding is for a collaborative effort in leveraging knowledge, academic and research expertise and institutiona strengths of Gandhi Smriti and Zakir Husain Delhi College, University of Delhi to promote research, skilloriented courses and progrmmnes based on Gandhian principles.

Between:- Zakir Husain Delhi College, University of Delhi.

AND

Gandhi Smriti and Darshan Samiti(GSDS)

GSDS formed in September 1984 is an autonomous body u functioning under the Ministry of Culture, Government of India. Its overarching goal is to promote the life and message of Mahatma Gandhi. The Prime Mister of India is its Chairperson. and it has the following objectives:-

i. To plan and carry out activities for the promotion of Gandhian ideals and philosophy.

ii. To Keep Gandhi Smriti and Darshan Samiti open for public as per standard rules related to museum and maintain it to provide maximum convenience to visitors.

iii. Promote Audience Development and Museum Management Framework in both Gandhi Smriti Museum and Gandhi Darshan Exhibition.

iv. Promote initiative to create awareness on the life and massage of Mahatma Gandhi through educational media like exhibition, films. Gandhiana Posters, and different forms of Act, Culture and Technology

v. To develop and preserve a liberary of books including rare books literature, photographs films and documents etc.

vi. To collect, preserve and exhibit important relics of Mahatma Gandhi.

vii. Focus on empowering the marginalized through different activitis related to philosophy and ideals of Mahatma Gandhi.

ADVOCATE * THE SEAL OF NOTARY PUBLIC * Abhinay Gupta Appointed by Govt. of India

cont.2/p...

PRINCIPAL ZAKIR HUSAIN DELHI COLLEGE JAWAHAR LAL NEHRU MARG NEW DELHI-110002

दीपंकर श्री ज्ञान/Dipanker Shri Gyan, I.
निदेशक/Director
गाँधी स्मृति एवं दर्शन समिति
Gandhi Smriti and Darshan Sam
नई दिल्ली-110002/New Delhi-110002

viii.

ix. Developing capacities of children, youth, women and other groups for imbibing Gandhian values and work to bring attitudinal change/ development through practical applications of Gandhian Philosophy.

x. To restore, protech and manage both the emploexes at Gandhi Darshan and Gandhi Smriti and all movable and immovable properties therein according to requirement.

xi. To bring publication for various sections of people toenhance their knowledge about Mahatma Gandhi and the velues he propagated.

xii. Encourage and promote Gandhian perspectives on education and facilitate e ucation for peace, ecological security, equality and justice.

xiii. To conduct inter-disciplinary research on Gandhian philosophy in the context of contemporary issues.

xiv. To work extensively with different Universities and Academic institutions for better and in -depth understanding of Mahatama Gandhi and Gahian philosophy.

xv. Empowerment of the weaker sections of the society through vocational training programmes and other livelihood initiatives as part of Gandhain constructive work.

xvi. Respond and work to address challenging problems of the society.

xvii. Involving different stakeholders to work for a culture of collective living collective working, peace and nonviolence.

xviii. Reaching the unreached with thelife and message of Mahatama Gandhi especially in far flung areas.

xix. To undertake such other activities and to do all the foregoing mandate and to cooperate and seek cooperation from other institutions for the aforesaid purposes.

THE SEAL OF NOTARY PUBLIC
Abhinay Gupta
Appointed by
Govt. of India

cont.3/p...

PRINCIPAL
ZAKIR HUSAIN DELHI COLLEGE
JAWAHAR LAL NEHRU MARG
NEW DELHI-110002

दीपंकर श्री ज्ञान/Dipanker Shri Gyan,
निदेशक/Director
गाँधी स्मृति एवं दर्शन समिति
Gandhi Smriti and Darshan Samiti
नई दिल्ली-110002/New Delhi-110002

Zakir Husain Delhi College, University of Delhi

Zakir Husain Delhi College is one ofthe leading college of University of Delhi imparting higher education in Science, Commerce, Humanities and Social Sciences. The college holds the distinction of being in existence well before the existence of University ofDelhi. It carries within iteself a history of nearly 300 years as an institution of learning . The college was affiliated to Delhi University in 1925 and became one of ihs constituent degree college. Following the partition of India, the Delhi College wqs revived a a non-denominational institution in 1948 and was renamed Zakir Husain college after 1975 and managed by the Zakir Husain Memorial Trust under the Chairmanship of Prime Minister of India. Today the collge runs undergraduate courses in 21 disciplines and offers 17 post graduate courses. The College is Accrediated with "A" Grade by NAAC.

Vision:

To be a centre of Excellence in Teaching, Learning and Research and hence to improve the Quality of Education and knowledge.

MISSION:

- To provide Quality Research Facilities in the college.
- To provide Consultancy services to Industries Govenment/ Semi Government Organizations and other Agencies.
- To encourage Sill Develppment and Entrepreneurship among the Students.

The Objective of the Memorandum of Understanding:-

The objectives of the MOU are to entire into a strategic collaboration to jointly initiate academic programmers and research.
Specifically, in the initial phase, the Focus of work would be to initiate the following.

I) Short Term Certificate course on Nonviolent Communication and Peer Mediation in both Graduation and Masters Level.

II) Help Organize Extension lectures and training programmes, initiate research and publication bases on Gandhain Principles.

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Scope of the Partnership: -

I) For the course non Nonviolent Communication and Peer Mediation the Samiti is already running a highly successful online course having global tractions.As nonviolent communication is identified as an essential life skill, all students of the Zakir Husain Delhi College and others students from University of Delhi and other colleges in India and benefit from it.

Implementation Arragement

The course will be useful for all thestudents in different disciplines. the Students will be expected to give a qualifying exam to be eligible for certificate. The students can be charged a nominal fee as examination and certificate charges. Joint certificate with GSDS and the Zakir Husain Delhi College will be given.

Both the organizations will jointly organize lectures/workshops/ introduce other innovative strategies to help students understnad the importance of nonviolent communication in their daily lives.

Financials:

A portion of the amount received from exmination and certificate charges could go to GSDS to facilitate regular videos/innovative activities for the students, which can be mutually agreed upon after discussion at suitable forums in both the institutions.

Implementation Arrangements:-

The Zakir Husain Delhi college will Identify a Nodal officer who will directly work with the officers of GSDS to facilitiate the successful running the course/lectures/other activities as part of the course.

Duration :- Initially the agreement will be for three years.

Conflict Resolution: Any disputes will be resolved through mutual discussions and negotiations.

Termination:- In case of the need for termination, the MOU can be terminated through mutually agreeable terms.

ADVOCATE * THE SEAL OF NOTARY PUBLIC * Abhinay Gupta Appointed by Govt. of India

PRINCIPAL
ZAKIR HUSAIN DELHI COLLEGE
JAWAHAR LAL NEHRU MARG
NEW DELHI-110002

cong.5/p..

Dr. Gyan

Dr. Dipanker Shri Gyan, JAS
निदेशक/Director
गाँधी स्मृति एवं दर्शन समिति
Gandhi Smriti and Darshan Samiti
नई दिल्ली-110002/New Delhi-110002

This memorandum of understanding is signed in presence of the witness mentioned below at New Delhi on this 25th Day of February 2022.

Witnesses:-

1

Dr. Sanjeev Kumar
Convener, Gandhi Study Circle
Zakir Husain Delhi College
University of Delhi
New Delhi-110002

2.

Dr. Vedabhyas Kundu
Programme Officer,
Gandhi Smriti and Darshan Samiti
New Delhi.

Executant

25.02.2022

Prof. Sangeeta Pandita
Principal,
Zakir Husain Delhi College
University of Delhi
New Delhi 110002

PRINCIPAL
ZAKIR HUSAIN DELHI COLLEGE
JAWAHAR LAL NEHRU MG
NEW DELHI-110003

Dipanker Shri Gyan
Director
Gandhi Smriti and Darshan Samiti(GSDS), New Delhi 110002.

दीपंकर श्री ज्ञान/Dipanker Shri Gyan, JAS
निदेशक/Director
गाँधी स्मृति एवं दर्शन समिति
Gandhi Smriti and Darshan Samiti
नई दिल्ली-110002/New Delhi-110002

THE SEAL OF NOTARY PUBLIC ★ ADVOCATE ★
Abhinay Gupta
Appointed by
Govt. of India

ATTESTED

NOTARY PUBLIC

25 FEB 2022

GANDHI STUDY CIRCLE

Under the Aegis of Internal Quality Assurance Cell (IQAC)

ZAKIR HUSAIN DELHI COLLEGE
(UNIVERSITY OF DELHI)

and

GANDHI SMRITI AND DARSHAN SAMITI
(MINISTRY OF CULTURE)

INVITES APPLICATION FOR-

Value Added Certificate Course

On

NON-VIOLENT COMMUNICATION

LAST DATE TO APPLY-
10 DECEMBER 2023

Tap the icon to register

For queries, tap to email

PROF. SANJEEV KUMAR
CONVENER, GSC

Student Program Coordinator
Suyash : +91 9721198009

PROF. NARENDRA SINGH
PRINCIPAL, ZHDC

Certificate Course in Nonviolent Communication

Gandhi Smriti and Darshan Samiti and Zakir Hussain College, New Delhi

Course Structure

Total Lectures: Block 1: Why the need for Nonviolent Communication in the Contemporary Society?

Unit 1.1 Importance of communication

Unit 1.2 Unhealthy communication and its impact

Unit 1.3 Forms of dysfunctional and violent communication in contemporary society

Unit 1.4 Healthy communication and its impact

Block 2: Exploring Nonviolent Communication?

Unit 2.1: Definition and explanation

Unit 2.2: Gandhian Model of Nonviolent Communication

Unit 2.3 Elements of Nonviolent Communication

Unit 2.4 Constructing a Nonviolent Communication Ecosystem

A) Developing Nonviolent Communication Ecosystem within us

B) Nonviolent Communication Ecosystem for a cohesive society

Block 3: Different approaches to Nonviolent Communication

3.1: Indian tradition of Nonviolent Communication

3.4: Integrating peace linguistics as part of Nonviolent Communication

Block 4: Applying Nonviolent Communication in our daily lives

4.1: Relationship building

4.2: Nonviolent Communication for promotion of humanistic society

4.3 Resolution of disputes and conflicts

4.4: Anger Management

4.5: Reduction of Stress

4.6: Countering hate speech

Unit 5: Nonviolent Communication in specific settings

5.1 Ecosystem: Educational Institutions

5.2: Workplace

5.3: Judiciary

5.4 Medical profession

5.5: Social Work and Volunteerism

5.6: Leadership and teambuilding

INTERNSHALA
internships that matter

internshala.com
+91 124 4367427
+91 124 4004123
university.relations@internshala.com

Scholiverse Educare Pvt. Ltd.
B-610, Unitech Business Zone,
Gurgaon, Haryana – 122018
CIN: U80901HR2011PTC064443

INTERNSHALA COLLEGE REGISTRATION AGREEMENT

This Agreement is executed on 03-02-2023 by and between:

Scholiverse Educare Private Limited, having its registered office at B-610, Unitech Business Zone, Nirvana Country, Sector-50, Haryana - 122018, acting through its authorized representative Ms. Aayushi Sharma, Head, University Relations (hereinafter referred to as **"Internshala"**);

AND

Zakir Husain Delhi College (University of Delhi) (hereinafter referred to as the "**College**" which expression shall, unless repugnant to the meaning or context thereof, be deemed to include its executors, representatives and permitted assigns) of the other Party; acting through its authorized representative Prof. Narendra Singh, Principal.

Internshala and College may be referred to as 'Party' individually and as 'Parties' collectively, as the context may require.

Overview:
This agreement is regarding the college registration of 'Zakir Husain Delhi College (University of Delhi)' with 'Internshala'.

Responsibilities of Internshala:

- Create student accounts for all the students registered by the College.
- Provide weekly internship update to all the students registered by the College as per their filled in preferences
- Provide an online resume maker to all the students of the College registered with Internshala.
- Safeguard students' data as per Internshala privacy policy (https://internshala.com/privacy)
- Inform the college when students get selected for an internship.
- Provide College with Internshala logo and brand name to be used in College's communications (internal or external) and on its website to recognize Internshala as the internship and training partner and any other purpose limited to the scope of the agreement.

Responsibilities of College:

- Recognize Internshala as the internship and training partner in all internal and external communications including on its website and in admission/media brochures.
- Send a communication to all the students and faculties regarding the association and direct/encourage students to verify their accounts.
- Provide the information of all the interested students of the College as required by Internshala for their registration. The information should contain the first name, last name, mobile number and the email address of all the students of the College.
- Regularly post a list of students selected for internships through Internshala every month on the college's notice board.
- Authorize Internshala to recognize college, using College logo and/or brand name, as a registered user in its communications (internal or external) and on Internshala platform only for the purpose limited to the scope of the agreement.

Commercials:
This is a non-commercial agreement whereas neither party is required to make any payment to other party for carrying out the responsibilities listed in this agreement.

Term and Termination:
This agreement will be operational and valid from 03-02-2023 and the initial tenure of the agreement is 1 (one) year. Upon completion of the tenure, the agreement can be renewed for another 1 year and so on with mutual consent of both parties.
Under normal circumstances, either party wanting to terminate the agreement can do so and it can be done on a mutually agreed upon date in a justified way with a notification given at least one month prior to termination date.

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CIN: U80901HR2011PTC064443

Indemnity

The college understands and agrees that all the information provided on Internshala related to internships and trainings is provided on *as is* basis. It further agrees that while Internshala makes efforts to ensure the accuracy of the information supplied, it does not guarantee it and the college will choose to disseminate this information to its students solely at its discretion. The college agrees to defend, indemnify and hold harmless Internshala, its subsidiaries, affiliates, licensors, employees, agents, third party information providers and independent contractors against any loss, claims, damages, costs, liabilities and expenses (including, but not limited to, reasonable attorneys' fees) arising out of or related to its use of content of Internshala platform feed that it posts, stores or otherwise transmits on or through its platform(s) or to its students or to general public at large.

The college understands and agrees that as a platform, Internshala acts as a bridge between the organizations who wish to hire interns and the students who wish to apply for the internships. We make best efforts to bring the best internships on the platform, educate students about the same and ensure that they can apply to these internships in a seamless manner. However, the eventual hiring decision, rightfully, resides with the organization which is hiring interns and is dependent on several factors such as the skills of the applicant, quality of her applications, competition, requirements and assessment process of the organization, student's availability at the required location and for the desired period of the internship etc. Since these factors are beyond Internshala's control, Internshala does not and can not guarantee an internship to an applicant.

The college further agrees to indemnify and hold harmless Internshala, its subsidiaries, affiliates, licensors, employees, agents, third party information providers and independent contractors, if any, who controls any thereof, against any loss, liability, claim, damage and expense whatsoever (including, but not limited to, any and all expenses whatsoever reasonably incurred in investigating, preparing or defending against any litigation commenced or threatened or any claim whatsoever) arising out of or based upon any false representation or warranty or breach or failure by the College to comply with any covenant or agreement made by the College herein or in any other document furnished by the College to any of the foregoing in connection with this agreement.

Trademarks:

Except to the limited extent expressly provided in this Agreement, neither Party grants, nor the other Party will not acquire any right, title or interest (including, without limitation, any implied license) in or to any property of the first Party. All rights not expressly granted herein are deemed withheld. All use by a Party of the other trade names, trademarks, service marks, logos, etc., and any goodwill associated therewith, will inure to the benefit of the grantor.

Confidentiality:

Internshala and the College will not disclose the details of this agreement and any private information that they come across when this agreement is in effect to any third-party.

If either Party (the "Receiving Party") under this Agreement gains access to confidential information of the other Party (the "Disclosing Party") concerning the Disclosing Party's prices, business, plans, technology, products, and other non-public information of the Disclosing Party (collectively, "CI" or "Confidential Information"), then the terms of this section will apply. CI includes all information in tangible or intangible form that is marked or designated as confidential by the Disclosing Party or that, under the circumstances of its disclosure, should be considered confidential. The Disclosing Party owns all right, title and interest, including all patent, copyright, trademark, trade secret rights and any other intellectual property or proprietary rights in any jurisdiction, including any and all applications, renewals, extensions and restorations thereof, in the Disclosing Party's CI. Each Party agrees that it will not use in any way, for its own benefit or the benefit of any third party, except as expressly permitted by, or as required to implement, this Agreement, nor disclose to any third party (except as required by law or to such Party's attorneys, accountants and other advisors as reasonably necessary), any of the Disclosing Party's CI. Each Party will take reasonable precautions to protect the confidentiality of the other Party's CI that are at least as stringent as it takes to protect its own CI.

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Gurgaon, Haryana – 122018
CIN: U80901HR2011PTC064443

Force Majeure:
Except for any payment obligations, neither Party will be liable to the other for failure to fulfill obligations hereunder if such failure is due to causes beyond its control, including, without limitation, acts of God, earthquake, fire, flood, embargo, catastrophe, sabotage, utility or transmission failures, governmental prohibitions or regulations, national emergencies, insurrections, riots or wars, strikes, work stoppages or other labor difficulties ("Force Majeure Event"). The time for any performance required hereunder will be extended by the delay incurred as a result of such Force Majeure Event.

Disputes:
The Parties shall attempt in good faith to resolve any dispute arising out of or relating to this Agreement promptly by negotiation between executives.

Signed and Delivered by The Signatory Representative of Parties to this agreement:

For and on behalf of

Internshala

Scholiverse Educare Pvt. Ltd. Gurgaon

:_____

(Aayushi Sharma, Head - University Relations)

(Authorized Signatory)

Zakir Husain Delhi College (University of Delhi)

:_____

(Prof. Narendra Singh, Principal)

(Authorized Signatory)

प्राचार्य/Principal
जाकिर हुसैन दिल्ली महाविद्यालय
Zakir Husain Delhi College
दिल्ली विश्वविद्यालय/University of Delhi
नई दिल्ली-११०००२/New Delhi-110002

ZAKIR HUSAIN DELHI COLLEGE
(UNIVERSITY OF DELHI)
Jawaharlal Nehru Marg, New Delhi - 110002
Tel.: 011-23232218, 23232219, 23233420, Fax : 011-23215906
Website:www.zakirhusaindelhicollege.in
email:zakirhusaindelhicollege@gmail.com

ज़ाकिर हुसैन दिल्ली कॉलेज
(दिल्ली विश्वविद्यालय)
जवाहरलाल नेहरू मार्ग, नई दिल्ली - 110002
दूरभाष: 011-23232218, 23232219, 23233420, फैक्स: 011-23215906
वेब स्थल: www.zakirhusaindelhicollege.in
इ-मेल: zakirhusaindelhicollege@gmail.com

ZAKIR HUSAIN DELHI COLLEGE
(UNIVERSITY OF DELHI)

THE CAREER COUNSELING & PLACEMENT CELL

is organising

ANNUAL JOB-FAIR

Powered By : INTERNSHALA

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Profusion Konsulting

and many more...

8-9 FEB 2023

Time: 9AM onwards..
Venue: College Auditorium

Media Partner: DU.today

OPEN FOR ALL REGULAR BONAFIDE DU STUDENTS

College Address: Jawaharlal Nehru Marg, New Delhi

CONVENOR:
Dhiraj Kumar Singh
(Department of Mathematics)

CONTACT:
Ananya- +91 76783 20657
Amrita- +91 7052818107

SOCIAL MEDIA:
@pcellzhdc

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(University of Delhi)

CAREER COUNSELING & PLACEMENT CELL

in collaboration with

INTERNSHALA

RHEA SHARMA
Senior Associate
Internshala Trainings

Topic: How to prepare for your dream job and internships

Venue: AV Room

19 JAN 2023
10:45AM-12:00 PM

Registeration Link: https://bit.ly/3ICz3iT

Students from all courses and all years are invited!

CONVENOR:
Dhiraj Kumar Singh
(Department of Mathematics)

CONTACT:
Ananya- +91 76783 20657
Nidhi - +91 8700429329

SOCIAL MEDIA:
@pcellzhdc

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ZAKIR HUSAIN DELHI COLLEGE
LIVE BY LOVE

School of Open Learning
(Campus of Open Learning)
University of Delhi

No. SOL / PU/20/198 **Date** 24/2/202

The Principal,
Zakir Hussain College (M),
Ajmeri Gate,
New Delhi-110002

Sub: **Conduct of Academic Counselling Sessions of B.A. (Programme)/B.Com Semester-II on Saturdays of March, 2020 (07, 14, 21 & 28)**

Sir,

I take this opportunity to express my gratitude to you for kind support and co-operation in conducting Academic Counselling Sessions of SOL Under-graduate Courses for the Academic Session 2019-2020 at your esteemed Faculty/College.

It is well aware that the SOL had implemented CBCS (LOCF) Semester System in all undergraduate courses from the Academic Session 2019-2020 and onwards. Accordingly, the Academic Counselling Sessions for Semester-II for one of the courses are being conducted at your Study Centre.

As the SOL started the Academic Counselling Sessions of Semester-II in the first week of February, 2020 hence SOL will be required to conduct some more Academic Counselling Sessions of Semester-II at your Study Centre by the end of March-2020.

In the light of the above and bearing the best interest of the students in mind, you are requested kindly to make necessary arrangements for conducting Academic Counselling Sessions for Semester-II on 07th, 14th, 21st, & 28th March-2020 (Saturdays) also at your Study Centre, so that the SOL students may be able to get their study related doubts dispelled during these extended Academic Counselling Sessions.

Thanking you,

Yours faithfully,

(Dr. U. S. Pandey)
Dy. Director/OSD

S.O. Admn

28.2.2020

Principal's Office,
Receipt No. 689
Date 28-02-2020
Zakir Hussain Delhi College

5, Cavalry Lane, University of Delhi, Delhi-110007
Tel. : 27667600, 27667166, 27667645, Fax : 27667242

SCHOOL OF OPEN LEARNING
UNIVERSITY OF DELHI
5, CAVALRY LINES
DELHI-110007

Ph.No. 27008428, 27667600
27667645, 27667581

Ref. No.PCP/2022/ 218

Principal's Office,
Receipt No. 1127
Date 08-04-2022

Dated 30/3/2022

The Principal
Zakir Hussain College
J.L.Nehru Marg
Delhi- 110002

Sub: **Proposal for Establishment of Learner Support Centre for conducting Academic Counselling Sessions (PCP classes) for SOL Students.**

Sir/Madam,

I may like to submit that School of Open Learning, University of Delhi, is constituent institution of the University of Delhi which imparts quality higher education in distance mode in five under-graduate and five post-graduate courses for about 5 lakh students. To provide better students support services to SOL students, the Governing Body of School of Open Learning in its meeting held on 04th March, 2022 approved the revised guidelines for establishment of SOL Learner Support Centres and Regional Centres. It will be implemented from the academic session 2022-23 onwards.

Accordingly, SOL would like to establish a Learner Support Centre for the students of the SOL in your esteemed Faculty/College/Department. For this purpose some academic, administrative and logistic support would be required from the Faculty/College/Department for conducting Academic Counselling Sessions (PCP classes) smoothly during Saturdays, Sundays & Holidays, and conducting examinations, **if required,** as per the guidelines issued by the University/SOL from time to time. The comprehensive requirements as well as financial implications are given in the enclosed Proposal (Annexure 1).

The admission process for fresh students is likely to commence from April-May 2022 for undergraduate courses for the Session 2022-23 and consequent upon the Academic Counselling Sessions will probably be conducted for the students at Learner Support Centres in the month of April/May 2022 onwards.

I will be grateful to you, if you kindly give your consent to establish a Learner Support Centre in your Faculty/College/Department premises to facilitate Academic Counselling Sessions for the SOL Students and also conduct of examinations, **if required,** as per the guidelines issued by the University of Delhi/SOL from time to time.

The Proposal for the Establishment of SOL Learner Support Centre and guidelines are enclosed alongwith specimen of undertaking to be submitted by the Academic Coordinator on the stamp paper of Rs.100/- for your kind information and necessary compliance.

Thanking you,

Yours faithfully,

Principal (Officiating)

Encls: **As above.**

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सत्यमेव जयते

INDIA NON JUDICIAL

Government of National Capital Territory of Delhi

e-Stamp

Certificate No.	:	IN-DL56427114392513V
Certificate Issued Date	:	02-Feb-2023 03:06 PM
Account Reference	:	IMPACC (IV)/ dl754103/ DELHI/ DL-DLH
Unique Doc. Reference	:	SUBIN-DLDL75410385985640930630V
Purchased by	:	DR NARENDER SINGH
Description of Document	:	Article 4 Affidavit
Property Description	:	Not Applicable
Consideration Price (Rs.)	:	0 (Zero)
First Party	:	DR NARENDER SINGH
Second Party	:	Not Applicable
Stamp Duty Paid By	:	DR NARENDER SINGH
Stamp Duty Amount(Rs.)	:	10 (Ten only)

Please write or type below this line

MEMORANDUM OF UNDERSTANDING
AMONGST
UNIVERSITY OF DELHI, Delhi - 110007
AND
SCHOOL OF OPEN LEARNING, (Campus of Open Learning)
5 Cavalry Lines, University of Delhi, Delhi – 110007
AND
Bhaorao Deoras Sewa Nyas, C – 91, Nirala Nagar, Lucknow – 226020 (U.P)
AND
Zakir Husain Delhi College, Jawahar Lal Nehru Marg, New Delhi-110002.

Hereinafter collectively referred to as the "Parties" or individually as the "Party"

AND WHEREAS, all parties have agreed for collaboration to work together in the area of Skill Development, Employment and Entrepreneurship Development for the benefit of students of the University of Delhi & its colleges on the following terms and conditions:

1. UNIVERSITY OF DELHI

1.1 The party of the first part is offering various undergraduate and postgraduate degree programmes in its colleges and departments.

2. SCHOOL OF OPEN LEARNING

2.1 The party of the second part offers several courses/ programmes through open and distance learning mode to lakhs of students making education accessible.

3. BHAORAO DEORAS SEWA NYAS

3.1 The party of the third part BDSN through its project SAMARTH BHARAT is engaged in expanding skill development efforts in India by creating an end-to-end, outcome-focused implementation framework, which aligns the demands of the employers for a well-trained, skilled workforce with the aspirations of Indian citizens for sustainable livelihoods.

3.2 SAMARTH BHARAT also endeavours to nurture the entrepreneurs virtually and physically from the ideation till establishing of business Enterprise by providing single window support to the First Generation entrepreneurs or Educated Youth by a step-by-step roadmap for establishing a business enterprise or becoming an industry ready person.

3.3 SAMARTH BHARAT works for enhancing youth behavioural & professional competencies to make them industry ready through various interventions like regular live workshops, seminars, industrial documentaries, skilling, professional & experts episodes on the portal.

3.4 SAMARTH BHARAT provides end-to-end implementation framework for skill development, which provides opportunities for life-long learning and for quality long/short-term skill training that meets the aspirations of trainees as well as outcome focused training that aligns to employer/industry demand and workforce productivity with trainees' for sustainable livelihoods.

3.5 SAMARTH BHARAT focuses to build capacity for skill development in organized and un-organized sectors and provide pathways for re-skilling/up-skilling in pre-identified sectors, to enable them to

f) Create a Start-up support ecosystem in colleges with guidance for Idea and Start-up Launch, Incubation Centre Connect, Pitch development, Investor Tie-ups, etc.

g) Launch peer to peer mentorship program through various mediations like Entrepreneur Talks, Young Achievers Success Stories, Industry & Alumni Connect, etc.

6.3 As and when required, SAMARTH BHARAT shall provide its extensive network to support above mentioned initiatives like connecting with other educational, training institutions, business and industrial bodies, content development, experts network and services.

7. ALL PARTIES

7.1 Draw the attention of the top management in case of any interface or operational problems.

7.2 Will complete the project activities within the agreed time frames of the projects/programs that are initiated and developed.

7.3 Will work towards obtaining necessary ethical, legal, financial, administrative, and other required approvals/ permissions/ acceptance/ sanctions etc., required for joint activities at respective institution as well as from regulatory authority.

7.4 Shall ensure that all activities are conducted while meeting the highest standards of safety and regulations as per prevailing.

7.5 Shall ensure that all the data/information provided by any of the Parties should be used only for the purpose explicitly stated in the specific projects or which ethical/legal clearances are granted by the UNIVERSITY OF DELHI.

7.6 All the knowledge that is generated as a result of joint projects/activities shall be shared by all the parties.

7.7 All attempts will be made to ensure that developments and projects are accomplished to a very high degree of quality, with efficiency of time. All parties shall especially ensure that each party shall complete its tasks correctly in time where work of other party is dependent upon timely and correct completion of its work.

7.8 Not use/ sell/ license/ rent technologies/ resources/ material/ solutions of either parties to/for any third party without prior written mutual consent of the other party.

7.9 Undertake Projects in various areas of mutual interest on mutually agreed terms reduced into writing and signed by all the parties.

Vikas Gupta

11. TERMINATION

11.1 This Memorandum of Understanding can be terminated at any time by any part with or without assigning any reason, by giving six month's written notice to all the other parties.

11.2 Upon termination of this MoU, each party shall return to the other such material, documents etc. belonging to the other parties lying in its possession.

12. SEVERABILITY

12.1 If any party of this MoU is found by a court of competent jurisdiction or other Competent Authority invalid, unlawful, or unenforceable, then such part will be severed from the remainder of this MoU which will continue to be valid and enforceable to the fullest extent permitted by any law.

13. FORCE MAJEURE

13.1 Neither party shall be liable to the other party for any delay or failure on their part in performing any of their obligation under this MoU, resulting from any cause beyond their control, but not limited to strike/ lock-outs, fires, floods, earthquake, explosions, war, enemy action, or political changes, natural disaster or military hostilities and strike of employees, the act or omission of any third party for whom the parties are not responsible.

13.2 Each of the parties agrees to give notice immediately to the other party upon becoming aware of an event of force majeure and such notice should contain details of the circumstances giving rise to it.

13.3 If a default due to force majeure continues for more than 6 weeks then the party not in default shall be entitled to terminate this agreement.

13.4 Neither party shall have any liability to the other in respect of the termination of this agreement as a result of force majeure.

14. LIMITATION OF LIABLITY:

14.1 In no event any of the parties be liable to the other party for any incidental, consequential, special and exemplary or direct or indirect damages, or for any lost profits, lost revenues, or loss business arising out of the subject matter of this MoU, regardless of the cause of action, even if the party has been advised of the likelihood of damages if the same is without intention and beyond reasonable control

20. NON-WAIVER

20.1 The failure or neglect by any of the Parties to enforce any of terms of this MOU shall not be construed as waiver of its rights preventing subsequent enforcement of such provisions or recovery of damages for breach thereof.

21. SIGNED IN DUPLICATE

21.1 This MoU is executed in quadruple with each copy being an official version of the agreement and having equal legal validity and supersedes all prior oral and written agreements, understandings, representations, conditions and all other communications relating thereto. Both copies together will constitute binding contract.

IN WITNESS WHEREOF, THE DULY AUTHORIZED REPRESENTATIVES OF THE PARTIES SIGNED THIS MEMORANDUM OF UNDERSTANDING AT THE PLACE AND ON THE DAY WRITTEN BELOW

(Dr. Vikas Gupta)
Registrar
University of Delhi
डॉ. विकास गुप्ता / Dr. VIKAS GUPTA
कुलसचिव/Registrar
दिल्ली विश्वविद्यालय/University of Delhi
दिल्ली–110 007/Delhi-110007

(Prof. Payal Mago)
Chairperson
School of Open Learning

(Shri Rahul Singh)
General Secretary
SAMARTH BHARAT – BDSN

(Prof. Narendra Singh)
Principal
Zakir Husain Delhi College

THE SEAL OF NOTARY PUBLIC
M. L. GARG
App. By Govt. of NCT of Delhi India
Regd. No. 058/08
DELHI

ATTESTED
Notary Public, Delhi
- 2 FEB 2023

9

15. GOVERNING LAW & JURISDICTION

15.1 All disputes regarding this MoU shall be under the jurisdiction of the Civil Courts of Delhi only.

15.2 This MoU shall be governed and interpreted in accordance with the established Law. Court of New Delhi shall have exclusively jurisdiction to try, entertain, and decide the matters, which are not covered under the Civil Courts.

16. COMMUNICATION

16.1 Each party shall nominate its Nodal Person who shall be the single point of authority for the purpose of implementation of this MoU.

16.2 Each Party is free to change or reappoint such contact point on its behalf with a notice to the other Party.

16.3 Each party may change nodal contacts/ address by written notice in accordance with this paragraph.

17. NOTICES

17.1 Any Notice, request, demand, approval, consent or other communications provided or permitted hereunder shall be in writing in Hindi/English Language and given by personal delivery or sent by registered post or by fax/email addressed to the above nodal contacts.

17.2 Notices delivered personally will be deemed communicated as of actual receipt. Mailed notices will be deemed communicated as of four (4) days after mailing.

17.3 Post-mailed notices will be deemed communicated as of seven (7) days after mailing.

18. MODIFICATION

18.1 No modification to this MoU, will be effective unless agreed to in writing by all the parties and duly signed by the authorised signatories of the Parties.

19. HEADING

19.1 The headings shall not limit, alter or affect the meaning of the Clauses headed by them and are solely for the purpose of easy reference.

7.10 Ensure the safety of the personnel and material whenever placed at all ends by the all the parties.

8. CONFIDENTIALITY, COPYRIGHT AND INTELLCTUAL PROPERTY RIGHTS

8.1 Existing IP as on date of execution of this MoU shall be exclusively owned by respective parties to which the IP belongs.

8.2 All the parties shall be ensured that all the data/information provided by either party will be used in accordance with the regulations and guidelines on human ethics and privacy of personal data law and also strictly in accordance with the Indian Intellectual Property Laws and Rules.

8.3 The intellectual property (including but not limited to inventions, ideas, innovations know-how/ process/ design/ technique/ copyright/patent etc.,) generated / created / designed / developed in relation to or arising out of or incidental to any projects initiated under this MoU shall be owned jointly by all the parties.

8.4 All the parties agree to hold in confidence all data/information designated by either party as being confidential which is obtained from either party or created during the operation of this MoU and shall not be disclosed to any outsider without written consent of all parties.

8.5 For any intellectual property arising during the operation of this MoU, respective Participating Institutions intend to ensure adequate and effective protection of the same in order to maintain its uniqueness and shall never be shared with any outsider.

9. REVENUE SHARING

9.1 Bhaorao Deoras Seva Nyas through its project SAMARTH BHARAT provides a facilitating platform for skill development, jobs and business start-up to the needy people without charging any fees.

9.2 UNIVERSITY OF DELHI, SOL & Zakir Husain Delhi College shall provide resources required to support their students like training infrastructure, remuneration directly to trainers, staff for management of Career Development Centre, etc.

10. COMMENCEMENT AND DURATION

10.1 This MoU shall be effective from the date of signature by the Heads of all the parties and/or their nominees. This MoU will be valid for 05 Years (Five Years) from the date of its commencement.

Xerox Copy

transit into formal sector employment through a developed network of quality instructors thereby we will establish this ecosystem through high-quality teacher training institutions and leveraging existing public infrastructure and industry facilities.

4. The party of the fourth part is a constituent college of the University of Delhi offering various undergraduate and postgraduate degree programmes.

5. SCOPE OF THE MOU

This MOU is only to facilitate collaboration to work together in the area of Career Counselling, Skill Development, Employment, Entrepreneurship Development, Start-up support and Mentorship Program for the benefit of students of UNIVERSITY OF DELHI, Delhi without any financial implications from either of the parties.

6. ROLE AND RESPONSIBILITIES

6.1 All parties will work together to create a career development framework and implement it through a Career Development Centre based in the premises of the FOURTH PART.

6.2 All parties shall appoint respective Single point of contact (SPOC) that will work together to identify/develop and implement various career development offers including but not limited to

a) Inspiring students to take self-development as a lifelong habit. The same shall be achieved through creation of Career Development Centre, Community, Career Support Helpline, University of Delhi, SOL, Samarth Bharat & Zakir Husain Delhi College Website, Support Groups, etc.

b) Implement career counselling framework to identify competency, interest and prospective career paths including exposure to various career options with guidance to choose the right career path & skilling/educational requirements.

c) Creating college based or external training infrastructure (E-Learning/ Classroom/ Internships) for various trainings like – Employability Skills & Workplaces issues, Finance Management & Investing, Competency Development, Vocational Skills, etc.

d) Organise various job placement opportunities including – Domestic & Global Work Opportunities (Technical Intern Training Program, Etc.), Earn while u learn – part time jobs & Internships, etc.

e) Organise various interventions for Entrepreneurship Development Program including exposure to industrial sector wise business opportunities, training in industry, business start training including guidance on how to organise finance for projects, etc.

THIS MEMORANDUM OF UNDERSTANDING (hereinafter referred to as "MoU") is made and executed on 07th February, 2023 at Delhi.

By and among

UNIVERSITY OF DELHI, Established in 1922 as a unitary, teaching and residential University incorporated under The Delhi University Act, 1922 as amended from time to time comprising of 16 faculties, 86 departments and 91 colleges (herein after referred to as "UNIVERSITY OF DELHI", which expression shall, unless it be repugnant to or inconsistent with subject or context thereof, include and be deemed to include their heirs, executors, successors or administrators and permitted assigns), represented by its Registrar, Dr. Vikas Gupta.

Party of the First PART

AND

The School of Open Learning (Herein after referred to as SOL) a part of the Campus of Open Learning formerly known as the School of Correspondence Courses and Continuing Education, established under the University of Delhi in 1962, is a pioneer Institution in the field of Distance Education in India, represented by its Chairperson, School of Open Learning, Prof. Payal Mago.

Party of the Second PART

AND

Bhaorao Deoras Seva Nyas is a Non-Profit Charitable Trust (under Section 12AA) registered in 1993 having its registered office at C-91, Nirala Nagar, Lucknow, Uttar Pradesh - 226020 (hereinafter referred to as "BDSN", which expression shall, unless it be repugnant to or inconsistent with subject or context thereof, include and be deemed to include their heirs, executors, successors or administrators and permitted assigns) represented by its General Secretary, Shri Rahul Singh.

Party of the Third PART

AND

Zakir Husain Delhi College, is a constituent college of the University of Delhi and located at Jawahar Lal Nehru Marg, New Delhi-110002, India (herein after referred to as "Respective college, Delhi", which expression shall, unless it be repugnant to or inconsistent with subject or context thereof, include and be deemed to include their heirs, executors, successors or administrators and permitted assigns) represented by its Principal, Prof. Narendra Singh.

Party of the Fourth PART

ZAKIR HUSAIN DELHI COLLEGE
(UNIVERSITY OF DELHI)
Jawaharlal Nehru Marg, New Delhi - 110002
Tel.: 011-23232218, 23232219, 23233420, Fax : 011-23215906
Website:www.zakirhusaindelhicollege.in
email:zakirhusaindelhicollege@gmail.com

ज़ाकिर हुसैन दिल्ली कॉलेज
(दिल्ली विश्वविद्यालय)
जवाहरलाल नेहरू मार्ग, नई दिल्ली - 110002
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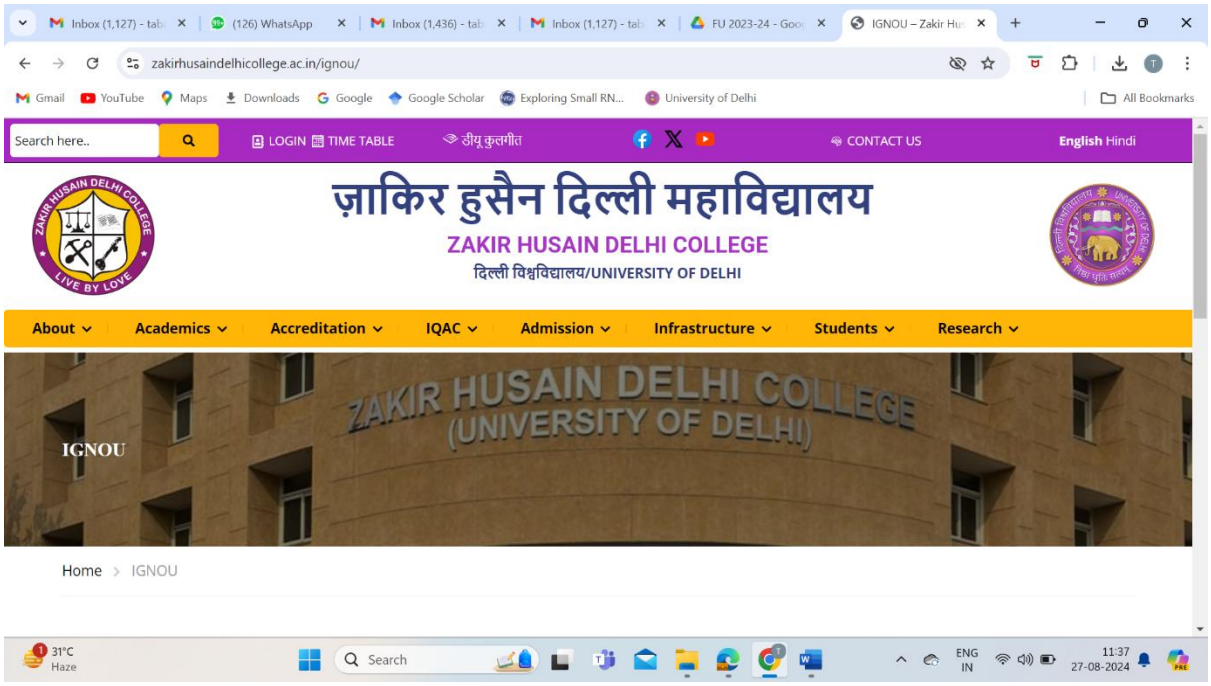
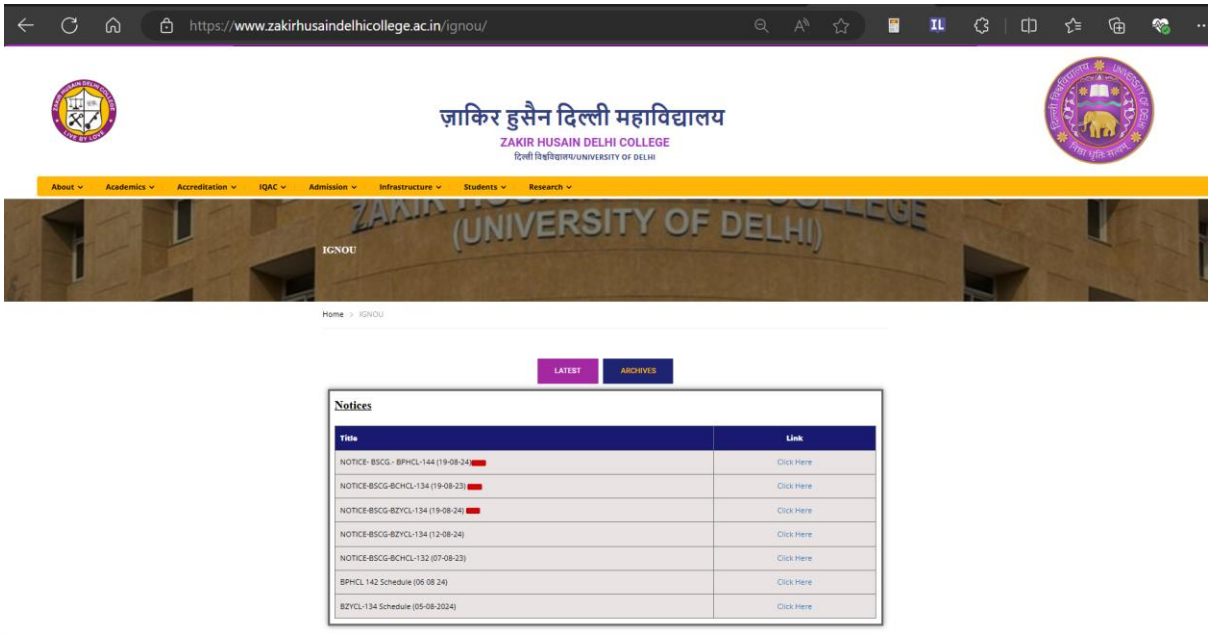
वेब स्थल: www.zakirhusaindelhicollege.in
इ-मेल: zakirhusaindelhicollege@gmail.com

Academic Counselling Centre for IGNOU





MEMORANDUM OF UNDERSTANDING
BETWEEN
BUSAN UNIVERSITY OF FOREIGN STUDIES,
65 Geumsaem-ro 485 beon-gil, Geumjeong-gu, Busan - 46234, Republic of Korea
AND
ZAKIR HUSAIN DELHI COLLEGE, UNIVERSITY OF DELHI
Jawaharlal Nehru Marg, New Delhi -110002, India

This Memorandum of Understanding (MoU) is entered into between **Busan University of Foreign Studies**, Republic of Korea, and **Zakir Husain Delhi College, University of Delhi,** India, hereinafter jointly referred as the "Parties,"

Desiring to expand and strengthen mutual friendly relations and to promote cooperation in the field of education enter into this agreement for greater understanding between the two parties.

1. **Purpose:**

A. To strengthen and encourage cooperation between the parties on education, culture and related matters.
B. To facilitate collaboration among the parties to further their shared goals and objectives to enhance educational and cultural ties.

2. **Scope of Work:**

A. Both Parties will implement and actively cooperate in mutually agreed activities.
B. Both Parties agree to establish a "Global Cooperation Center," which supports collaborative activities between both Parties;
C. To nominate a coordinator for the operationalization of "Global Cooperation Center" by both Parties; and
D. To promote 'Tandem Start-ups'/Virtual or Physical Classrooms for faculty/students exchange between the Parties.

3. **Future Cooperation:**

A. Both Parties will work together to achieve the objectives of this arrangement.
B. Both Parties will respect each other, act in good faith and cooperate in the pursuit of mutually determined interests of both sides.
C. Joint Projects under this arrangement will be based on prior agreement in writing between both the Parties.

4. **Legal Considerations:**

A. This arrangement does not lead to any legal or financial liability except as mutually agreed.
B. This arrangement shall enter into force on the date of signature and remain in force for a period of two years unless terminated by either Party by giving six months written notice in advance of intention to terminate the agreement.

11/6

email Sent to Dr. saini 16/4/24

IN WITNESS WHEREOF, the undersigned, being duly authorized by their respective institutions, signed the agreement on 24th Aug 2023 in English.

Signed by, for the

BUSAN UNIVERSITY OF FOREIGN STUDIES

Dr. Soon-Heung CHANG (President)

President

Date: 24th Aug 2023

Signed by, for the

ZAKIR HUSAIN DELHI COLLEGE, UNIVERSITY OF DELHI

Prof. Narendra Singh (Principal)

Principal

Date: 24th Aug 2023

REPORT

MOU between Zakir Husain Delhi College & Busan University of Foreign Studies

August 24, 2023

Zakir Husain Delhi College (ZHDC), University of Delhi signed MOU with Busan University of Foreign Studies (BUFS), Republic of Korea on August 24, 2023 for educational collaboration and international exchange of students and faculty members. On behalf of BUFS, MOU was signed by President Dr. Soon-Heung Chang and Prof. Narendra Singh, Principal, ZHDC signed it in the presence of a three-member visiting delegation from BUFS. Both institutions agreed to expand and strengthen mutual friendly relations and to promote cooperation in the field of education, culture and related matters.

SYMPOSIUM ON

CELEBRATING INDIA-KOREA FRIENDSHIP

A Symposium on 'Celebrating India-Korea Friendship' was also organised on this occasion which witnessed active participation by faculty members and students. Dr. Sonu Trivedi, Associate Professor, Dept. of Political Science gave an overview of 'India-Korea Cultural Connection.' Prof. Jung, Myungsook Dean of International Affairs, BUFS focussed upon educational exchange and collaboration under Global Cooperation Centre between the two institutions. Prof. Lee, Soon Chul, Director, India Centre, BUFS highlighted upon 'India-Republic of Korea Business Environment' and encouraged the students to participate in the forthcoming educational collaboration programmes with BUFS. The Programme concluded with an Open House Session between the students and the visiting delegation from BUFS.

PROGRAMME

MOU SIGNING CEREMONY

09:30 am Greetings and Introduction of Delegates

1. Jung, Myungsook (Dean of International Affairs)
2. Lee, Soon Chul (Director of the India Center)
3. Park, Jae Yeong (Staff member of the International Affairs Team)

09:35 am Signing of MOU between Zakir Husain Delhi College & Busan University of Foreign Studies.

09:45 am Group Photo & Tea Break

SYMPOSIUM ON

CELEBRATING INDIA-KOREA FRIENDSHIP

organised by

Department of Political Science, Zakir Husain Delhi College, University of Delhi

10:00 am Welcome Remarks, Dr. Aftab Alam, Teacher-in-Charge, Dept. of Political Science

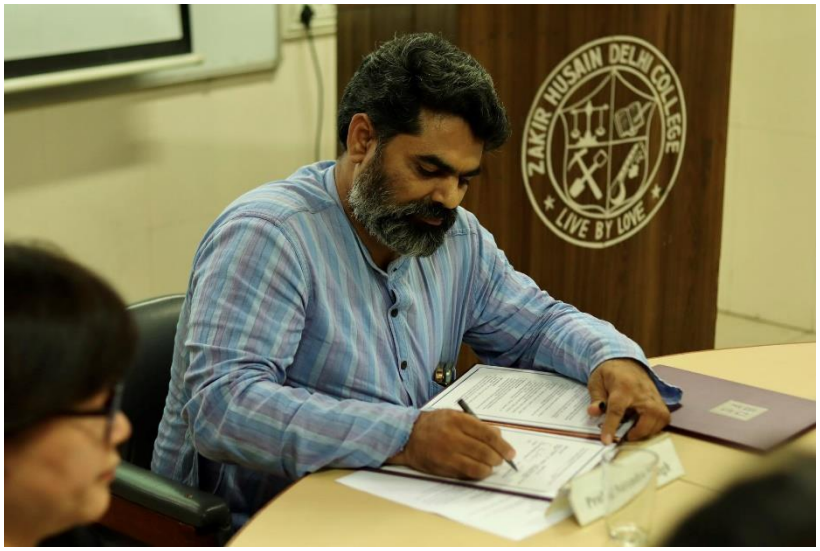
10:05 am Overview of India-Korea Cultural Connect, Dr. Sonu Trivedi, Dept. of Political Science

10:15 am Educational Exchange & Collaboration under Global Cooperation Centre, Prof. Jung, Myungsook Dean of International Affairs, BUFS

10:25 am India-ROK Business Environment, Prof. Lee, Soon Chul, Director, India Center, BUFS

10:35 am Interaction and Open House Session with students and Faculty members

11:00 am Concluding Remarks.


ZAKIR HUSAIN DELHI COLLEGE
LIVE BY LOVE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SYMPOSIUM ON
CELEBRATING INDIA-KOREA FRIENDSHIP
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AUGUST
24
BUFS - ZAKIR HUSAIN DELHI COLLEGE
Global Cooperation Center
부산외대 글로벌협력센터


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Annual Reports (AY: 2023-24)

Viksit Bharat Committee

The Inaugural ceremony of Viksit Bharat committee of Zakir Husain Delhi College, University of Delhi took place on February 29, 2024. The event was graced by esteemed guests, including the Guest of Honour, Prof Shri Prakash Singh, and the Honourable Chairman of Zakir Husain Delhi College Governing Body, Prof Surender Singh. The ceremony signified a notable achievement in the college's dedication to promoting growth and innovation within India. To enrich the occasion, a panel discussion on startups in India was organized, featuring esteemed panelists: Dr. Abhishek Tondan, Jt. CEO of Udhmodya Foundation; Mr. Shonal Gupta, Executive Director & Visionary of Prasadini Oil Mills Pvt Ltd.; and Dr. Aditya Thakur, CEO & founder of Dentrifice Pvt Ltd. Following this insightful discussion, various student activities such as video making, slogan writing, and logo designing competitions were held to celebrate the essence of innovation and creativity that characterizes the vision of ViksitBharat@2047.The inaugural ceremony concluded with a cash prize distribution session for the best ideas for Viksit Bharat@2047, marking the successful conclusion of the event.

In collaboration with the BSE Institute, the Viksit Bharat committee facilitated a seminar focused on exploring "Investment Opportunities in the Stock Market." The seminar featured Mr. Pulock Bhattacharji, Vice President of BSE Institute Limited, as the keynote speaker. This collaborative effort aimed to enrich attendees' understanding of investment prospects within the stock market.

Gandhi Study Circle, ZHDC

The society conducted its Orientation Programme on 18th August, 2023 where the relevance of Gandhi in the contemporary world was elaborated by the Convener, Prof. Sanjeev Kumar. With the help of Gandhian activist Mrs. Indubala, Charkha spinning classes formally began from 20th September 2023. On 29t September 2023, the Gandhi Study Circle conducted a guided trip to Gandhi Darshan. On the auspicious occasion of Mahatma Gandhi's 153rd birth anniversary on 2nd October, 2023, organised an International Webinar on "Gandhi's Legacy: Words & Marketing Brands by Prog. Thomas Weber - Eminent Gandhian Scholar & Senior Fellow at La Trobe University, Melbourne, Australia. A Panel Discussion on the theme " Gandhi's Satyagraha Today: Issues and Challenges" was organised on 3rd October, 2023 followed by Debate and Art competition. A webinar on Peace Building and Reconciliation was organised where the Lieutenant Commander Bijay Nair was the guest speaker, highlighted on the pivotal steps required towards building a future devoid of conflict and war on 13th November, 2023. A symposium on Mapping Sustainability, Energy and Environment: A perspective of

Gandhian Economics organised on 30th January, 2023 Economist Dr. Pooja Sharma provided an insightful analysis of Gandhi's tenets.

The Induction Ceremony on 'Non-Violent Communication' - a collaborative endeavour with Gandhi Smriti and Darshan Samiti, under the auspices of the Ministry of Culture was proudly launched on 1st February, 2024.

National conference on “Exploring the Gandhian Approach of Conflict Resolution,” in collaboration with the Indian Council of Philosophical Research and Gandhi Smriti and Darshan Samiti is organized on 20th March, 2024. Prof. Dennis Dalton a distinguished Gandhian Scholar from Columbia University was a keynote speaker give shed light on Mahatma Gandhi's interpretation of duty. Prof. Ramin Jahanbegloo in his Valedictory remarks underscored the importance of forgiveness, reconciliation, and nonviolence. Prof. Balaram Pani, the Dean of Colleges, University of Delhi was the Chief Guest for the event.

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1947 To 2047
ZAKIR HUSAIN DELHI COLLEGE
UNIVERSITY OF DELHI
GANDHI STUDY CIRCLE
in collaboration with
INDIAN COUNCIL OF PHILOSOPHICAL RESEARCH
& GANDHI SMRITI AND DARSHAN SAMITI
Cordially Invites You to the
National Conference
On
Exploring the Gandhian Approach of Conflict Resolution:
Relevance for India and the World in the 21st Century
Wednesday, 20 March 2024
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Canara Bank
R.S.V.P
PROF. SANJEEV KUMAR
CONVENER
PROF. NARENDRA SINGH
PATRON


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Wednesday, 20 March 2024

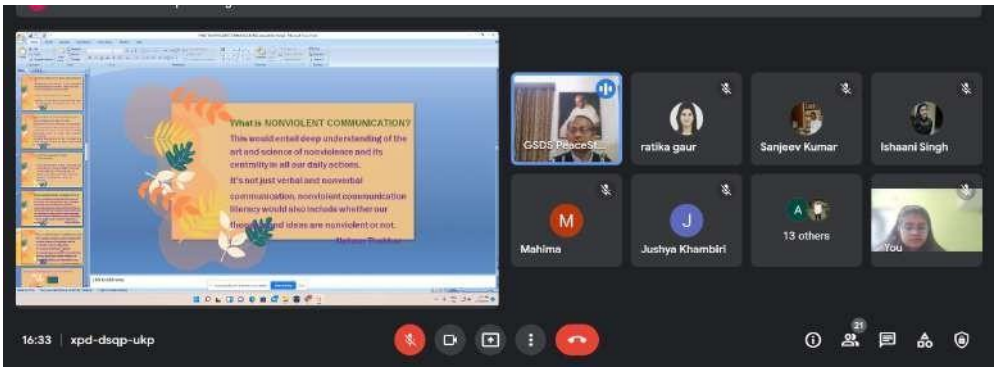
<u>Annual Reports (AY: 2021-22)</u>

Gandhi Study Circle, ZHDC

Certificate Course Orientation

Gandhi Study Circle, Zakir Husain Delhi College initiated the First Batch of the Short-term Certificate Course on 'Non-Violent Communication' jointly

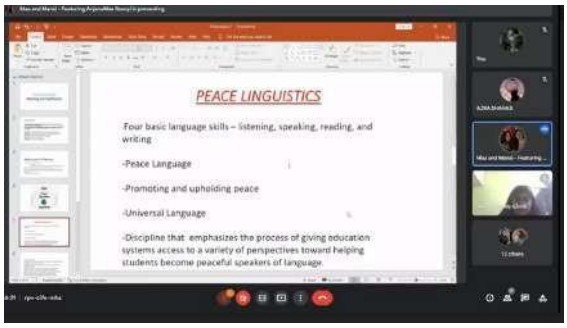
offered by Gandhi Study Circle, Zakir Husain Delhi College, and Gandhi Smriti and Darshan Samiti (Ministry of Culture). The course commenced with an Orientation Program on 18th February 2022. The Orientation Session was attended by the students enrolled in the course.



Dr. Vedabhyas Kundu (Program Officer, Gandhi Smriti, and Darshan Samiti) and our Convenor Dr. Sanjeev Kumar briefed us about the importance of Non-Violent Communication as a significant value to be inculcated in an individual's life. In this 30 Hours Value-added Certificate Course, the classes are engaged in different aspects of Non-Violent Communication.

Short-term Certificate Course on Non-Violent Communication

Gandhi Study Circle of Zakir Husain Delhi College, University of Delhi in collaboration with Gandhi Smriti and Darsan Samiti, Union Ministry of Culture is conducting this 30 weeks short term, skill enhancement, and value-making course. The classes for the course take place on every Friday and Saturday beginning with an orientation program on 27th December 2021. Our weekly classes are held on an online mode, which sees a good number of participation from the students. With their expertise in this field, our instructors in each of the sessions have been able to make us introspect and reform ourselves inside-out to be better human beings.



These classes have taught us the importance of positive thinking; pro- social behaviour; the Gandhian principle of Non-Violent Communication; altruism, gratitude, compassion, empathy, and forgiveness. Discussions on these topics have opened up pores for some very crucial questions by our participants. Last but not the least, we would like to extend our gratitude to our convener Dr. Sanjeev Kumar and the program officer of Gandhi Smriti, and Darsan Samiti, Dr. Vedvyas Kundu for making this endeavour possible.

Annual Reports (AY: 2020-21)

NSS, ZHDC

2020-2021

- NSS- Orientation Program - Lecture on Stress Management Dr. Nisha Khanna (Psychologist)
  5th March, 2021
- NSS-Yoga Day Celebration Chief Guest; Prof. P.C. Joshi (VC, University of Delhi) - Mr. Sunil Kumar Gupta (Yoga Expert)
  21st June, 2021
- NSS-Slogan Writing on Importance of Yoga 50
  20th June, 2020
- NSS-COVID-19 Awareness Program 20
  31st March, 2020
- NSS-Tree Plantation Drive 20
  6th September, 2020
- NSS-Clean your Surroundings Drive 20
  1st March, 2021
- NSS-Pledge for being responsible citizen during Pandemic 50

27th October, 2020

- NSS-Poster Making on topic of 'Atma Nirbhar Bharat' 20
  15th August, 2020
- NSS-Feeding the Stray Animals Drive 20
  1st March, 2021
- NSS-Essay Writing on 'Gandhian Value and NSS' 20
  24th September, 2020

Aranya- The Nature and Environment Society

Zakir Husain Delhi College

University of Delhi

The society organized wall magazine activity for the month of January and February with eco-friendly and recyclable materials on different topics.

Organized National Conference on Water Sustainability: Conservation, Policy, Ethics and Science in collaboration with Department of Environmental Studies, Zakir Husain Delhi College from 21st-22nd January, 2020.

Field visit to Yamuna Biodiversity Park to celebrate the World Wetland Day on 2nd February, 2020.

Organized an inter college paper reading competition on the topic "Can the environment be a political issue?" on 20th February, 2020.

Winners-

1st Prize- Aadil Ashraf, B.Sc. (H) Botany

2nd prize- Gagan Malhotra, B.Sc. Life Sciences

3rd prize- Himanshi Gupta B.Sc. (H) Botany

Organized Inter College Nature and Environment quiz in collaboration with the Department of Environmental Studies on 9th April 2020.

Launched a dedicated social media team to update society activities regularly on Facebook Page from 11th June 2020.

Launched an Instagram page of Nature and Environment Society from 14th June 2020.

Regular updates about various environmentally important dates on social media began from 15th June 2020 till date

The new office bearers of the society announced for the new session on 22nd July 2020

Announcements to initiate new members in the society and selection process ensued.

Organized inaugural session - welcoming the new members through a webinar on the topic History of Ponds and Pond Restoration and interaction with the esteemed speaker Pond Man of India - Ramveer Tanwar on 4th August 2020

New invitations for magazine entries for the development of annual magazine of Nature and Environment Society - Srishti announced from 17th August 2020

Organized a virtual Plantation Drive in collaboration with NSS and Gandhi Study Circle with the theme of Plant a Toxin Free Future where participants planted saplings with medicinal properties in their balconies or nearby place so that proper the plants can be nurtured and sent a video clip of the same on 6th September 2020

Organized a Poster and Quiz Competition along with a series of posts in social media handles to create awareness about Ozone Day and mark the 35 years of success by Montreal Protocol from 15th to 23rd September 2020.

Quiz Winners:

The first runner up Dhananjay Kaushik of ASN Sr. Sec. School, Vaishnava A. of Meenakshi Vilasam Government Higher Secondary School and Manasi Chaturvedi of 2nd Year Botany (H.) - Hindu College

The second runner up Mohit Gupta of 3rd year B.Com (prog.) - Zakir Husain Delhi College

And the WINNER Roshni Ramesan of 2nd-year Philosophy (H.) - Zakir Husain Delhi College

Poster winners

The First Runner up Riya Dikshit of Zakir Husain Delhi College

The Second Runner up Chitra Mangla

And the WINNER Aisha Panda of Buxi Jagabandhu English Medium School

The consolation prize Pradeep Kaushik of Zakir Husain Delhi College

Organized Hopping Sparrows Film Festival where a number of wonderful short films raising the various ecological and environmental issues to light and discussion sessions will be featured in the online festival on the theme of, "Each One, Protect One" in collaboration with

the Department of Environment Studies Parimandal of Zakir Husain Delhi College on 3rd October 2020.

Organized a virtual act to create awareness about Permanent Ban On Firecrackers on 13th November 2020

First year students were registered from 3rd-10th December 2020, 24th -29th December

Selection process with questionnaires, interview sessions and extra curricular talents such as photography, graphic designing, artistic rendition, content writing, event management and computer skills and capabilities in two rounds – to shortlist members were conducted from 1st - 19th January 2021

The new year began with the orientation program organized for new-comers. We introduced the members to the functioning, past year activities of our society and the annual magazine published by our society.

Followed by that, Aranya had organized a wetland quiz on 1st February and the inaugural lecture on 2nd February, which was graced by Dr. Sharmila Sinha, a former member of CSE. The theme of the lecture was “Water water everywhere, but where does it come from?”. The lecture covered the fundamentals of wetlands as we were commemorating “World Wetland Day” which is celebrated on 2nd February. The results of the quiz were announced following the lecture.

Thereafter, a photography and a live online poem competition were organized on themes “Nature and Solitude” and “Lessons from Nature” respectively. The results of the live poem competition were announced after the event on 24th February, along with the results of the photography competition as well.

On 4th March 2021, we organized a “Workshop on Waste Management” conducted by Mr. Vasuki Iyengar, member of SWMRT (Solid Waste Management Round Table). The theme of the workshop were waste management strategies, bio-enzymes, composting methods, improving soil structure, texture and fertility.

On 10th March, a talk on “Sustainable Menstruation” was organized in collaboration with AASMI- the Girl’s Association of Zakir Husain Delhi College. The speakers at the talk were Smita Kulkarni, member of SWMRT and Santha Nataraj, who works along with Ms. Kulkarni. The talk focused on alternative eco-friendly solutions of sanitary pads, such as reusable cotton pads and use of menstrual cups.

On 27th March, the members of the society had pledged their action towards “Earth Hour” by switching off non-essential lights from 8.30 PM to 9.30PM.

On June 17th, the annual magazine called Srishti was published virtually on the college website. The magazine is a platform for students and faculty to voice their opinions in forms of articles, creative art, stories, poems, etc. It also records the report of the session.

Thereafter, on 29th June, a farewell event was organized to bid adieu to the graduating members of the society, thus ending the session for the year 2021.

Gandhi Study Circle, ZHDC

Gandhi Jayanti Celebration and 1st Lecture of "Distinguished Gandhi Lecture Series" by Prof Akeel Bilgrami, 2nd October 2020

Commemorating Mahatma Gandhi on his 151st birth anniversary celebration, Gandhi Study Circle organized a weeklong celebration with a series of events, both academic and creative. Before 2nd October, a week-long online competition was organized namely Mono act, Digital art, and letter-Writing. In Mono- Act, participants were asked to present a short mono-act on the theme "Be the voice of the institution you think has suffered the most in independent India" meanwhile in letter writing competition theme decided for the participants were "A letter from Gandhi to address Contemporary Distress" which, in other words, was an open-letter writing competition. Adding to the necessity of time, a modern set of technical competition digital Art on the theme of "Undoing 2020" was also organized.

On 2nd October 2020, Gandhi Study Circle organized "Gandhi Jayanti celebration" in collaboration with Gandhi Study Circle, Miranda House in which a relaxing meditative session was organized in which illustrious BK Nikita Ji, let the audience understand the importance of meditation and its habitable practice. In the event, meditation was also practiced for a considerable duration of time. The entire event was highly interactive and enriching along with a meditative session.

Another event "Dastan - E- Bapu" in which an enriching "Dastan Goi" a unique form of storytelling by MS Rupali Gupta of Miranda House served the essence and importance of the day.

In the same very event, core members of Gandhi Study Circle, Zakir Husain Delhi college recited poems dedicated to the greatness and the personality of our respected Bapu.

On 2nd October 2020, in the evening, Gandhi Study Circle inaugurated another great initiative of the "Distinguished Gandhi lecture series" which is still in practice and three different lectures of this series have been organized.

The inaugural lecture of this series was presented by an eminent personality Akeel Bilgrami, professor department of philosophy at Columbia University who is an Indian philosopher of language and mind. Professor Bilgrami endorsed and embraced the evening of Gandhi Jayanti on "Gandhi's Legacy of our Times". The talk was joined by eminent scholars all over the world. The conversation became fruitful and enriching by the sharp interventions by the Scholars and the audience who attended the event. The event was telecasted live on Facebook and the YouTube page of GSC and we had more than 250 participants. The link to the lecture is provided below.

https://youtu.be/qxc7dwIxMDw

3rd Lecture of Distinguished Gandhi Lecture Series, 15th January 2021

Functioning in online mode persuaded our core members to utilize the online platform to its best by organizing an international webinar under the guidance and support from our convener Dr. Sanjeev Kumar. The society organized its 3rd lecture under 'Distinguished Gandhi Lecture Series' on 15th January 2021 on online platform zoom, the event was organized in collaboration with 'Gandhi Research Foundation', the theme of the lecture was 'Gandhi and Swaraj in ideas'. The lecture was delivered by eminent dignitary Lord Bhikhu Parekh, emeritus professor Political Philosophy, University of Westminster and Member of Parliament of United Kingdom, the event was chaired by Professor Geeta Dharampal, Dean, and prof. of Gandhi Research Foundation, Jalgaon.

The event began with an opening video created by our core student member, which introduces the society and the events it has organized in the past year, and through the ongoing pandemic, the event concluded with a question-answer session that was moderated by the student member of Gandhi Study Circle. The discussion was joined by scholars like prof. Faisal Devji, Dr. Gopal Guru, renowned personalities like Mr. Mark Tully, former BBC Bureau Chief, and students from universities across the globe. The event witnessed the presence of more than 347 participants and was telecasted live on Facebook and the youtube page of Gandhi Study Circle, allowing more participants to join it. The link to the lecture is provided below.

https://youtu.be/6gBDMfewOyE

Annual Reports (AY: 2019-20)

NSS, ZHDC

- NSS-Orientation Program - Lecture on Health Issues and Motivational Skills
  Dr. Jasjeet Singh Wasir (Medanta Hospital)
- NSS-Mr. Gaurav Thakral (an Alum of ZHDC and MTV Roadies Contestant)
  300
  24th September, 2019
- NSS-Stem Cell Donation Workshop 100
  31st January, 2020
- NSS-Raddi Collection Drive 100
  16th to 21st October, 2019
- NSS-Cloth Distribution in Nearby Locality 50
  6th November, 2019
- NSS-Best Out of Waste Competition 50
  31st January, 2020

- NSS-Diwali Mela 200
  23rd October, 2019
- NSS-Visit to Aashram 50
  24th October, 2019
- NSS-Poster Making Competition 50
  30th September, 2019
- NSS-SwachchtaPakhwada Ministry of Jal Shakti, GOI Sparsh Ganga 20
  2nd October, 2019
- NSS-National Youth Festival Ministry of Sports and Youth Affairs, GOI National Youth Festival 2
  12th to 16th January, 2020
- NSS-Internship Program Indian Red Cross Society Internship on Blood Donation Awareness 1

  3rd June, 2019 to 15th July, 2019

Aranya- The Nature and Environment Society

Aranya- The Nature and Environment society of Zakir Husain Delhi College has worked relentlessly in order to educate students and make them realize the importance of the environment and how important it is to keep it healthy, clean and pollution free.

The new term commenced with the Orientation Program on 1st August 2019 in association with Chintan Environment group making students aware about the importance of waste segregation and harmful effects of plastic along through a very interactive session. The new members of the society were also acquainted with the functioning of the society, its existing members, past achievements, and aspirations; thus encouraging them to come forth and contribute to the well being of this planet.

The society organized an online poster making competition on 'Defeat day zero' to make students realize the importance of water and make them take necessary steps against the increasing scarcity.

Furthermore, society members volunteered for India Plog Run on 2nd October 2019, organized by WWF in association with United Way. It was a 3 km walk/run in which participants picked up plastic trash and disposed of it suitably.

On October 14, 2019, an Inaugural Lecture was held,wherein Dr. Monalisa Sen delivered her talk on Various Aspects of Urban Biodiversity. This made the students aware of the facts and various avenues regarding the conservation of biodiversity.

On the occasion of Diwali, the society collaborated with Chintan Environmental group and launched a collection drive for Plastic and E waste collection was organized to ensure its proper disposal. An Inter College Monoacting Competition on the topic 'Ill effects of Diwali due to crackers.', highlighting the was also organized by the society.

On November 6,2019, the society also performed Nukkad Natak on the topic *"Dilli teri Yamuna Maili "at* the awareness workshop on River Yamuna held at Delhi Secretariat, organized by the Department of Environment, Government of NCT of Delhi.

Nature and Environment society in association with Department of Environmental Science of Zakir Husain Delhi College, University of Delhi, in the presence of eminent guests and lecturers like Dr. Rajendra Singh (Waterman of India) and Professor Dinabandhu Sahu, organized a National Conference on Water Sustainability: Conservation, Policy, Ethics and Science on 20-21 January 2020.

Followed by that, students of the society attended the World Wetland Day celebration event at Yamuna Biodiversity Park with a great enthusiasm to understand the importance of wetlands and the need to conserve them.

A Paper reading competition on the topic "Can the environment be a political issue?" was organized in order to make people aware of the role of government and other political entities in improving the quality of the environment.

Moreover, members of our society also attended an event by Youth Clean Air Network (YCAN) on February 24, 2020, which aimed to engage young people in finding solutions for better air quality.

The Earth Warrior Competition was organized by Mission 100 Crore Tree for people of all age groups, which required contributions in the form of posters, poems or articles.

An online poster making competition on 'Let's BeatDefeat day zero' was held in order to make students realize the importance of water and make them take necessary steps to curb the increasing scarcity.

The society strived to bring about a change in people's mindset towards the environment throughout the academic year 2019-2020 by constantly organizing such aforementioned seminars, drives, and competitions, hoping for a safer, greener planet.

Gandhi Study Circle

30th January National Gandhi Museum: All-religion Inter-Faith prayer in the remembrance of bapu in an event organized at National Gandhi Museum. International Sarangi player, Nabeel Khan, who is also a student of Zakir Husain Delhi College, gave a presentation of the melody of Sarangi, in the same event, assisted by the strokes of Tabla

Gandhi and Contemporary World- Dr. Sanjeev Kumar's Book Launch Event: March 3 ,2020, a day of proud and inspiration for the members of Gandhi Study Circle, Gandhi Smriti and Darshan Samiti and Indian Council of Gandhian studies, celebrated the publication of "Gandhi and Contemporary World" edited by Dr Sanjeev Kumar convener of Gandhi Study Circle

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Guru Angad Dev Teaching Learning Centre
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Government of India
Ministry of Education

NPTC Group of Colleges
United Kingdom

Sri Guru Tegh Bahadur Khalsa College
University of Delhi

Certificate

This is to certify that PROF. SARITA PASSEY of Zakir Husain Delhi College, DU has participated in **INDO-UK Seminar** on **"Future of Teaching-Learning and Assessment in Higher Education"** jointly organized by Guru Angad Dev Teaching Learning Centre, SGTB Khalsa College, University of Delhi under the Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT) of Ministry of Education and NPTC Group of Colleges, Wales, United Kingdom held at India International Centre, Delhi on **01st September 2023.**

Prof. Jaswinder Singh
Principal
S.G.T.B. Khalsa College
University of Delhi

Prof. Vimal Rarh
Project Head & Joint Director
GAD-TLC of Ministry of Education

UNIQUE CERTIFICATE NO.: GAD-TLC/23-24/SEM-91/43

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TEACHING LEARNING CENTRE

A Centre under Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT), MHRD, Govt. of India.

SRI GURU TEGH BAHADUR KHALSA COLLEGE
UNIVERSITY OF DELHI

Date: 11th September 2023

To whomsoever it may concern

This is to certify that **DR. SARITA PASSEY**, **ZAKIR HUSAIN DELHI COLLEGE, UNIVERSITY OF DELHI** has contributed as **Member of the Organizing Committee** in One-Day Workshop on **"Future of Teaching-Learning and Assessment in Higher Education"** organized by Guru Angad Dev Teaching Learning Centre, SGTB Khalsa College, University of Delhi under the Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT) of Ministry of Education held on **01st September 2023.**

Prof. Vimal Rarh
Project Head & Joint Director
GAD-TLC of Ministry of Education

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Guru Angad Dev
TEACHING LEARNING CENTRE
A Centre under Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT), MHRD, Govt. of India.
SRI GURU TEGH BAHADUR KHALSA COLLEGE
UNIVERSITY OF DELHI

Date: 11th September 2023

To whomsoever it may concern

This is to certify that **DR. SARITA PASSEY**, **ZAKIR HUSAIN DELHI COLLEGE, UNIVERSITY OF DELHI** has contributed as **Member of the Organizing Committee** in One-Week Online National Faculty Development Program on "Cancer Awareness" jointly organized by Indian Cancer Society, Delhi and Guru Angad Dev Teaching Learning Centre, SGTB Khalsa College, University of Delhi under the Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT) of Ministry of Education held from **21st August to 28th August 2023**.

Prof. Vimal Rarh
Project Head & Joint Director
GAD-TLC of Ministry of Education

ZAKIR HUSAIN DELHI COLLEGE
(UNIVERSITY OF DELHI)
Jawaharlal Nehru Marg, New Delhi - 110002
Tel.: 011-23232218, 23232219, 23233420, Fax : 011-23215906
Website:www.zakirhusaindelhicollege.in
email:zakirhusaindelhicollege@gmail.com

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(दिल्ली विश्वविद्यालय)
जवाहरलाल नेहरू मार्ग, नई दिल्ली - 110002
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Certificate

NEP 2020 ORIENTATION & SENSITIZATION PROGRAMME

This is to certify that

PROF. SARITA PASSEY of **ZAKIR HUSSAIN DELHI COLLEGE, DU**

has contributed as **Member of the Organising Committee** in NEP 2020 Orientation & Sensitization Programme under Malaviya Mission Teacher Training Programme (MM-TTP) of University Grants Commission (UGC) organized by UGC-MMTTC (GAD-MMTTC), Sri Guru Tegh Bahadur Khalsa College, University of Delhi from **19 January to 31 January 2024.**

Prof. Vimal Rarh
Project Head & Joint Director
GAD-TLC of Ministry of Education

UNIQUE CERTIFICATE No: GAD-MMTTC-23-24-NEP-JAN-B-OT-001

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Prof. Vimal Rarh
Project Head & Joint Director
GAD-TLC of Ministry of Education

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UNIQUE CERTIFICATE No: GAD-MMTTC-23-24-NEP-FEB-A-OT-001

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Prof. Vimal Rarh
Project Head & Joint Director
GAD-TLC of Ministry
of Education

UNIQUE CERTIFICATE No: GAD-MMTTC-23-24-NEP-FEB-B-OT-001

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Prof. Vimal Rarh
Project Head & Joint Director
GAD-TLC of Ministry
of Education

UNIQUE CERTIFICATE No: GAD-MMTTC-23-24-NEP-MAR-A-OT-001

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Prof. Vimal Rarh
Project Head & Joint Director
GAD-TLC of Ministry of Education

UNIQUE CERTIFICATE No: GAD-MMTTC-24-25-NEP-APRIL-A-OT-001

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Prof. Vimal Rarh
Project Head & Joint Director
GAD-TLC of Ministry of Education

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Prof. Vimal Rarh
Programme Director

UNIQUE CERTIFICATE No: GAD-MMTTC-24-25-NEP-MAY-A-OT-001

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Prof. Vimal Rarh
Programme Director

UNIQUE CERTIFICATE No: GAD-MMTTC-24-25-NEP-MAY-B-OT-001

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Prof. Vimal Rarh
Programme Director

UNIQUE CERTIFICATE No: GAD-MMTTC-24-25-NEP-JUNE-A-OT-001

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Prof. Vimal Rarh
Programme Director

UNIQUE CERTIFICATE No: GAD-MMTTC-24-25-NEP-JUNE-B-OT-001

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Botanical Excursion to IVRI

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Gmail **Dr Malti Gupta <dr.maltigupta@gmail.com>**

Permission for Students' Visit to the IVRI campus

3 messages

Dr Malti Gupta <dr.maltigupta@gmail.com> Tue, Oct 3, 2023 at 5:25 PM
To: directorivri@gmail.com, triveniduttivri@gmail.com
Bcc: Dr Malti Gupta <drmaltigupta@gmail.com>

To
Dr Trivent Dutt
The Director
IVRI, Mukteshwar , Uttaranchal , India

Dear Madam

From Zakir Husain Delhi College, Delhi University, I wish to bring our undergraduate students of Honours Programme , to this prestigious institute for an exposure to the world of research activities. We would like these undergraduate students to get a know-how of the recent technologies being used for higher studies and research programmes.

In the past also,we have visited this institute and have benefited a great deal from a direct exposure of research activities,ongoing projects and interaction with the scientists. Such visits have been an eye opener for these young minds and can help them design their future course of studies.

We plan to reach Mukteshwar on the morning of 16th October, 2023 and would like to visit IVRI campus on the afternoon of 16th October. Ours would be a group of 25 people including faculty members, and boys and girls.

We would feel privileged if you would kindly grant us permission for visiting the Institute and assure that they get a guided tour of some of its divisions on 16th October, from 1 pm onwards.

Hoping for a suitable reply,

with My Best Warm Regards
--
Dr. Malti Gupta, M.Sc., M.Phil., Ph.D.
Associate Professor in Botany
Zakir Husain Delhi College,
University of Delhi
M- 9810023164

Joint Director Mukteswar <jointdirectorivrim1@gmail.com> Wed, Oct 4, 2023 at 11:35 AM
To: Dr Malti Gupta <dr.maltigupta@gmail.com>

Dear Sir/madam,

Greetings from IVRI, Mukteswar.

With reference to your mail, it is to inform that the students of your College are welcome to visit IVRI, Mukteshwar on 16th October, 2023. Dr. Amol Gurav, Scientist, Mob No. 9760214814 will coordinate the students group.

Yours sincerely,

Station Incharge

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Visit to Aravalli Biodiversity Park

TABASSUM JEHAN <tabassumjehan@zh.du.ac.in>

Request for visit to Aravalli Biodiversity Park on 9 February 2024

Aravalli Biodiversity Park <aravalli_biodiversitypark@yahoo.co.in> Mon, Feb 5, 2024 at 12:26 PM
To: TABASSUM JEHAN <tabassumjehan@zh.du.ac.in>

Dear Madam,

Yours College's educational Visit is confirmed at Aravalli Biodiversity Park on Feb 09/2024 at 10:00 am. It will be complete responsibility of the concerned teachers to ask the students to maintain discipline while inside the Park. Students should carry water bottles, notepads, pen/pencils, caps and mask. Eatables are not allowed.

In case of cancellation of your visit due to any reason kindly inform us.

Please find the Aravalli Biodiversity Park location link

Aravalli Biodiversity Park
https://maps.app.goo.gl/ZwZpB6Z74U3hvEr76

Regards,
Ms. Balwinder Kaur
Nature Education Officer
Mob : 8810212947
Aravali Biodiversity Park
Vasant Vihar, New Delhi
[Quoted text hidden]

Visit to BIONEST- South campus

22:08 ! 04:21

Bionest UDSC Feb 12
to me, yogi110, head, mi...

From Bionest UDSC • bionest@south.du.ac.in
To SAVINDRA KUMAR • savindra@zh.du.ac.in
Cc yogi110@gmail.com
head@microbio.du.ac.in
microsdc@yahoo.co.in
Date Feb 12, 2024, 16:03
Standard encryption (TLS).
View security details

Dear Sir,

Greetings from BioNEST-UDSC..!!

Thank you for your interest in BioNEST-UDSC. We are happy to facilitate this visit on **22 Feb 2024.**
You are requested to kindly let us know the time of your visit to BioNEST facility.

Thanks and Regards

BioNEST-UDSC
University of Delhi South Campus
Benito Juarez Road
New Delhi-110021
email:bionest@south.du.ac.in
Ph:24157371

Report of History Department Trip in Zakir Husain Delhi College

The trips and Heritage walks are important part of History curriculum, as these visits provide insights into the various architectural styles prevalent across different regions as well as historical time periods. Also, most of the papers taught as part of history syllabus, engage in the aspects of political rulership, along with social, religious and cultural domains and the regular historical excursions both within and outside Delhi are undertaken to provide students with more indepth understanding of all these aspects.

As part of these historical excursions, the department of History undertook two historical visits in the year 2023-24. From 29th April to 6 May 2023, a trip to Sikkim was organised. A number of heritage sites especially related to Budhhism including the Rumtek Monastery, Nathula-pass, Gurudongmar lake etc were covered. The trip included 18 students along with 3 teachers.

List of Students:

Fareed (22/476)
Sameer (22/482)
Mayank (22/491)
Harshit (22/470)
Alok (22/489)
Yash (22/490)
Amrit (22/511)
Lileng(
Divya (22/467)
Aditi (22/493)

Khushi (22/484)
Samra(22/497)
Saba (22/466)
Riya Panchal (22/514)
Riya Maurya(22/469)
Srishti (22/468)
Sneha (22/488)
Deepshikha(22/486)

From 27 April to 4th May 2024, a trip to Himachal was organised. Numerous heritage places, belonging to medieval and modern Indian history - Shimla (Institute of advanced studies), Spiti Valley, Naggar Castle (1460 CE), Hidimbadevi temple (1553 CE), Atal Tunnel were visited by a total of 24 students and 6 teachers

List of students:
Apoorv (21/685)
Aishwarya (21/1816)
Vishesh (21/1814)
Vishal (21/692)
Alok (22/489)
Sameer (22/482)
Lileng (22/499)
Labiduz (22/1604)
Aditya Singh (22/508)
Sadanand (22/509)
Karan Kumar(23/196)
Aditya Patel (23/195)
Anmol (23/191)
Nasir (23/175)

Vivek (23/202)
Dulal Murmu (23/201)
Janki (23/174)
Pragati Chaurasiya (23/199)
Palak Tiwari (23/184)
Nutan (23/179)
Sneha (22/488)
Shrishti (22/468)
Ashmi (22/504)

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Visit to WTC- IARI

Mohammad Wahid Ansari <mwahidansari@zh.du.ac.in>

Requesting your permission to allow my students (Delhi University) to visit your centre for study purposeas
7 messages

Mohammad Wahid Ansari <mwahidansari@zh.du.ac.in> Tue, Oct 3, 2023 at 3:58 PM
To: pd_wtc@iari.res.in

Dr. Pothula Srinivasa Brahmanand
Project Director, Principal Scientist
Division: Water Technology Centre (WTC)

Dear Sir,

As a teacher to fulfill the course requirement of the course 'Basic Analytical techniques" in which a student's visit is required to make the students aware about water treatment technology. Therefore, I request you to kindly allow the undergraduate students (A total of 10-15 students) to visit your centre for the same purpose. After your consent I will coordinate with you to finalize the date of visit.

Thank you in advance.

With regards

Dr M Wahid Ansari
Assistant Professor
Zakir Husain Delhi College (University of Delhi)
JLN Marg, New Delhi 110 002

pd_wtc@iari.res.in <pd_wtc@iari.res.in> Fri, Oct 20, 2023 at 12:40 PM
To: Mohammad Wahid Ansari <mwahidansari@zh.du.ac.in>

Dear Sir,

With reference to the subject cited above, it is to inform that the Water Technology Centre, ICAR-IARI visit of undergraduate students the from your colleges (University of Delhi) may be scheduled on **31.10.2023.** Kindly conform the same

With best regards

P S Brahmanand
Project Director
WTC, ICAR-IARI

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Malaviya Mission Teacher Training Programme

ज्ञान-विज्ञान विमुक्तये
University Grants Commission
Quality Higher Education For All

सत्यमेव जयते
Ministry of Education
Government of India

Guru Angad Dev Malaviya Mission Teacher Training Centre (GAD-MMTTC) (Formerly GAD-TLC)

Sri Guru Tegh Bahadur Khalsa College University of Delhi

Certificate

NEP 2020 ORIENTATION & SENSITIZATION PROGRAMME

This is to certify that

DR. TABASSUM JEHAN of **ZAKIR HUSSAIN DELHI COLLEGE, DU**

has contributed as **Member of the Organising Committee** in NEP 2020 Orientation & Sensitization Programme under Malaviya Mission Teacher Training Programme (MM-TTP) of University Grants Commission (UGC) organized by UGC-MMTTC (GAD-MMTTC), Sri Guru Tegh Bahadur Khalsa College, University of Delhi from **19 January to 31 January 2024.**

Prof. Vimal Rarh
Project Head & Joint Director
GAD-TLC of Ministry of Education

UNIQUE CERTIFICATE No: GAD-MMTTC-23-24-NEP-JAN-B-OT-005

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Visit of students to Sultanpur Wildlife Sanctuary

Annual Report 2023-24

Nature and Environment Society "Aranya"

The Nature and Environmental Society "Aranya" has conducted various activities to spread awareness about the importance of conserving the environment for future generations and inspired people to act towards conserving habitats and the environment.

The society, in collaboration with Golden Hive Foundation, organized a Honeybee Workshop in Sunder Nursery on 2 November 2023. This workshop is intended to create awareness of the ecosystem services provided by the honeybees, imparting training and creating innovation in young minds by observing the complex collective behaviour of the honeybees. This workshop provided a myriad of knowledge about the complex behaviour of the honeybees and their role in the existence of the ecosystem to the participants.

The members of the "Aranya" were a part of the 7th edition of Ganga Utsav organized by the National Mission for Clean Ganga in Ambedkar International Centre on 04 November 2023. The event was inaugurated by Ms Debashree Mukherjee, Secretary, Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti in the presence of Shri G. Ashok Kumar, Special Secretary and Director General, NMCG. The event was a great effort to reinforce the idea of saving our rivers and passing the baton to the next generations.

The society organized a Nature Walk to Sanjay Van, the sprawling forest area near Vasant Kunj, on December 20, 2023. This activity allowed the participants to learn about the rich fauna and flora of the 443 acres of the park. These include diverse plants and trees and many resident and migratory birds. The forest also conserves natural habitat for the nilgai, golden jackal, snakes and varieties of butterflies.

Under the aegis IQAC and Viksit Bharat Abhiyan, we organized a Waste Collection Drive in February 2024 to collect and segregate electronics, plastic and paper waste generated in our college. The students and faculties of our college were actively participated in the drive and made it a huge success.

The Society under the aegis of IQAC and VIKSIT BHARAT, participated in a plantation drive organized by Saksham Bhoomi Foundation and Neem Team on the 3rd of March at Welcome Jheel. Welcome Jheel, situated near Welcome Metro Station, was a serene oasis in the bustling heart of Delhi. The plantation drive was a small effort undertaken by nature enthusiasts to revive this once-existing serene oasis. We arrived at the location at 9:30 a.m. The session commenced with a brief lecture by Mr. Mohit, Founder and Director of Saksham Bhoomi Foundation, highlighting the importance of nature and the steps we should take to preserve it. Following this, a cleanliness drive was conducted to tidy up the site. Subsequently, the plantation drive began, during which we planted ten trees. We collectively pledged to repeat this activity regularly at the site, aiming for a complete makeover within the next 3-4 months.

The Society, under the aegis of IQAC and VIKSIT BHARAT, scheduled a visit to Sultanpur National Park, Gurugram, on 24 February 2024. During this visit, 60 students were accompanied and guided by Dr Ragesh P. R (Convener of the Society). Sultanpur Park is a Ramsar site centred on a lake encircled by a walking track extending four kilometres in a circle. This park is known for around 320 species of resident and migratory birds. The mosaic landscape of the park consists of patches of riparian vegetation, marsh, and semi-arid scrub contributing to a diversity of resident bird species, winter and summer migratory bird species. Apart from the rich avian fauna, the park also has mammals like nilgai (*Boselaphus tragocamelus*), golden jackal (*Canis aureus*), and jungle cat (*Felis chaus*). During the visit, students observed various resident birds like Indian cormorant, white-throated kingfisher, Indian spot-billed duck, painted stork, black-headed ibis, cattle egret, grey heron, rose-ringed parakeet, red-wattled lapwing, weaver bird, and common mynah. The winter migratory birds like black-winged stilt, Eurasian teal, common coot, northern pintail, Northern shoveller, gadwall, spotted sandpiper, Eurasian wigeon, and imperial eagle were also observed at the park. The features and behaviour of these birds were recorded with the help of written notes and photographs. The participants also visited the Salim Ali Museum at the park, where they studied the migratory patterns and the calls of the birds through the stimulation models. Overall, the visit was very successful; the participants learnt how the wetlands especially the Ramsar site,

contribute to the biodiversity. The participants also learnt the reason for the migration and migratory patterns of the birds and appreciated the importance of conserving wetlands and biodiversity.

Dr. Ragesh P. R
(Convenor)

CHEMICAL REACTIONS AND CATALYSIS FOR CREATING A SUSTAINABLE FUTURE

Anil Vishwambhar Shinde[1*], Dr. Jyotsna Ratan[2], Professor Poonam Pipil[3], Dr. K. Praveen Kumar[4]

Abstract –
Chemical reactions and catalysis have the most impactful role in the research area. Catalyaus has a more sustainable future; therefore, the radical overhaul is being highlighted in modern chemistry. Catalysis is the most critical natural resource; moreover, lowering the activation energy process is being highlighted with the support of this catalysis. New bonds with the base of a new combination are allowed to be addressed with the support of catalysis. Primary pollution control, therefore, and renewable feedstocks are the two main factors that are addressed with the help of this catalysis process. A chemical reaction is considered a process that is capable to convert one reactant to another.
Chemical transformation is allowed to be highlighted and changes in the position of the electrons are the main factor that is addressed within the chemical reaction. Sustainable future development is based on chemical reaction, moreover, radioactive elements has a significant role in chemical reaction. Chemical concentration becomes increased with the support of the chemical; reaction, moreover, the electromagnetic reaction has to be highlighted. Chemical, physical, therefore, biological science is based on chemical reaction; therefore, 85–90% of chemical processes is included in catalysis. Additionally, Primary energy consumption improves with the dependence on catalysis.

Keywords- Catalysis, Chemical Reaction, Energy consumption, Radioactive elements, Atoms, Electrons, Atomic model

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I. INTRODUCTION

Catalysis is a factor that is responsible for speeding up the rate of the chemical reaction. With low temperatures and low energy consumption, a chemical reaction is highlighted with the dependence on catalysis [1]. The key feature of a catalyst is that it is capable to take part in the chemical reaction, hence, undergoing without any permanent changes. The rate of the chemical reaction becomes forward and backward with the dependence of the chemical reaction, thereafter, the rate of the reaction has to be highlighted and chemical changes are measured. Facilitation of a reaction is the main role of a catalyst in the chemical reaction; therefore, sustainable development in the future is highlighted with the support of the impactful role of a catalyst [2]. Bonds between the molecules and atomes are breakdown and new combinations of the substances are highlighted with the dependence of the chemical reaction. The more energy-efficient reaction is being facilitated with the dependence on a catalyst, moreover, enhance the amount of the products is also improved. On the other hand, unwanted byproducts are reduced with the support of a catalyst, and potential uses of the substances are allowed to be highlighted with the effectiveness of the catalyst [3].

Reduction of hazardous substances is another essential factor that is facilitated with the aid of the catalysts; thereafter, the design, manufacture, and chemical structure of the newly created substances are allowed to be highlighted with the aid of a catalyst [4]. Sustainable chemical development is based on chemical reactions and catalysts have a significant role to boosts the rate of chemical reactions. The energy barrier become

Synthesis, Spectral Characterization on Few Transition Metal(II) Complexes Containing Novel Schiff Base Ligand Condensed from 3-Hydroxythiophene-2-carbaldehyde and Naphthalene-1,2-diamine

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Abstract

Few metal complexes of Mg(II), Zn(II), Sn(II), VO(II), ions with the Schiff base ligand 2,2'-((1E,1'E)-(1,2-naphthenylenebis(azanylylidene))bis(methanylylidene))diphenol, which as prepared by the condensation of 3-hydroxythiophene-2-carbaldehyde and naphthalene-1,2- diamine, were synthesized and characterized. The solid-state isolation was used to remove the ligands and metal complexes from the reaction mixture. The UV-Visible, FT-IR and certain physio-chemical studies validated the structural and spectral features of the ligand and complexes. Studying the IR spectra of Schiff bases has shown that the N and O atoms are ligand binding sites with the metal ion. Evidence from molar conductance measurements suggests that the complexes are not electrolytic. TLC analysis was used to check the total responses. In addition to the tetrahedral geometry predicted by magnetic susceptibility data, electronic spectra for the [ZnC20H14O2N2S2], [SnC20H14O2N2S2], [VOC20H14O2N2S], [MgC20H14O2N2S] complexes indicated a square planar geometry. In order to test for antibacterial activity, the Schiff base ligands and their complexes were exposed to a disc diffusion assay.

Keywords: Schiff base, Transition metal complex, Antibacterial activity.

INTRODUCTION

When primary amines react with carbonyl compounds, Schiff bases are formed. Schiff bases have received a great deal of attention due to their potential applications as biochemical, analytical and antibacterial reagents [1,2]. Schiff bases have been used and they can be synthesized from a wide range of carbonyl compounds and amines. Schiff base oxygen and nitrogen donor transition metal complexes have a distinct configuration, structural liability and molecular sensitivity [3,4].

Most of the Schiff bases and their transition metal(II) complexes showed antibacterial, antifungal, antitumor, anticancer, and antiinflammatory activity, which is attributed due to the azomethine moiety (-C=N-). This adds to the growing body of evidence that these compounds are an important class of molecules with important medical and pharmaceutical applications [5]. Only a few N,O donor Schiff bases and the transition metal complexes that go with them have been synthesized recently [5-8]. Keeping in mind above these facts, in the work, we have synthesized and characterized Mg(II), Zn(II), Sn(II), VO(II) metal complexes from Schiff base ligand prepared from 3-hydroxythiophene-2-carbaldehyde and naphthalene-1,2-diamine.

Experimental

All of the reagents, intermediates, and solvents were acquired commercially and utilized. The melting points were measured using a Gallen Kamp melting point instrument equipped with a hot stage. The FTIR spectra were obtained using a Shimadzu FTIR.8300 Spectrophotometer and a CsI disc, and they cover the frequency range of 4000-200 cm-1. The UV–Vis spectra in the range of 200-1100 nm were collected using a Shimadzu UV–Vis 160 A-Ultraviolet Spectrophotometer. The magnetic susceptibility was measured with a Bruke Magnet B.M.6 Magnetic Susceptibility Balance at room temperature. Atomic absorption was measured using a Shimadzu 680 ccflame, and conductivity was observed using a WTW conductivity meter. The 1H spectra were recorded in the presence of deuterated d6-DMSO as the solvent and TMS as the internal standard using a Jeol 400 MHz spectrometer. The data was analyzed using an ESI (70-eV) model and a direct intake probe attached to a Shimadzu QP-2010 mass spectrometer to display the m/z in elementary charge unit notation.

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Effect of Cookware Material on the Iron Content in Green Leafy Vegetables

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Abstract: ***Iron is an essential component of haemoglobin which is responsible for carrying oxygen in various parts of the body. Deficiency of iron causes anemia which can further result in many serious health conditions. The focus of this study is to examine and suggest ways to improve cooking methods to increase iron content in daily diet. In this work, four green leafy vegetables (spinach, goosefoot, fenugreek leaves and mustard leaves) which are known to be good sources of iron and are also part of regular Indian diet have been selected. Their iron content was determined in uncooked and cooked form in iron and aluminium utensils. Since iron forms a coloured complex with 1, 10- phenanthroline, UV-visible spectroscopy has been used to determine iron content. The analysis employs Beer-Lambert law for the determination. The results show that the amount of ironcontent in vegetables increases significantly when cooked in iron utensils while it decreases in aluminium utensils. This study suggests that adopting Indian traditional ways of cooking involving iron utensils can contribute to fightiron deficiency problems. The use of aluminium utensils on the other hand, may cause aluminium to leach into food and consistent usage may cause harmful effects in body.***

Keywords: Green vegetables, Iron deficiency, Aluminium utensils, Iron utensils, Spectrophotometer

1. Introduction

Iron is not only the most common element on earth by mass but it is also very necessary for human body to function properly. This transition metal is found in red blood cells in human body and is necessary for the synthesis of proteins like hemoglobin and myoglobin (1). Iron also plays important role in variety of metabolic processes such as DNA synthesis and electron transport (2). It is also very essential for proper mental and physical growth (3, 4).Iron in human body stays in complex forms bound to protein as heme compounds, heme enzymes, or non-heme compounds. Iron is transported in body via transferrin and stored in ferritin molecules (5,6). After iron absorption, there is no apparent mechanism for excretion of iron other than blood loss. Hence, iron is conserved by the body (3,7). Not having enough amount of iron in body is known as iron deficiency which can also lead to koilonychia (spoon-shaped finger nails), malnutrition and some general or serious health problems like fatigue, chest pain, brittle nails, anemia, hypoxia (8,9,10). The major consequences of this are child morbidity and development, maternal mortality and reduced adult work efficiency (11,12).When the body doesn't have enough iron to produce haemoglobin, the condition is called iron deficiency anemia. Women, children and adolescent girls are more commonly affected by this disease (13,14). According to WHO report, up to 88% of pregnant and 74% of non-pregnant women are affected by anemia in India (15). The National Family Health Survey-3 (NFHS-3) data shows 56% adolescent girls (15-19 years) were found to be affected and as per National Nutrition Monitoring Bureau Survey (NNMBS) 2006, the number was 68.6% for the age group 12-14 years whereas it is 69.7% in 15-17 years age group (16). If a pregnant woman is anemic, she may carry this deficiency till the later pregnancy stage and the same deficiency may pass on to the baby.

Despite of many initiatives taken by the government of India to address this health issue; it has been continuously increasing (17, 18). The various possible reasons behind this can be unavailability of true data of anemic population, poor awareness about daily nutrition requirements, lack of access to various government launched food programs like the Integrated Child Development Scheme (ICDS) and the Public Distribution System (PDS), the Mid-day Meal (MDM) programme (under the 2013 National Food Security Act (NFSA)), National Rural Employment Guarantee Act (19). However, it is worth mentioning that excess iron in the body, which is also called secondary iron overload or secondary hemochromatosis can also have undesirable health effects like liver disease (leading to cirrhosis), skin pigmentation, diabetes, arthropathy, erectile dysfunction, and sometimes heart failure (20).Cereals, nuts, vegetables, beans, and fortified grains are good sources of iron. Meat and seafood are very rich in iron content and people who consume these are less prone to iron deficiency (21,22). On the other hand, vegetarians have to pay more attention towards iron intake in their food since they consume non-heme iron which needs to be altered before it can be absorbed by the body (2,9). In vegetarian food, green leafy vegetables are known to be good sources of iron (23,24).The right method of preparing food also impact the iron content

A short review on toughened epoxy based nanocomposites for EMI shields

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Abstract: Modern era devices and appliances require shielding from electromagnetic interference to ensure stable and efficient functioning. This is all the more pertinent in view of the safety and protection of electronic gadgets used in defence security equipment. It has been observed that the most prominent radiations of EMI fall in the range of microwave (GHz) and radio waves (MHz). Those materials which protect equipment from electromagnetic interference are called EMI shields, since they shield the equipment by either reflecting, absorbing or transmitting the electromagnetic radiation. However, not all materials can be used as EMI shields. The basic material requirement to be used as EMI shields include good magnetic permeability and dielectric properties as well as strong mechanical properties. Currently EMI shields made up of metals or silicones are used in the form of solid enclosures, cables, gaskets, O-rings, films, coatings, fabrics, tapes etc. With time and research new advanced lightweight materials have been developed which have shown potential for use as EMI shields. These include carbonaceous and ferrite nanofillers based polymer nanocomposites. These materials are unique because they provide shielding for a wide range of microwave frequency 2-18 GHz by a judicious choice of conductive, dielectric and magnetic nanofillers. The present review article provides an overview of the research work carried out on toughened epoxy (epoxy modified with other polymers) filled with multifunctional nanoparticles and their characterization for EMI shielding efficiency. Various factors and features have been critically analysed in this article. The entire focus of the article is aimed at Toughened epoxy as a base matrix which can support EMI shielding in the complete frequency range of 2-18 GHz and overcome inherent disadvantages of non-toughened epoxy.

Keywords: Electromagnetic interference, Toughened epoxy, EMI shielding, composites

1. Introduction and Literature Review:

Electromagnetic interference (EMI) shielding assumes paramount significance since EMI is one of the most undesirable by-products of telecommunication devices and high frequency electronics. Any device or technology which deduces, process, reflect and transmit or utilizes electrical energy of any form may emit radiations[1]. The performance and shell life of electronic gadgets is adversely affected due to EMI and is a major concern for defence security equipment [2].It has been observed that the most prominent radiations of EMI waste stand in the range of microwave and radio waves. Hence, most of the research work is focussed on developing EMI shields for this frequency range. Electromagnetic interference (EMI) shields are conventionally based on metals, silicones, ceramics and cements. They are used in the form of metallic enclosures, wire mesh and screens, gaskets, O-rings, cable shields and coatings. With time and research, however, the focus has shifted to composite materials which provide a spectrum of EMI shielding properties. These are achieved by adding desired fillers in the base matrix and making a judicious choice of processing

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Review Article

Open Access

Synthesis of Quinazolines Scaffold Using Green and Sustainable Heterogenous Nano-catalysts

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Abstract

Six-membered nitrogen containing heterocyclic bioactive molecules like quinazolines, and its derivatives have gained significant interest in recent years. Quinazolines have found to be an important base moiety in many of drugs used in the treatment of cancer and other diseases. Syntheses of quinazolines using green and sustainable methods have grabbed reasonable attention of researchers, to limit the use hazardous catalysts and reaction conditions. Among various methods, use of heterogenous eco-friendly nano-catalysts have emerged as an excellent approach for preparation of quinazolines. Nanoparticle based catalysts possess many advantages over conventional catalytic system since nano-catalyst provides high surface area for the rapid conversion into product even under mild reaction conditions and easily separated out from reaction mixture without following tedious work-up procedures. In this review we documented various nano-catalysts used for synthesis of biologically active quinazolines and their derivatives.

Keywords

Multi-component reactions, 2,3-dihydroquinazolin-4(1H)-ones, Heterogenous nano-catalyst, Green and sustainable catalyst

Introduction

In the field of organic synthesis and drug discovery research, there is growing interest in designing and development of energy-efficient and sustainable synthetic strategies, particularly for the synthesis of heterocyclic molecules with molecular complexity and structural diversity [1] via multi-component reactions. Multi-component reaction involves reaction between two or more components reactions in one step thus preferred to the conventional multi-step synthetic technique because they offer desired advantages lie structural variety and chemical complexity, easy experimental methodology and cost effectiveness. Development of nitrogen containing heterocyclic moieties exhibiting wide spectrum of biological property including anticancer, antibacterial, anti-inflammatory, antimalarial, and antihypertensive effects generally synthesize via multi-component reactions and have gained much attention in recent years. One such nitrogen-containing heterocyclic scaffold is quinazolines having chemical formula $C_8H_6N_2$. Quinazolines are fused, planar six-membered aromatic rings, possessing a benzene ring and a pyrimidine ring. Quinazolines and its derivatives exhibit versatile applications in medicinal chemistry such as antimalarial, anticancer agents and used as analgesics as depicted in figure 1. Quinazoline scaffold linked with various moieties, or bicyclic residue were

Nano World Journal

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Review Article

Open Access

A Decennary Update on Coumarin Derived Fluorescent Nanosensors and Chemosensors for Selective Sensing of Heavy Metal Ions

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Published by United Scientific Group

Abstract

Fluorescent nanosensors are capable of sensitive and selectively sensing target heavy metal ions under physiological conditions. In recent years, these sensors have attracted enormous interest as they offer outstanding features such as high selectivity, simplicity, extraordinary sensitivity, simple manipulations, rapid response rate, low cost, facile visualization real-time detection, and spatiotemporal resolution. Generally, fluorescent chemosensors exhibit significant noticeable changes in their physicochemical properties upon interaction with target guest analytes and generate detectable fluorescent signal. In the previous times, a wide range of fluorescent nano-chemosensors with sensing capabilities have been designed and evaluated for sensing purposes. Coumarins are a family of 2H-chromen-2-one scaffold, generally found in plants in nature. In recent years, coumarin scaffold has been extensively utilized in designing of fluorescent chemosensors because of its high fluorescence quantum yield, stable and strong fluorescence emission, excellent biocompatibility, low toxicity, and good structural flexibility. This review article emphasis on decennary development of coumarin derived fluorescent and nano-chemosensors for metal ions sensing during the time of 2013 - 2022. This piece of review article could facilitate the scientific community for the advancement of more efficient fluorescent chemosensors and nano-chemosensors for exciting wide range applications in the future.

Keywords

Coumarin, Fluorescent sensors, Nano-chemosensor, Sensing, Heavy metal ions

Introduction

Metal ions play a crucial role in many industrial, environmental, and biochemical purposes. For example, some metal ions like Cu^{2+}, Al^{3+}, Zn^{2+}, Fe^{2+}, etc., are necessary for variety of enzymatic reactions and biological processes in the human body whereas metal ions like Hg^{2+}, Pb^{2+} and Cd^{2+} are toxic and hazardous for human health and environmental [1]. For instance, copper is the third most essential transition element in biological system and plays an important role for human nervous system and physiological process. It was found that although copper toxicity is quite low, its deficiency can cause growth and metabolism problems. Imbalance amount of Cu^{2+} ions cause severe disease like Wilson's disease and Alzheimer's disease [2]. In view of remarkable importance of copper ion, WHO (World Health Organization) restricts 30 μM Cu^{2+} in drinking water and suggests that people' daily intake be limited to 10 - 12 mg [3]. Same way, aluminum, the most common metal in the earth's crust, is

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RESEARCH

pH responsive dextran nanoparticles loaded with doxorubicin and RITA against cancer cells: synergistic inhibitory effects

Priyanka Bhatnagar · Ruby Bansal · Vishal K. Vishwakarma · Harlokesh N. Yadav · Amit K. Dinda · Yogender K. Gupta

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Abstract Cancer is the second leading cause of death globally. Despite of significant advances in combination therapy of chemotherapeutic drugs, its application in clinical settings is limited due to several limitations such as side effects and availability of drugs at therapeutic levels at target site. In order to overcome the limitations, we developed pro-drug-based pH-responsive alkylated dextran nanoparticles co-linked with doxorubicin (Dox) as a model drug along with RITA {2,5-bis([5-hydroxymethyl-2-thienyl]furan)} which induces tumor cell apoptosis. RITA loaded and Dox-conjugated dextran-based NPs were synthesized with series of chemical reactions and characterized for particle size, drug loading, release, etc. The nanoparticles (NPs) were found to be 131.7 ± 20.6 nm in size with zeta potential of 15.1 ± 2.13 mV. Dox conjugation efficiency and RITA entrapment efficiency was found to be 92 ± 4.24 and 55.6 ± 5.24%, respectively. The Dox and RITA loaded dextran NPs showed enhanced cancer cell killing properties when compared with free RITA, free Dox, and a combination of free RITA and Dox. In vitro drug release studies demonstrated faster release of drugs at the tumor pH (6.5–6.8) conditions owing to the cleavage of amide bond releasing Dox, responsible for antitumor properties of NPs. Cytotoxicity and clonogenic studies in cell lines of diverse origins demonstrated cell killing efficacy of NPs, attributed to the enhanced cellular uptake of NPs. Combination index values observed were < 1 suggesting that the growth inhibition effect of NPs was synergistic. Hence, this novel combination may offer a potential treatment for cancer therapy.

Keywords RITA · Doxorubicin · Nanoparticles · Synergism · Dextran

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Introduction

Clinical management of cancer still employs a complex approach which includes chemotherapy, surgery and radiation. Conventional chemotherapy involves the use of chemotherapeutic drugs which acts by inhibiting the cell division of cancer cells. Chemotherapy is still considered to be the most effective modalities since it prolongs the overall

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ORIGINAL PAPER

Analysis of line intensity of cloud-to-ground lightning and flux ratio of active galactic nuclei forbidden nebular lines in NII

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Abstract: We discuss our calculations based on collisional radiative model and multispectral line method to analyze spectra of N II in visible range and determine line intensity and flux ratio of spectral lines 476 and 528 nm which have been observed in Cloud-to-Ground lightning spectra. Collisional ionization and excitation rate coefficients are calculated with collisional radiative model and impact of both processes is studied in the N II spectrum. At temperatures of lightning plasma, intensity ratio I_{NII528}/I_{NII476} from collisional-radiative (CR) model and calculated from multispectral line method are discussed. The flux ratio of Active Galactic Nuclei (AGNs) forbidden nebular lines compared with theoretical results calculated by using flexible atomic code (FAC). Energy levels and lifetimes of $2p^2$, 2p3s, 2p3p, 2p3d levels are presented and found extra ordinary lifetime of $^3P_{1,2}$ states verify the experimental reasons behind the existence of forbidden nebular lines of AGNs. The comparison of results shows a reasonable agreement with existing calculated and measured data.

Keywords: Collisional radiative model; Line intensity; Flux ratio; Active Galactic Nuclei; Lifetime; Rate coefficients

1. Introduction

The highly intense voltage and current during lightning discharge phenomenon is followed by the electromagnetic radiations [1–7] and consequently, high temperature thermal effects of lightning plasma channels cause fires in many forests, lightning disasters which results into devastation and disruption in microelectronic and electrical devices [8, 9]. Therefore, temperature of lightning plasma channels is fundamental parameter of discharge phenomenon from cloud-to-ground (CG) in the field of lightning protection. Diagnosis and analysis of lightning spectrum of CG lightning is an emphatic way to determine the lightning plasma temperature. The lightning temperature have been reported in literature in past few years. Wang et al., Cen et al., Mu et al. and Qu et al. [3–6, 10] have analyzed slitless spectrograph lightning spectra and estimated temperature by using multispectral line method. While Orville and Prueitt [11, 12] have used double line method for the estimation of lightning temperature. Several studies [1–11] on lightning discharge phenomenon shows that N II lines having wavelength in visible range have been recorded in the spectra and found that N II line come from core channels. So, intensities of N II lines are related to characteristics of lightning discharge phenomenon. The lightning discharge phenomenon and its characteristics can be analyzed by calculating temperature using theoretical methods.

The emission lines of N II have also been observed in spectra of several astrophysical objects such as Saturn's moon Titan and Enceladus, galaxies, H II regions, solar chromosphere and corona. N II lines have been observed in Titan atmosphere and Saturn's inner magnetosphere by using Cassini Ultraviolet Imaging Spectrograph (UVIS) [13] and Cassini Plasma Spectrometer (CAPS) [14, 15]. The forbidden emission lines of wavelength 654.8 nm and 658.3 nm of N II have been observed first time in spectra of gaseous planetary nebulae [16–18]. Due to physical conditions and observational circumstances, N II spectral lines are appropriate for diagnosis of astronomical objects [19]. Baldwin et al. [20] have used line intensity ratio of spectral line N II 658 nm ($2p^2\ ^1D_2$–$^3P_2$) with Hα line to classify extragalactic objects. While some authors have used this

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ORIGINAL PAPER

Photoionization of ground and excited states of Cr VIII with Rydberg series analysis of resonances involved

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Abstract: The relativistic calculations of total photoionization (PI) cross sections of Cr VIII in the ground $3s^2 3p^5(^2P^o_{3/2})$ and the first two excited states $3s^2 3p^5(^2P^o_{1/2})$, $3s^1 3p^6(^2S^e_{1/2})$ have been performed by taking the lowest 41 target states of sulphur-like Cr IX in Breit–Pauli R-matrix method for the first time, to our knowledge. The target states and their energies are calculated using a very accurate configuration interaction technique. Our theoretical energy levels of the lowest 41 target states of Cr IX agree with the experimental NIST data results. We have discussed photoionization cross-section variation, analysed resonance structures, determined resonance positions, effective quantum number, and width of nd Rydberg series of Cr VIII using Quigley and Berrington's approach. We have identified nd resonant series below the first threshold in the photon energy range 13.82–14.00 Ryd. We believe that our photoionization study of Cr VIII will be useful in astrophysical plasmas' modelling and their diagnostics.

Keywords: Photoionization; Configuration Interaction; Rydberg series; Quigley and Berrington

1. Introduction

Research on neutral atoms and ions such as photoionization (PI) cross section and their absolute measurements has been of considerable interests over the last few years. The basic details and information involving atomic interactions are relevant to the study of photoionized plasmas in supernova remnants, stellar gas around compact objects like black holes and neutron stars [1, 2]. They are also necessary for determining the abundance of elements, opacities and ionization fractions in extreme temperature conditions like fusion reactors, stars, and astrophysical nebulae [3]. The convolution technique of photoionization in astrophysics and physics has also garnered interest in recent times. In astrophysics, photo-processes are noticeable for spectral modelling. Radiative transition and atomic processes such as low-energy photoionizations (PI) have prominent applications in various fields of science, i.e. atmospheric science, plasma physics, the lighting industry, and astrophysics. Cr ($Z = 24$) belongs to the iron (Fe) group. In particular, accurate PI cross sections and transition rates for iron group elements are prerequisites for the analysis and modelling of the observed spectra of late-type stars [4–6]. Furthermore, accurate and reliable photoionization cross sections are required for the correct interpretation of spectral line emissions from plasmas. In the doubly excited states, auger spectra reveal critical information helpful for plasmas diagnostics and provide insights into atomic structure and collision mechanism [7]. While performing the experimental studies of photoionization, difficulties occur due to inadequate densities of highly charged ions. Therefore, theoretical methods are helpful to overcome these difficulties. Earlier, some studies utilizing a relativistic approach highlighted the resolved spectra of a precise level, which allowed detailed comparisons between theory and experiment [8–10]. Additionally, within the relativistic approach, the accuracy of higher studies in PI of ions with ground level and excited levels are significant in determining photoionization cross sections [11].

In order to study astrophysical plasmas, iron group elements are essential, as most of the spectral lines from various astrophysical sources are identified from multiple ionization stages. Spectra of most of these lines are

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Electron impact single ionization cross-section and Maxwellian rate-coefficients of L-shell of tungsten ions W^{64+}-W^{71+}

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ABSTRACT

The cross-sections and Maxwellian rate coefficients of electron impact single ionization is theoretically investigated for tungsten ions (W^{64+} to W^{71+}) for fine structure levels of configurations containing n = 2 orbitals. To check the accuracy of calculated cross-sections and rate-coefficients, detailed comparison between result from different approximations, binary encounter dipole (BED), distorted wave (DW) and coulomb born exchange (CBE) is presented. The calculations for electron impact ionization cross-sections of ground state are carried out for energy range 20 keV–1000 keV of final electron and Maxwellian rate coefficients for ground state are evaluated at the temperature range 20 keV–300 keV. We have also provided cross-sections at five different energies and rate-coefficients at five different temperatures. The present study of tungsten ions may be useful in fusion plasma modelling and in future comparison.

1. Introduction

The informative study of collisional ionization cross-sections has been found to be important in applications in several fields such as plasma physics, semiconductor physics, laser physics, astrophysics, radiation physics and also in gas discharges and lightning devices (Kumar et al., 2021; Crandall et al., 1982). The determination of accurate values of electron impact single and multiple ionizations cross-sections has become very important for the study of the spectrum of ionized plasmas (Kallman and Palmeri, 2007; Dai et al., 2010; Mewe, 1999; Van Den Berg et al., 2018; Muller et al., 2021). The charge state distribution (CSD), impurity composition, power balance and calculation of electron density and temperature is based on electron-impact ionization cross-sections which is very important for plasma spectroscopic diagnostics (Muller, 1986; Liu et al., 2014; Landi and Landini, 1999; Bryans et al., 1992). Mark & Dunn (Mark and Dunn, 1986) and Stephens & Botero (Stephens and Botero) have discussed about the importance of electron impact ionization cross-sections and rate coefficients in study of high temperature plasms. Low sputtering rate, low retention of tritium and high melting point are characteristics of tungsten which makes tungsten, a key element for plasma facing in magnetic fusion devices and wall material tokamak due to its characteristics (Banine et al., 2011; O'Sullivan and Faulkner, 1994; Shevelko et al., 1998). Due to large number of applications, many authors performed theoretical calculations and experimental measurements of tungsten ions (Karazija et al., 2006; Haris et al., 2014; Windberger et al., 2016; Torretti et al., 2017). Kramida and Shirai (Torretti et al., 2018; Scheers et al., 2018) have provided energy levels and spectral lines of W^{2+} to W^{73+} ions by compiling experimental and semi-empirical results of lowest energy levels. Several theoretical and experimental researches have been carried out for tungsten ions but data is still incomplete and theoretical and experimental efforts for different species of tungsten ions are required.

Due to experimental difficulties, the solution of the collection of quantitative information of electron impact ionization (EII) cross-sections is beyond from practical study and till date, it is very difficult to carry out measurements on high Z atoms. To fill the gap between experimental data of EII cross-sections, high accurate data is required by theoretical calculations. Since practical applications of cross-section data demand immediate calculation of precise and accurate data for different tungsten ions. Therefore, theoretical study of EII on W atoms and its ions is very crucial. Since calculations of EII and other atomic processes is complex and challenging on high Z atoms and ions due to multi-electron effects (Muller, 2015) and various phenomena in high Z atoms and ions. Therefore, many theoretical approaches have a vital

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SOCIEDADE BRASILEIRA DE FÍSICA

PARTICLES AND FIELDS

Mass Spectra of Diphotons at Finite Chemical Potential in Massive Nuclear Collisions

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Abstract
In this study, the production of diphotons in a hot and dense medium of Quark-Gluon Plasma (QGP) is investigated. The emission of photon pairs is one of the essential electromagnetic probes in the sector of QGP and hadron gas. Experimentalists are striving to confirm this unique signature at the Relativistic Heavy-Ion Collider (RHIC) and Large Hadron Collider (LHC). This study is an extension of Kumar et al. [Phys. Scr. 96 (2021) 124060], in which finite quark mass has been incorporated, neglecting the value of chemical potential. Since experiments confirmed the appreciable amount of chemical potential in heavy nucleus-nucleus collisions, it provides us the chance to explore various features of quark-gluon plasma. To see the behaviour of diphoton mass spectra in the QGP phase and the hadronic phase, on account of using a finite chemical potential since these values cannot be neglected at the time of QGP creation. We employ a simple quasi-particle model in a hot and dense system of quarks and gluons and show some intriguing results of diphoton production rate with a finite value of chemical potential in the region of QGP and hadronic phase. The production rate shows a significant enhancement by considering a non-vanishing chemical potential. We compare the results that we obtained with those of the previous theoretical studies. These results contribute to the further understanding of diphotons, which helps in probing the properties of quark-gluon plasma and heavy-ion collision studies at LHC and RHIC.

Keywords Diphoton · Quark-gluon plasma · Chemical potential · Heavy ion collisions

1 Introduction

The properties of quark-gluon plasma have not been very well understood for a long time. The massive collisions between heavy ions at Relativistic Heavy-Ion Collider (RHIC) and Large Hadron Collider (LHC) can only create QGP for very short intervals of time, posing a challenge in uncovering its true characteristics [1–3]. Exploring QGP stands as a captivating subject in high-energy heavy-ion physics replete with several unresolved questions regarding its essence [4–7]. The collisions between heavy ions are assumed to lead in the surity of the QCD phase transition from the hadronic phase to the formation of the quark-gluon plasma phase. The formation of the QGP phase requires the heating of hadronic matter above or around the critical temperature $T_c \approx 200MeV$ although it is yet to be confirmed.

Phenomenological models are very efficient in treating with the properties of QCD for the appropriate choice of parameterization factors. Many indirect signatures such as electromagnetic radiations [8–10], equation of state [11, 12], formation of droplets [13, 14], strangeness enhancement, and more, serve as valuable tools for probing the QGP phase. Among these, electromagnetic emissions yield the more precise insights into both the QGP and hadronic phases [15–17]. These emissions provide clear and readily interpretable data to detectors, making them an excellent

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Research Article

Role of Time-Varying Magnetic Field on QGP Equation of State

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The phase diagram of quantum chromodynamics (QCD) and its associated thermodynamic properties of quark-gluon plasma (QGP) are studied in the presence of time-dependent magnetic field. The study plays a pivotal role in the field of cosmology, astrophysics, and heavy-ion collisions. In order to explore the structure of quark-gluon plasma to deal with the dynamics of quarks and gluons, we investigate the equation of state (EoS) not only in the environment of static magnetic field but also in the presence of time-varying magnetic fields. So, for determining the equation of state of QGP at nonzero magnetic fields, we revisited our earlier model where the effect of time-varying magnetic field was not taken into consideration. Using the phenomenological model, some appealing features are noticed depending upon the three different scales: effective mass of quark, temperature, and time-independent and time-dependent magnetic fields. Earlier the effective mass of quark was incorporated in our calculations, and in the current work, it is modified for static and time-varying magnetic fields. Thermodynamic observables including pressure, energy density, and entropy are calculated for a wide range of temperature- and time-dependent as well as time-independent magnetic fields. Finally, we claim that the EoS are highly affected in the presence of a magnetic field. Our results are notable compared to other approaches and found to be advantageous for the measurement of QGP equation of state. These crucial findings with and without time-varying magnetic field could have phenomenological implications in various sectors of high-energy physics.

1. Introduction

The extensive research in the field of high-energy physics unveiled the phase diagram of quantum chromodynamics (QCD) which involves hadronic phases (HP) as well as quark-gluon plasma (QGP) phase [1–10]. This area captivated some light on revealing the process of phase transition at high temperatures and densities in heavy-ion collision experiments [11, 12]. QCD is a particular theory related to the strong interactions of quarks and gluons. It is observed that at the critical temperature $T_c \approx 170$ MeV, the hadronic matter transforms into a new phase where quarks and gluons are almost free called quark-gluon plasma (QGP) [13–16]. The accelerator (RHIC and LHC) facilities around the globe provide an opportunity to look deep into the matter where several unresolved mysteries for the formation and evolution of the universe after the big bang may resolve. The upcoming facility (FAIR) at GSI is also working in the same direction in which physicists are trying to gain some useful insights into the basic structure of matter and investigate the evolution of the universe.

One of the best measurements of these accelerators is to deal with the properties of QGP in which the nature of phase transitions, critical temperature, and thermodynamic properties are treated as a peculiar study. Besides these, equation of state (EoS) is one such characteristic of QGP that encodes

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ORIGINAL PAPER

Supersymmetry breaking in quaternion space

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Abstract: Keeping in view the advantages of quaternion, an attempt is made to explain supersymmetry breaking in the interacting field in terms of quaternion superpartner Hamiltonian. A complete theory for supersymmetry breaking in the thermal field in terms of bosonic and fermionic operators has been obtained along with certain restrictions due to the non-commutativity of quaternions that can hint at some hidden results. Witten index in terms of quaternion units has been obtained, and we find that energy is different along different axes. It has been observed that supersymmetry remains good symmetry at zero temperature but breaks down with temperature.

Keywords: Supersymmetry breaking; Quaternion; Finite temperature SUSY; Thermal field

Abbreviation

SUSY Supersymmetry
QQM Quaternion quantum mechanics

1. Introduction

Supersymmetry is a unified theory of bosons and fermions that are treated as elements of a graded algebra and with the help of supersymmetric operators' bosons can be converted into fermions and fermions into bosons [1]. SUSY in quantum mechanics was first introduced by Nicolai [2] and further extended by Witten [3]. Exact SUSY means exact boson and fermion masses that have not been observed so far; hence, SUSY must be broken [4, 5]. Quaternions have proved very useful tools in quantum mechanics [6] latter developed by Finkelestein et al. [7]. They are extensions of complex numbers but noncommutative among themselves. Quaternion quantum mechanics was developed by Adler [8] and has following advantages over usual quantum mechanics.

Quaternions occupy a unique place in mathematics because they are the most general quantity that satisfy the division. Further, the product of transpose of a quaternion with quaternion has the property of complete inner product space [8]. Quaternion structure provides homogeneous space time in higher-dimensional quantum mechanics because space and time can be interpreted by single quaternion operator, whereas (3+1) space time formalism does not consider space and time on equal footing [8–12]. Quaternion units are represented by Pauli spin matrices so spin is natural outcome of any theory developed in terms of quaternion units [8, 10, 12, 13]. So they are very useful when dealing with spin particles (fermions). The problem with the Schrödinger equation, where imaginary 'i' is used, is solved by using quaternion units. This interpretation is a serious attempt to describe the ontology of quantum mechanics and demonstrates that the complete ontological interpretations of quantum mechanics exist [8, 14]. Quaternion representation is more generalized representation and can be reduced to complex and standard quantum mechanics by making two imaginary units to zero and three imaginary units to zero, respectively [8, 15]. Recently,

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Advances in Natural Sciences: Nanoscience and Nanotechnology

PAPER

Enhancing photocatalytic performance: a study of anionic (congo red, orange-g) and cationic (malachite green) dye degradation using WSe_2 and $WSe_2/ZnIn_2S_4$ nanocomposite

Mool Chand[1], Arun Singh Rawat[1], Manika Khanuja[2] and Seema Rawat[3]

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Realization of a DNA biosensor using inverted Lamb wave MEMS resonator based on $ZnO/SiO_2/Si/ZnO$ membrane

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What do these dates mean?

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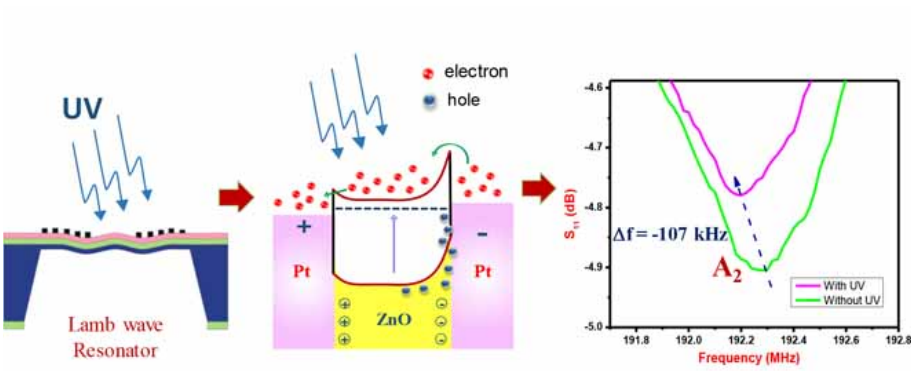
Lamb Wave Resonator for UV Photodetection and Impact of Induced Piezopotential on Schottky Barrier Height Toward Enhanced Sensitivity

Publisher: IEEE

Manisha Bharati ; Lokesh Rana ; Kajal Jindal ; Reema Gupta ; Anjali Sharma ; Monika Tomar **All Authors** •••



Abstract:
In this work, a Lamb wave resonator-based UV photodetector is fabricated using ZnO thin film grown on SiO2/Si membrane. Electrical studies of the fabricated ZnO/SiO2/Si L... **View more**

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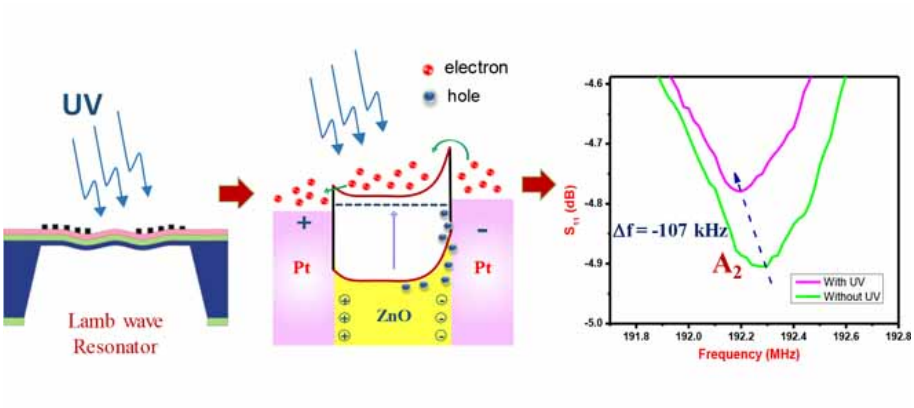

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Optical Materials

Volume 142, August 2023, 114088

Research Article

Fabrication of Surface Acoustic wave resonator as Acousto-optic Modulator

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Journal of Magnetism and Magnetic Materials

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Research article

PZT based dual energy harvester using chemical solution deposition technique

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Anju Dahiya · S. Somorendro Singh

Equation of State of 2 + 1 Flavor Quarks in Magnetized PNJL Model

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Abstract We extend our earlier work of 2 flavor quarks to $2+1$ flavor quarks using thermal and magnetic field dependent quark mass and magnetic potential in the Lagrangian density. We find that the magnitude of equation of state of $2+1$ flavor quarks have increased from 2 flavor quarks up to the temperature $T = 2.2T_c$. The results produced by $2+1$ flavor quarks has been compared with Ratti et al's result without thermal mass and magnetic field. It also shows improved outputs from the result without thermal mass and magnetic field. It implies that the calculation with the thermal and magnetic field effect in $2+1$ flavor quarks can describe the thermodynamic behavior, indicating some difference from our earlier work for 2 flavor case with thermal mass and magnetic field. It means there is overall improvement of this model from the result without thermal mass and magnetic field.

1 Introduction

The primary goal of ultra-relativistic heavy ion physics is to explore the properties of nuclear matter at high temperature or high nuclear density obtained under the intense pressure. It is generally believed that under such high temperature and pressure, the nuclear matter undergoes a phase transition to a possible deconfined state of quarks and gluons. This phenomenon of transition is believed to exist for a few microseconds after the big bang. Thus the phenomenon of such phase transition is described in the theory of strong interaction called quantum-chromodynamics (QCD) [1]. In a recent time, many accelerator-based experiments like relativistic heavy ion collision (RHIC) at Brookhaven National Laboratory (BNL) and Large Hadron Collider (LHC) at CERN try to provide distinct observations about the creation of this high density matter. These experiments also study the properties of the matter considering high temperature and pressure indicating the signal for formation of quark-gluon-plasma (QGP) in a very organized way and simultaneously, they conduct several experiments having energy scale from 1 GeV to a few hundred times of GeV to provide the significant behavior of QCD [2]. Thus the non-abelian picture of QCD has two important features of confinement and asymptotic freedom. However the highly energetic accelerators on these experiments can not explain the confinement feature of QCD, but only reveal or reflect it. In the case of deconfinement which is particularly obtained at very short range or at large momentum transfer known as asymptotic freedom, the force of attraction is approximately towards zero when the separation between the quarks tends to zero. So quarks are considered to be free within this very short range of distance. Therefore the feature of QCD interaction is difficult to be understood as the participants in the interactions are contributed by the different particles and their behavior show the different phenomena. Moreover, there is even an another contribution in the interaction of QCD known as self interaction done by the exchange of particle called gluon and this interaction makes the system more complicated in terms of its understanding [3]. Due to this complicated understanding of gluon self

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BIOCHEMISTRY & PHYSIOLOGY - REVIEW ARTICLE

Review and future prospects on the impact of abiotic stresses and tolerance strategies in medicinal and aromatic plants

Priya Yadav[1] · Mohammad Wahid Ansari[1] · Sakshi Saini[2] · Shweta Punia[3] · Babeeta C. Kaula[1] · Varsha Rani[4] · Sarvajeet Singh Gill[5] · Narendra Tuteja[6]

Received: 18 September 2023 / Revised: 10 March 2024 / Accepted: 11 March 2024 / Published online: 11 April 2024

Abstract
The importance of medicinal and aromatic plants (MAPs) for humans has been recognized since ancient times for treating diseases of themselves and animals based on their traditional knowledge. In the past few decades, the requirement for medicinal plants has increased and resulted in their increased cultivation. However, different biotic and abiotic stresses significantly affect the growth and production of medicinal plants. Abiotic stresses such as drought, salinity, heavy metals, and cold are the primary constraints on plant biomass production and, consequently, their considerable metabolite production. Under unfavorable conditions, medicinal plants exhibit and adapt various responses at the physiological and molecular level to overcome these stresses, and it is essential to understand these responsive mechanisms to overcome the issue. This article presents data on some indigenous medicinal plants and their responses to anticipated global climate change conditions. Furthermore, applications of plant growth-promoting rhizobacteria (PGPRs), arbuscular mycorrhizal fungi (AMF), *Serendipita* (*Piriformospora*) *indica*, phytohormones, and nanoparticles have been summarized to overcome the impact of abiotic stress on plants in sustainable manner.

Keywords CRISPR-cas9 · Microbes · Nanoparticles · Phytohormones · Stress alleviation mechanism · Stress toxicity

1 Introduction

Medicinal plants include different families of plants and contain many biochemical compounds, which are crucial for human health. Numerous medicinal plants are cultivated in various parts of the world. According to the World Health Organization, from 300,000 plant species, worldwide, around 21,000 species are of medicinal potential (Bhattacharjee et al. 2020; Pandita et al. 2021). In India, recently 800 medicinal plants have been recorded and out of these 21,000 plant species (Kamboj 2000; Singh and Kumar 2021). Due to the rich repository of medicinal plants, India is also known as the botanical garden of the globe (Roy and Pradhan 2022). Medicinal plants play a significant part in the development and synthesis of drugs, more than 100 plant-based medicines have been unveiled in the market and it gives a considerable contribution to recent therapeutics (Bhoi et al. 2023). In Ayurveda, Siddha and Unani medicinal plant species are used for curing various ailments and diseases. In the Indian subcontinent, medicinal plants are used as a traditional medicine to treat various types of chronic diseases. Recent research showed that a combination of a large number of polyherbal formulations provides an effective response for the treatment of complex diseases (Pertrovska 2012; Sharma et al. 2020). The global demand for medicinal plant products has significantly expanded due to their lack of side effects (Lipp 1996). Distinct investigations depict the

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Synbiotics: A Paradigm Shift in Biotherapeutics

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Highlights:

- ✓ Prebiotics are selectively fermented ingredients that result in specific changes in the composition and/or activity of the gastrointestinal (GI) microbiota, thus conferring health benefits upon the host.
- ✓ Probiotics are defined as "live microorganisms that, when administered in adequate amounts, confer a health benefit on the host"
- ✓ Postbiotics are non-viable probiotics, along with their cellular components and metabolites, significantly contribute to health improvement.
- ✓ Pharmabiotics are probiotic formulations demonstrating pharmacological effects on the human body, promoting health, and treating specific diseases.
- ✓ Synbiotics is a combination of two components, probiotic and prebiotic in which both of them function in collaboration that is beneficial for the host.

Abstract: Synbiotics is "a mixture comprising live microorganisms and substrate(s) selectively utilized by host microorganisms that confers a health benefit on the host" International Scientific Association for Probiotics and Prebiotics (ISAPP) (1). They represent a promising intervention in the field of gut microbiota modulation. They exert their beneficial effects by promoting the useful microbial populations and inhibiting pathogenic species. The literature available focuses on current landscape of synbiotics research, highlighting their potential benefits in supporting digestive health, enhancing immune function, and preventing various gastrointestinal disorders. It also provides insight into future directions for synbiotics research, immobilised synbiotics, micro-capsulation and co-capsulation modalities, emphasizing the need for personalized approaches and rigorous clinical trials to optimize their therapeutic potential. The clinical proof available also supports the viability of synbiotics in treating conditions viz. irritable bowel syndrome, inflammatory bowel disease, and diarrhoea caused due to antibiotics. This comprehensive review aims to consolidate current literature, identify gaps, and propose strategies for advancing the application of synbiotics in clinical practice for better health care.

ScienceDirect

Plant Physiology and Biochemistry

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Arsenic transport, detoxification, and recent technologies for mitigation: A systemic review

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Highlights

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Harnessing Jasmonate, Salicylate, and Microbe Synergy for Abiotic Stress Resilience in Crop Plants

Priya Yadav[1] · Ashima Nehra[2] · Gopal Kalwan[3,4] · Deepak Bhardwaj[5] · Yasheshwar[6] · Varsha Rani[7] · Niraj Agarwala[8] · Narendra Tuteja[9] · Ritu Gill[2] · Mohammad Wahid Ansari[1] · Sarvajeet Singh Gill[2]

Received: 16 September 2023 / Accepted: 7 December 2023

Abstract

Due to frequently changing global climatic conditions, the frequency of abiotic stresses such as unexpected flooding, drought, different temperature regimes leading high or low temperature, soil salinization, and nutrient deficiency or toxicity has been dramatically increased. These stresses are important threats to sustainable agriculture causing numerous direct and indirect effects on plants ultimately influence the quantity and quality of food crops. However, plants are equipped with array of internal methods for coping with devastating impacts of stress including production of antioxidants, osmoprotectants, proteins, phytohormones, relocation of nitrogen, phosphorus etc. Phytohormones in general play crucial role in the regulation of various physiological and biochemical processes in terms of plant growth, development, and productivity under normal as well as stressful conditions. Adaptation and resistance towards these stresses need sophisticated perception, signalling, and responsive mechanisms. In this review, we go through recent developments in comprehension how jasmonic acid (JA) and salicylic acid (SA) control abiotic stress responses in plants. Interaction of plant growth promoting rhizobacteria (PGPR) with the roots of higher plants alters the concentration of endogenous phytohormones and exemplifies a novel pattern of hormonal interaction. PGPR help plants withstand abiotic stressors by altering the sensitivity to response and controlling the production of phytohormones. Since they activate signalling pathways, the interaction of phytohormones is essential for the survival of plants under adverse conditions and emphasis is given on the crosstalk of JA, SA, and PGPRs.

Keywords Abiotic stress · Crosstalk · Jasmonic acid · Plant growth promoting bacteria · Stress tolerance · Salicylic acid

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Priya Yadav and Ashima Nehra have contributed equally to this work.

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Molecular characterization and phylogenetic relationships in Asiatic *Vigna* using ITS and cpDNA loci

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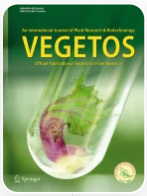

Vegetos

Aims and scope

Submit manuscript

Ruchi Vir, Tabassum Jehan, K. V. Bhat & Suman Lakhanpaul

Abstract

Asiatic *Vigna* constitutes group of economically important pulses that are off tremendous agronomic importance. These pulses are not only source of proteins and other nutrients in human diet but also known for increasing soil fertility by nitrogen fixation. However, their inherent low genetic base is the major constraint in the production of improved varieties resulting in low yield. The pulses have increasingly been pushed to marginal lands and therefore, adding in low production. There is an urgent need to explore wild forms for novel genes for the genetic upgradation of cultivated forms, as till now only, exotic lines and cultivated germ plasm has been exploited for the same. Also, it is important to decipher the

Zukovskij PM (1962) Cultivated plants and their wild relatives. Commonwealth Agriculture Bureau, London

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Ethics declarations

Conflict of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Phylogenetic analysis of selected Asiatic *Vigna* species based on PCR–RFLP of three non-coding cpDNA Loci

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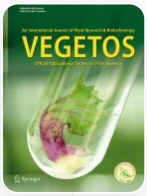

Ruchi Vir, Tabassum Jehan, K. V. Bhat & S. Lakhanpaul

Abstract

The PCR–RFLP was used to analyze the genetic diversity and relationship between cultivated species and wild taxa belonging to subgenus *Ceratotropis* of the genus *Vigna*. The chloroplast DNA was analyzed by amplification followed by restriction of three non-coding regions, *trn*L_{UAA} intron, *trn*L_{UAA}–*trn*F_{GAA} and *psb*A-*trn*H_{GUG} spacers. The length of intergenic spacers *trn*L_{UAA}–*trn*F_{GAA} and *psb*A-*trn*H_{GUG} varied from 475 to 580 bp. The length of *trn*L_{UAA} intron varied from 600 to 700 bp. Wild forms *V. radiata* var. *sublobata* and *V. mungo* var. *silvestris* emerged as distinct taxa and grouped close to their proposed cultivated forms viz. *V. radiata* and *V. mungo*. *V. radiata* var. *setulosa*, another wild form grouped closer to *V.*

Tsumura Y et al (1996) Molecular phylogeny of *Dipterocarpaceae* in Southeast Asia using RFLP of PCR amplified chloroplast genes. Theor Appl Genet 93:22–29

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Assessment of genetic diversity among species mungo-radiata group of subgenus Ceratotropis of genus *Vigna* Savi. using amplified fragment length polymorphism (AFLP)

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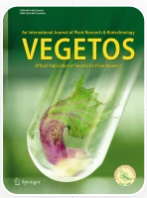

Vegetos

Aims and scope

Submit manuscript

Ruchi Vir, Tabassum Jehan, K. V. Bhat & S. Lakhanpaul

Abstract

Genetic diversity, population substructure, species relationships, and gene flow was evaluated in 85 accessions belonging to the mungo-radiata group of section Ceratotropis of subgenus Ceratotropis of genus *Vigna* using amplified fragment length polymorphism. Twelve preselected AFLP primers generated 1869 polymorphic amplification products. The number of fragments for each primer pair ranged from 44 to 296, showing 100% polymorphism. An analysis of the mungo-radiata group from different phytogeographical

soybean (*Glycine max* L. Merr.) cultivars of Russian and foreign selection. Agron Res 15:2217–2225

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Additional information

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Supporting Information

Green synthesis of silver nanoparticles using *Drymaria cordata* and their biocompatibility with haemoglobin: A therapeutic potential approach

Atul Arya [1], Deepak Chahar [2], Kavya Bhakuni[3], Vandana [4], Suresh Kumar[1*], and Pannuru Venkatesu [2*]

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This supporting information contains Materials and methods, 1 Figures and 4 Tables in 14 pages.

Unfolding the Chemical composition, antioxidant and antibacterial activities of *Drymaria cordata* (Linn.) Willd. against chloramphenicol-resistant *Bacillus subtilis* and β-lactams-resistant *Pseudomonas aeruginosa*

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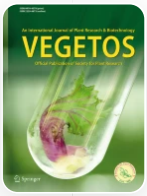

Vegetos

Aims and scope

Submit manuscript

Atul Arya, Suresh Kumar, Dolly Kain, Ab Majeed Ahanger, Amrita Suryavanshi & Vandana

Abstract

The current study was done to investigate the chemical composition, antioxidant and antibacterial activities of *Drymaria cordata*. Different solvents i.e. methanol (DCM), hexane (DCH) and water (DCW) were used and compared for their antioxidant and antibacterial efficacy against chloramphenicol-resistant *Bacillus subtilis* and β-lactams-resistant *Pseudomonas aeruginosa*. GCMS chromatograms of three extracts depict the presence of antioxidant and antibacterial compounds such as hexanedioic acid, hexadecanoic acid, nonadecadiene, hexadecen-1-ol, octadecadienoic acid, nonane, phytol, henicosanal, stearyl

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Vandana

Contributions

AA designed and performed whole experiments related to this work. Prof. SK helps in the conceptualization and design of the work. DK help in data analysis and interpretation of work. AMA and AS helped in the drafting and reviewing of the manuscript. Vandana helps in spectral analysis and the drafting of manuscripts.

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Ethics declarations

Conflict of interest

Author declares no conflict of interest.

Ethical Statement

This article does not contain any studies involving animals performed by any of the authors.

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Inorganic Chemistry Communications

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Short communication

Synthesis and characterization of *Drymaria cordata* mediated encapsulation of Zeolitic Imidazolate Framework-8 and their antibacterial action against drugs resistant bacteria

Atul Arya, Suresh Kumar, Harsha Singh, Dolly Kain, Ab Majeed Ahanger

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Highlights

nature biotechnology

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Patents | Published: 12 October 2023

Patents

Are ecological processes that select beneficial traits in agricultural microbes nature's intellectual property rights?

David Kothamasi, Saskia Vermeylen & Sharma Deepika

Nature Biotechnology **41**, 1381–1384 (2023)

Novel beneficial traits in agricultural microbes represent inventive steps of nature, but the inability of patent laws to reward nonhuman inventors has led to conflicts over microbial ownership rights and presents barriers to the sharing of benefits.

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Contributions

D.K. and S.V. conceptualized the study. D.K., S.V. and S.D. provided input and concepts. D.K. wrote the first draft. All authors reviewed and made edits on the manuscript.

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Source, Occurrence, and Risk Assessment of Antineoplastic Medicines in Aquatic Environments: A Comprehensive Review

Ankush Yadav[1] · Eldon R. Rene[2] · Manisha Sharma[1] · Vinod Kumar[3] · Mrinal Kanti Mandal[4] · Kashyap Kumar Dubey[5]

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Abstract

Purpose of Review This review article focuses to fulfill the gaps in the available literature on cancer incidence, antineoplastic drug consumption, environmental persistence, and toxicity assessment and provides a better understanding of the evaluation of the risk and difficulties resulting from the emergence of anticancer medications.

Recent Findings Large amounts of antineoplastic drugs present in water bodies have adverse effects on the environment and human health. As the number of cancer patients continues to grow exponentially, the prevalence of antineoplastic chemicals in aquatic environments is steadily increasing worldwide. The oncology wards at hospitals, pharmaceutical firms, and municipal garbage (from outpatients) are the biggest contributors to the presence of antineoplastic drugs in aquatic environments. When released into the environment, the unmetabolized fraction/derivatives and free radicals of these medicines are more toxic.

Summary It is evident from the review that the ecotoxicity, mutagenicity, and cytotoxicity are a result of the persistence of antineoplastic drug residual in water bodies. Thus, the presence of such substances in water bodies is detrimental to the health of both aquatic species and humans. The fate of antineoplastic drugs in the environment will also cause an adverse effect on agricultural crops and the soil microflora if the treated wastewater would be used for irrigation purposes.

Keywords Hospital effluent · Anticancer drugs · Toxicity · Risk behavior · Agro eco-system

Introduction

The presence of pharmaceutically active compounds in the environment is of major concern because its presence leads to detrimental health issues. The excreted waste from humans as well as animals along with wastewater leads to the introduction of pharmaceuticals into the environment [1]. After excretion from the human body, the non-metabolized part of the pharmaceutical compounds form conjugated compounds with polar molecules and these modified conjugates are cleaved during sewage treatment and released in water in original drug form or transformed products [2•, 3]. Many pharmaceuticals can persist in the environment as their biodegradation and elimination during wastewater treatment are rather limited [4]. Pharmaceutical compounds, and their metabolites, are highly mobile in the aquatic environment due to their hydrophilic nature [5, 9•, 10–12]. They can persist in different aquatic compartments of the environment at concentrations ranging from < 0.1 ng·L^{-1} to >1000 µg·L^{-1}. The Food and Drug Administration (FDA) and European Medicines Agency (EMA) have made regulatory guidelines for the monitoring and management of different pharmaceuticals in the environment [13].

Antineoplastic drugs, also known as anti-cancerous agents, are cytostatic in nature which stops the growth of normal dividing cells. Antineoplastic drugs used as therapeutic agent for treatment of cancer disease represent a wide range of compounds with great potential for action.

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Current Opinion in
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Current scenario and challenges in recycling of human urine generated at source in rail coaches as resource

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Abstract

The current scenario of human urine being directly discharged into the environment without recycling, despite being an economical source of fertilizer. Train coaches are the major source of large-scale urine waste generation. Adopting a circular economy creates significant synergies toward usages of water generated after nutrient recovery from urine. Some advanced decentralized treatment systems, such as electrochemical, bioelectrical, or reverse osmosis, would be useful to treat and recover nutrients from urine waste/wastewater. The laborious and costly affair of removing nutrients like N, P, and K from human urine needed a sustainable solution. These recovered nutrients can be reused as fertilizers in irrigation and, indirectly, in large-scale biodiesel production by being used in microalgae cultivation. However, the potential of reusing human urine waste is yet to be explored commercially. Additionally, artificial intelligence may be explored with sustainable approaches for urine separation and recycling soon.

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Keywords

Human waste, Waste to value, Onboard management, Bio-fertilizer, Decentralization, Policy for management.

Introduction

When wastewater is discharged into water bodies, nutrients like nitrogen and phosphorus are introduced, which causes harmful algal blooms, fish kills, and other ecological problems. By reusing treated wastewater instead of discharging it, these nutrients can be captured and reused as a resource rather than being wasted or causing harm to the environment [1,2*]. Additionally, treating and reusing wastewater can help to conserve freshwater resources, reduce energy use and greenhouse gas emissions, and provide a reliable source of water for non-potable uses like irrigation, industrial processes, and toilet flushing [3,4**] (Figure 1).

The Indian Railway system stretches almost 86,000 km and operates the world's most densely utilized train system, with a daily passenger count of 24 million, leading to the daily discharge of a large amount of human organic waste. Data show nearly 40,000 tons of human excreta is dumped daily directly into the ground and onto the railroad tracks in the coaches. Its long decomposition time and contaminated water under bridges spread diseases like dysentery, vomiting, diarrhea, typhoid, dengue, and malaria [5]. The issue of open discharge is resolved nowadays by installing Bio-Toilets. "Bio-Toilets are the vacuum composting toilets fitted in the rail coaches that use microorganisms under aerobic or anaerobic conditions to treat human waste by biological decomposition process for further use as agro fertilizers." It conserves energy and reduces water and air pollution. A multi-directional strategy has been implemented to adopt environment-friendly toilets on Indian Railway passenger coaches [6].

This article deals with source-separated urine waste, processing liquid fertilizers on board, and then collecting these fertilizers at terminal train stations for widespread usage in agriculture [7]. The composition of human urine is elemental nitrogen (8.1−9.2 g/L), phosphorus (8.1−9.2 g/L), and trace amounts of boron, zinc, copper, iron, cobalt, and manganese [8]. In typical

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Navigating the impact of climate change in India: a perspective on climate action (SDG13) and sustainable cities and communities (SDG11)

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Climate change is a global concern of the current century. Its rapid escalation and ever-increasing intensity have been felt worldwide, leading to dramatic impacts globally. The aftermath of climate change in India has brought about a profound transformation in India's environmental, socio-economic, and urban landscapes. In 2019, India ranked seventh, among the most affected countries by extreme weather events caused due to changing climate. This impact was evident in terms of both, the human toll with 2,267 lives lost, and the economic damage, which accounted for 66,182 million US$ Purchasing power parities (PPPs). Over the recent years, India has experienced a significant increase in the number and frequency of extreme weather events, causing vulnerable communities. The country experienced severe air pollution problems in several metropolitan cities and was highlighted in the list of the world's most polluted cities. Additionally, India has become the most populous nation globally, boasting a population of 1.4 billion people, equating to ~18% of the global population, and experiencing an increased rate of consumption of natural resources. Owing to the country's current scenario, various climate mitigation strategies, including nature-based solutions, must be implemented to reduce such impacts and support India's target of achieving the Sustainable Development Goals (SDGs). This review tries to have a holistic understanding of the effects of climate change on different sectors to identify India's challenges in achieving SDG 13 and SDG 11. Finally, it also highlighted the future recommendations for climate change-related research from an Indian perspective.

KEYWORDS

urbanization and development, climate change, human health, sustainable development, India

1 Introduction

India, with its diverse geography, dense population, and intricate socio-economic fabric, is particularly susceptible to the changing climate. Notably, the issue of air pollution has become a prominent concern in India, further compounded by the effects of climate change. Air pollution in India is fueled by diverse sources, including industrial emissions, vehicular

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NEWS AND NOTES

International Geodiversity Day 2023

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The UNESCO General Conference designated October 6 as "International Geodiversity Day" to recognize the importance of geoscience in addressing global issues. To commemorate International Geodiversity Day, the Geological Society of India (GSI), Bangalore organized the event in collaboration with the Indian National Science Academy (INSA), New Delhi and the Society of Earth Scientists (SES), Lucknow.on 6th October 2023 at the the Indian National Science Academy, New Delhi in hybrid Mode. The Ministry of Earth Sciences (MoES), New Delhi, supported the event.

The welcoming address was given by INSA Emeritus Scientist and National Committee for IUGS-INOUA Chair Prof. D. M. Banerjee. He stated that biodiversity and geodiversity are related and need to be preserved for sustenance of human societies. He warmly greeted the participants of the event and encouraged lively discussions on preserving biodiversity and ensuring a sustainable Earth.

Prof. Om. N. Bhargava, an INSA Senior Scientist, spoke about the "Geodiversity of Himalaya." Bhargava highlighted the importance of minerals, hot springs, glacial valleys, Chandra Tal's origins, and fossils. He used the "Symphony of Stones" to represent Earth's various geological characteristics and landslides caused by neotectonics. He narrated, glacial, fluvial, lacustrine, eolian landforms, conspicuous structural features, rocks preserving palaeoclimate and depositional record, fossils, tectonic/orogeny features represent Himalayan geodiversity. Anthropogenic activities have damaged several geological features.

Prof. M.G. Thakkar from the Birbal Sahni Institute of Palaeosciences spoke about "Kachchh: A potential Geodiversity and Geoheritage hotspot in India. He stressed the need to protect Kachchh, a place rich in geodiversity and geoheritage that is at risk of disappearing. The Deccan Traps, sedimentary formations, fossils, archaeological finds, paleo-seismic evidences, and geoheritage sites in the Mesozoic, Tertiary, and Quaternary successions are only a few of the region's geological wonders. He talked about Kachchh's lignite mines as well.

The notion of "Geoethics in the Indian Context" was discussed by Prof. Surya Parkash, who also serves as the Indian Coordinator for IAPG and is a Professor at the National Institute of Disaster Management under the Government of India. He talked extensively about various topics related to geodiversity and covered different aspects of geology. He gave a lot of attention to facilitating student brainstorming sessions on geoethics and geodiversity. Prof. Prakash highlighted the significance of moral considerations in studying geology while discussing the creation of a disaster management museum. He also suggested that besides celebrating this geodiversity day, we should create a road map for the future.

Dr. Satish C. Tripathi, General Secretary of the Society of Earth Scientists, discussed the status of geoheritage conservation and geoparks in India. He talked extensively about India's diverse geography, focusing on fossil parks and important geological sites. He highlighted various international gatherings and other initiatives such as "Walk to Save Geoheritage" which are being taken to create awareness and preserving geodiversity. Tripathi proposed that we create National Geological Monuments and have Indian geoparks recognized by UNESCO as Global Geoparks. He also spoke about the geoheritage draft laws and status report.

Prof. Shyam Mude, Head of the Geology Department at Fergusson College, Pune, discussed the subject of "Geoheritage Conservation and Geodiversity in Maharashtra". He talked about the circular crater known as Lonar Lake, which was created when a big meteorite struck the Deccan Basaltic rocks. Here, we can see the impact structures in the basalts. This crater is thought to be the third largest on the planet. He listed several notable examples of geological formations: the columnar joints in basalt at Kolhapur; the cliffs in Mahabaleshwar; the volcanic ash deposits in Pune; the natural arch at Aneghat, Ahmed Nagar; and the well-known caves of Ajanta, Elephanta, and Gilbert Hill. Prof. Mude discussed reserve forests, the tectonically active Ramtek region, temples' role in sustaining geological sites, and the Wadadam Fossil Park in Sironcha, Gadchiroli. He focused on involving the local government, organizing awareness campaigns, organising conferences, and including students to protect these important areas.

Dr. Rasik Ravindra, the former director of the National Centre for Polar and Ocean Research, spoke about "Need for preserving National Geoheritage". India has both ancient rock formations and a young mountain chain, spanning from the Himalaya in the north to Kanyakumari in the south, and the Thar desert in the west to Arunachal in the east. The region exhibits remarkable geological diversity, including type sections for many stratigraphic formations, an abundance of preserved fossils, a variety of geological characteristics, and an unspoiled environment with natural rock sculptures. He underlined that GSI has identified roughly 90 geoheritage sites in India with significant educational, scientific, and tourism potential. Geoparks serve as hubs for geotourism and help with the conservation of geoheritage. He emphasized the importance of preserving nation's geoheritage, in line with the UN's sustainable development goal. Ravindra emphasized the Himalayas' vulnerability due to its unstable terrain and the formation of lakes in Sikkim. This highlights the need to protect our geological heritage and address the related challenges.

Prof. Ramanathan Baskar from the Indira Gandhi National Open University, New Delhi gave a presentation on "Geo-Collections" . He serves on the Geo-collection Committee of the International Union of Geological Sciences. He explained biodiversity and geodiversity, as well as the history of the International Commission of Geoheritage and the primary objectives of the subcommittee on geo-collections. An IUGS Geoheritage Collection is a curated collection of specimens

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Uranium concentration in groundwater of Charkhi Dadri district of Haryana, India by using LED fluorimeter

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Abstract
The general population's health is directly related to the quality of the water used for drinking. As a result, research will be done on the radiation levels in the groundwater in the Charkhi Dadri area in the Indian state of Haryana. Using the LED Fluorimetry Technique, the concentration of uranium in drinking water samples taken from sources including hand pumps and tube wells of varying depths from the district will be determined. 40 water samples are gathered from various districts sites. With average value of 41.30 µg/L, variations in uranium level were noted within the range of 2–99 µg/L. The average value of uranium concentration is within the safe limit of 60 µg/L as recommended by Atomic Energy Regulatory Board, India but greater than 30 µg/L, the safe limit recommended by World Health Organization (WHO 2011). The value of cancer mortality is varying from 0.03×10^{-6} to 1.4×10^{-6} with mean value of 0.38×10^{-6} and that of cancer morbidity varying from 0.06×10^{-6} to 2.75×10^{-6} with mean value of 0.75×10^{-6}. LADD value varying from 0.15 to 7.29 µg kg^{-1} d^{-1} with mean value of 1.90 µg kg^{-1} d^{-1} and HQ varying from 0.12 to 6.07 with mean value of 1.50. 60% of the samples showed HQ values greater than unity, this shows noteworthy danger of chemical poisonousness of uranium.

Keywords Groundwater · Uranium · Annual effective dose · Risk assessment · LED fluorimeter

Introduction

Ever since the Eart formed, uranium has existed in varying concentrations in the atmosphere, hydrosphere, lithosphere, and biosphere [1]. The geological context, geographic location, and geochemical processes existing in the zone all affect the amounts of uranium present in environmental matrices. Natural deposits, mining industry releases, and the use of phosphate fertilisers are the sources of uranium's existence and distribution in environmental media [2, 3]. The majority of the uranium that has dissolved in the environment comes mostly from the degradation of the igneous rocks that made the Earth's first shell [4]. Human populations are exposed to natural radiation from a variety of sources, including cosmic and terrestrial radioactivity, as well as radioactive intake and inhalation through food, drink, and the atmosphere [5]. Primordial radionuclides like uranium are commonly found in the environment and is dangerous for human health [6]. The public is exposed to radiation from uranium mostly by ingestion, inhalation, and terrestrial exposure. The three main ways that the general public is exposed to radiation from uranium are by ingestion, inhalation, and terrestrial exposure. As uranium is a α-emitter so by intaking uranium can cause to internal radiation exposure that increases the risk of lungs cancer. Uranium is chemically toxic to human health, it affects kidneys, liver, respiratory system and lungs. High uranium intake can lead to kidney failure [7]. As a result, precise assessment of the

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ORIGINAL RESEARCH ARTICLE

An efficient framework for secure data transmission using blockchain in IoT environment

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ABSTRACT

The secure and efficient sharing of data has been recognised as a significant concern in Internet of Things (IoT)-enabled smart systems, including smart cities, smart agriculture, and smart health applications. Smart systems utilise a substantial quantity of IoT devices, which in turn generate a significant volume of data. Internet of Things (IoT) devices typically possess constrained storage and processing capacities, making the implementation of security measures on such devices a difficult task. This paper presents a framework for secure data transmission using blockchain (SDTUB) for blockchain-based IoT systems, with a focus on enhancing data security. The use of clustered authorization aims to enhance the interoperability of IoT authorization. The central blockchain is employed for permission purposes concerning cluster management nodes, whereas the regional blockchain suffices for authorization of regular nodes. The proposed mechanism is implemented using MATLAB, and the performance is analysed using performance metrics such as energy consumption and objective value. In the proposed mechanism, the energy consumption is low compared to the AuBWSN technique.

Keywords: IoT; blockchain; security; attacks; authentication

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1. Introduction

IoT refers to the integration of internet connectivity with various embedded devices within the realm of information technology. The establishment of wireless connectivity between devices has the potential to revolutionize interactions between systems, offering novel opportunities for control, tracking, and the integration of advanced service functionalities[1]. IoT devices are inherently designed with specific limitations, which impose restrictions on the available resources and performance capabilities in comparison to network devices found in enterprise environments. When developing a management and monitoring system for IoT

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Review Article

Recent Advances in Indium Selenide (InSe) based Photodetectors: A Mini Review

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Indium Selenide (InSe) is an emerging two-dimensional (2D) layered metal monochalcogenide (MMC) material which is highly regarded for its unique material properties. Due to the large surface area, high electron mobility and bandgap tunability (Visible to IR), InSe is widely sought for polarization sensitive photodetection. In the recent years, InSe heterostructure based broadband photodetectors (UV-Vis-IR) have received significant scientific attention. Photodetectors based on InSe layers/flakes and their heterostructures (with oxides, graphene, TMDCs, *etc*.) have displayed ultrahigh efficiency, fast switching and self-powered operation. Till now, a record breaking photoresponsivity up to10^7 AW^{-1} with switching time less than 2 μs for InSe based photodetector has been reported. Though, despite of scientific advancements, InSe based photodetectors suffer from numerous technological challenges. Therefore, in this mini review, we present a systematic and comprehensive review of noteworthy recent developments, scientific and technological challenges of InSe based optoelectronic devices. A brief discussion on the future aspects of InSe based photodetectors has also been presented.

Keywords: UV-Vis-IR; Photodectors; Graphene; Thin Film

1 Introduction

Thin film based photodetectors play a great role in modern day telecommunication, imaging (biomedical, optical *etc*.), spectroscopy, remote control and other consumer electronics[1-4]. Since the discovery of graphene in 2004, two-dimensional (2D) materials owing to small architecture, high mobility and broadband photo absorption and have been explored extensively for optoelectronic applications[3]. As the development of graphene based photodetectors was limited due to its zero bandgap, researchers found promising potential in layered transition metal dichalcogenides (TMDs). TMD material systems with a formula MX_2 (M: Mo, W, Ga, In and X: S, Se, Te) have emerged as a substitute of conventional 2D semiconductors for broadband photodetection[2-4].

In recent years, Indium Selenide (InSe) has appeared as a successor of layered van der Waals (vdW) based TMD material, with promising potential in the field of nano- and opto-electronics[1]. Due to their exceptional electronic properties, *i.e*., large carrier mobility (>10^3 $cm^2V^{-1}s^{-1}$), small effective mass ($m^* = 0.143m_o$) and layer dependent bandgap tunability (1.2 - 2.3 eV), InSe based photodetectors have shown superior photo-conducting performance[2]. It has been witnessed that photodetectors fabricated using InSe heterojunctions has exhibited broadband photo response (400-1000 nm), ultrafast switching(up to 2 μs) and high detectivity[3]. Recent studies have revealed that InSe thin films with exceptional field effect mobility have displayed extraordinary photo-responsivities (~10^6 - 10^7 AW^{-1}) which is much higher than other non-graphene contacted 2D semiconductors based photodetector[4].

As this area of research is relatively new and unexplored, researchers have encountered numerous roadblocks in optimizing the performance of InSe based optoelectronic devices as well. Although significant progress in the development of InSe based photodetectors has been made in the past few years, it is just the beginning to realize a matured device technology. Therefore, this mini review emphasizes and reports some of the notable recent advancements in the field of InSe based photodetectors. Further, challenges associated with material properties, device fabrication, efficiency optimization and technology upgradation have also been discussed briefly.

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RESEARCH ARTICLE

Morphological, Optical and Voronoi Polygon Analysis of Breath Figures Prepared on Polymeric Surface

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Abstract

Background/Objectives: The formation of breath figures over polymers like polystyrene has vast applications in material science for making numerous micro- and nanopatterned functional surfaces. However, the breath figures (BFs) method is a complex phenomenon as the actual formation of structures are many times unpredictable and the nature of structure depends on the type of polymer, solvent, degree of humidity and additives used. The work presented in this paper deals with the study of condensation on the surface of volatile polystyrene polymer solution and their uses for non-wetting using optical and morphological studies along with mathematical model Voronoi polygon analysis using polystyrene and solvent of benzene and chloroform. The growth dynamics of Breath-Figures (BFs) formed due to condensation is presented in brief. **Method:** Breath Figure (BF) patterns were prepared by two solvents: benzene and chloroform. Different representative values of relative Humidity viz. 60, 70, 80 and 90 % were employed for making BFs. Two different polymer concentrations of 5 and 10 w/v % was used in this study. **Findings:** The morphology has been statistically analyzed for different parameters like average diameter and their size distribution etc. In case of BFs formed on benzene surface, droplet has average diameter of about 12 μm at 90% humidity but in case of chloroform surface this diameter is about 25 μm at 90% humidity. Voronoi analysis demonstrates simplistic way to qualitatively check the six-fold order and the coordination numbers in BFs. **Novelty:** The work shows comparative study of BFs patterns using polystyrene on two different solvents with changing humidity. The study shows morphology of the breath patterns is mainly dependent on the polymer concentration, humidity and density of solvents which is a new observation. The study leads to the acquisition of new

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ORIGINAL PAPER

Effect of wastewater on physiological, morphological and biochemical levels and its cytotoxic potential on *Pisum sativum*

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Abstract
To meet burgeoning demand for water (mostly from agriculture), reclaimed wastewater is being reused, yet the environmental and health concerns about the effects of using raw and partially treated wastewater pose a challenge. Accordingly, here the effects of untreated wastewater on the pea plant (*Pisum sativum*) were examined in a holistic manner, by analyzing its morphological, physiological, and biochemical parameters. Wastewater samples were collected from Agra Canal, Faridabad, India at its most contaminated site. The tube-well samples were collected from village farmland located far from the canal. Sample analysis was carried out using standard available field and laboratory methods. Higher physicochemical parameters and concentrations of heavy metals were obtained for untreated canal wastewater (CW), nearly all being above the maximum permissible limit (MPL), whereas for tube-well water (TW) the same parameters are within the MPL. *Pisum sativum* seeds were treated with CW, TW, and Milli Q water (MQ, as control). When treated with CW, seeds had reduced germination and seedling growth was inhibited. Phytotoxicity parameters in CW-treated plants revealed oxidative stress and a significantly lower chlorophyll content than in TW- and MQ-treated plants. Likewise, significant reductions in the mitotic index and stomatal parameter values were observed. These findings indicate CW exerts toxic effects upon *Pisum sativum* grown in it. However, TW has a stimulatory effect on plant parameters, perhaps due to the dilution of toxic compounds like heavy metals. The present study suggests properly treated and diluted, CW may be used to irrigate crops as it also provides nutrients for plant growth, producing a stimulatory effect. Further investigation of heavy metal accumulation in different parts of plants irrigated with CW is required to evaluate its associated health risks.

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Original Research Article

Describing a New Freshwater Ciliate, *Aponotohymena botrinucleata* from Delhi, India

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ABSTRACT

Ciliates (Phylum Ciliophora) are one of the most diverse groups of protozoa which are present in a variety of habitats. Their taxonomic diversity is immense, encompassing thousands of species. Understanding the biodiversity of ciliates is essential for unraveling the intricate web of interactions that shape ecosystems. Consequently, the number of studies on the diversity and distribution of ciliates have increased globally. Ciliates are very important as they play roles in nutrient cycling, microbial food webs, and symbiotic associations, etc. to maintain the balance of ecosystem. In the present study, a new species of genus *Aponotohymena* (*Aponotohymena botrinucleata*) is being reported, from a pond located near 'Garden of Five Senses,' Saket, Delhi, India. This genus was created by Foissner in 2016. The type species of this genus, *A. australis* was first named as *Oxytricha austalis* and later redesignated as *Notohymena australis*. However, recently it is further redesignated as *Aponotohymena australis*. The identifying feature of this genus include: flexible body; 18 Frontal-ventral-transverse (FVT) cirri; more than 3 caudal cirri associated with dorsal kineties 1, 2 and 4 and splitting of DP_3 (third dorsal primordium). According to Foissner (2016), the genus *Aponotohymena* differs from the genus *Notohymena* only in the number of caudal cirri. Only three species of this genus are reported till date namely *A. australis*, *N. apoaustralis* and *A. isoaustralis*. In the present study, a new species of this genus, *Aponotohymena botrinucleata*, is being reported from a freshwater pond.

Keywords: *Aponotohymena*, Oxytrichidae, protargol, morphology & morphogenesis

1. INTRODUCTION

Ciliates, which are amongst the most diverse groups of Protozoa, inhabit a diverse range of environments, which includes free-living, parasitic, commensal, and symbiotic forms (Corliss & Coats, 1976; Corliss, 1979). The free-living forms of the ciliates have been reported from a number of varied water bodies such as lakes, ponds, underground pools, rivers, estuaries and oceans. Additionally, their existence has also been recorded in a variety of terrestrial environments, such as soil, desert sands and forest litter (Corliss, 1979; Lynn & Small, 1985; Foissner, 1987; Patterson et al., 1989; Foissner, 1994; Foissner et al., 1995; Foissner, 1998; Cheng et al., 2019; Bai et al., 2020).

The taxonomic diversity of ciliates is immense, encompassing thousands of species with distinct morphologies, behaviours, and ecological niches. Gradually, the number of studies on diversity and distribution of ciliates have increased globally (Dolan & Marrasé, 1995; Johansson et al., 2004; Yang et al., 2020).

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Review Article

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An Updated Review on Versatile Application of Schiff Base Metal Complexes

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ABSTRACT

Schiff-base metallic complexes have attracted immense scientific attention due to their unique properties and use in industrial and biological areas. Schiff bases are an essential chemical compound category produced by condensation of primary amines and aldehydes or ketones. Their recognized characteristics include applications in organic synthesis, chemical and biological sensing, agricultural chemistry, polymer and resin industries, coating, catalysis, coordination chemistry, and drug development. The -C=N- (imine or azomethine) functional group in Schiff bases is a crucial pharmacophore for developing and synthesizing lead bioactive chemicals. The wide range of biological effects of Schiff-bases has piqued the interest of many in medicinal chemistry. These complexes show various biological activities, such as antioxidant, cytostatic, and antibacterial/fungal effects. Additionally, they exhibit exceptional catalytic activity for a range of processes. This study focuses deeply on the chemistry, production, history, and uses of Schiff-base ligand-based metallic complexes, emphasizing the compounds' biological and industrial purposes. This review provides an overview of current circumstances and future directions of research in the field of inorganic chemistry, which may be extremely beneficial to researchers and those working in this field.

Key-words: Schiff base, metal complexes, azomethine, pharmacophore, biological activities, antifungal, antibacterial, antioxidant, cytostatic

INTRODUCTION

Macronuclear or macroacyclic ligands containing nitrogen and oxygen donors that play a part in coordination and often polydentate due to their coordinating characteristics are collectively referred to as Schiff bases. These ligands contain a functional group that is either azomethine (-C=N-) or an imine. Aldehydes or ketones condense with a primary amine to generate these compounds. This arrangement replaces the -C=O group with the C=N-R group. Schiff bases with aryl groups are more stable than those with alkyl groups. Schiff base's structure and condensation mechanism are provided (Fig. 1). Thus, they show a variety of biological actions, including antiviral, antifungal, antibacterial, antiproliferative, and anti-inflammatory activities [1]. They have piqued the scientific community's interest greatly because of how easily they can be synthesized and complexed with metals. The conventional manufacturing process for Schiff bases and metallic complexations is as follows: Schiff bases based on N_2O_2 metallic complexes, including salicylaldehyde and diamines, have attracted much interest. Their structures include hetero-atoms N, O, and S serve as the active sites for synthesizing novel physiologically active molecules and aid in creating diverse pharmacophore types [2].

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Research Article

Cytotoxic/Genotoxic Effects of the Antibiotic Streptomycin on Root Meristem Cells of *Allium cepa* L.

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ABSTRACT

Antibiotics such as streptomycin are used not only to treat human and animal diseases but also for the control of plant diseases. The effect of the antibiotic streptomycin on plant root meristem cells was investigated with the aim of studying its cyto-genotoxicity using the *Allium cepa* assay. Onion root tips were treated with different concentrations of streptomycin for 3-,5- and 24 hours duration, respectively, and distilled water as control. For statistical analysis one way analysis of variance (ANOVA) with Tukey's post hoc multiple comparison tests at significance level $p < 0.05$ was performed. The results showed that streptomycin reduced mitotic index and induced chromosomal aberrations in root tip cells like c-metaphase, vagrant chromosomes, anaphase bridge, contraction of chromosomes, chromosome fragmentation, disorderly anaphase and clumping of chromosomes at different concentrations and different duration of exposure. Thus, the results implicated streptomycin as an inducer of mitotic abnormalities and mutagenic to plant cells. This clearly indicates that streptomycin should not be the antibiotic of choice for control of diseases.

Keywords: Antibiotic, root tips, cytotoxicity, genotoxicity, mitotic index, chromosomal aberrations.

INTRODUCTION

Antibiotics or antibacterial compounds are the anti-microbial drugs used for the prevention (growth inhibition) and treatment (killing of bacteria) of bacterial infections. Antibiotics can be classified by their activity against a spectrum of microorganisms. The more the species of organisms that are killed, the broader is the spectrum of activity. Narrow-spectrum antibiotics target a few types of bacteria. Broad-spectrum antibiotics target many types of bacteria. Both types work well to treat infections. Using broad-spectrum antibiotics when they are not needed can create antibiotic-resistant bacteria that are hard to treat. Antibiotic resistance mostly develops in bacteria by mutation. Once acquired, the resistance can be transferred to other bacteria horizontally or to their progeny vertically[1]. New lethal strains of bacteria can evolve due to indiscriminate use of antibiotics. These new strains may be more lethal than the parent strain, posing a major environmental and health concern.

The antibiotics used for treating livestock animals are not metabolized and mostly excreted in manure and thus not only contaminate the environment but also affect the soil microbiome. These pose a serious risk of spreading antibiotic resistance genes in soil microorganisms[2,3]. The antibiotics can be taken up by plants which grow in manure enriched soil[4]. Besides their use for treating human and animal diseases, antibiotics are also sprayed on plants to control plant diseases. Bacteria and other prokaryotic microbes (e.g., phytoplasmas) are known to cause several diseases in plants of commercial importance, for example bacterial soft rots of fruits and vegetables, citrus canker caused by *Xanthomonas campestris* pv. *citri* and fire blight of apple and pear caused by *Erwinia amylovora.* Now-a-days antibiotics (for example, streptomycin, gentamycin, oxytetracycline, oxolinic acid) are also used directly on fruit crops like apple, pear and peach[5]. From a trial of about 40 antibiotics tested for their efficacy in controlling plant diseases, less than ten were brought into commercial use out of which only streptomycin is being used on a global scale[6]. Specifically, plant diseases like fire blight of pear and apple, flower and fruit infection of pear and apple trees caused by *Pseudomonas syringae*, and bacterial spot of pepper and tomato caused by *Xanthomonas campestris* are presently being managed by using streptomycin[7].

The antibiotics enter groundwater due to irrigation and rainfall[4]. Most water resources are gradually becoming polluted due to antibiotics and their metabolites coming from household and industrial waste, animal farms and agricultural run offs directly without treatment. The use of this water for irrigation and its uptake by plant roots may affect the vegetation, more importantly the agricultural crops. Therefore, recurrent, excessive and prolonged use of antibiotics may affect the physiology of plants by inducing harmful cytotoxic and genotoxic effects.

Tanaka and Satô[8] reported the mutagenic effect of streptomycin on the cells of *Tradescantia paludosa* undergoing mitosis pointing to its ability to cause minor genic changes such as recombination as well as major aberrations such as polyploidy and translocation. Nwangburuka and Oyelana[9] studied cytological effects of chloroquine on root mitosis of *A. cepa.* This study showed that chloroquine is a strong mitotic inhibitor and could give

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POSITIONAL AND THEORETICAL ASTRONOMY

Perturbations in Coriolis and Centrifugal Forces and N-R Basins of Convergence of Photogravitational Magnetic-Binary Problem with Variable Mass

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Abstract—In this paper, we have investigated the effect of small perturbations in the Coriolis (ϕ) and centrifugal (ψ) forces in the Photogravitational magnetic binary problem including the effect of third body as variable mass. The objective of this work is to analyse the effect of ψ and other parameters (magnetic moments (λ) and radiation pressure (q)) on the existence and evolution of equilibrium points, basins of convergence (BoC), degree of unpredictability in BoC. In addition, to examine the effect of ϕ and ψ (in the presence of other parameters) on the stability of equilibrium points are also one of the aspect of this work. For different values of parameters, a total number of cases of non-collinear equilibrium points are 3, 5 and 7. The effect of various parameters on the evolution of equilibrium points are explained with the help of graphs. All non-collinear equilibrium points are found to be unstable for permissible range of parameters present in this model. The change in geometry of BoC's is also shown and explained using graphs. The effect of ψ, q and λ on the degree of unpredictability in BoC's is examined using the method of basin entropy. It is found that for the complete range of λ and q, the BoC's are in fractal region. Also, for the values of $\psi = 1.37$, 1.38 and 1.40 to 1.44, the boundaries of BoC's are in non-fractal region.

Keywords: centrifugal force, Coriolis force, magnetic binary problem, basin of convergence (BoC), basin entropy

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1. INTRODUCTION

In the field of celestial mechanics and space dynamics, we generally observe complex nonlinear models. Many scholars have been exploring the phase space structure of these models since decades. One of such interesting model in this field is the circular restricted N-body problem. In order to make this model more realistic, we include different perturbations such as radiation pressure, oblateness effect, solar wind, variable mass, atmospheric drag, potential from the belt and magnetic dipole effect etc. We find several works for $N = 3$, 4, 5 and 6 in the recent times. In this paper, we have considered one of such model i.e., the circular restricted three body problem whose primaries are magnetic dipoles and the third body is taken as variable mass.

Many authors have been studied the restricted problem of three bodies with the effect of small perturbations in the Coriolis and centrifugal forces. A series of manuscripts are available that deal with the effect of small perturbations in the Coriolis and centrifugal forces. Few important works can be seen in (Wintner [21], Szebehely [20], Bhatnagar and Hallan [2, 3], Singh and Vincent [16], Suraj et al. [17, 18], Aggarwal et al. [1], Idrisi et al. [6]). In [20], Szebehley studied the effect of a small perturbation in the Coriolis force in the restricted problem of three bodies and discussed the stability of the equilibrium points. He considered a small change in the Coriolis force and left the effect of centrifugal force undisturbed. He concluded that the Coriolis force is a stabilizing force. In [2], Bhatnagar and Hallan studied the effect of small perturbations in the Coriolis and centrifugal forces on the positions and stability of the equilibrium points. Further, in [3], both have studied the effect of small perturbations in the Coriolis and centrifugal forces on the nonlinear stability of equilibrium points. They observed that triangular equilibrium points are stable for all mass ratio values except three mass ratios, while collinear equilibrium points are always unstable. In [14, 15], Singh and Ishwar studied the perturbations in the Coriolis and centrifugal forces in the restricted three-

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Full length article

Unveiling the intricacies of attracting zones in magnetic binary systems: Investigating the impact of Yukawa correction

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Keywords:
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ABSTRACT

This study delves into the restricted three-body problem with a Yukawa correction to Newtonian gravitational forces, focusing on magnetic binary systems. We scrutinize the influence of Yukawa correction parameters (α, β) and the ratio of magnitude of magnetic moments (λ) on the system's equilibrium points and their stability, zero-velocity curves. In our case, there exist of five and seven equilibrium points and all are found to be unstable for given range of parameters. Our examination extends to the basins of convergence and the existence of fractal under the influence of α and λ. Graphs drawn with the help of Wolfram Mathematica software vividly portray the parameter-driven evolution of equilibrium points, zero-velocity curves and basins of convergence. Furthermore, we explore the fractal characteristics within the basins of convergence, offering valuable insights into the complex dynamics of magnetic binary systems with Yukawa correction.

1. Introduction

1.1. Notations

We present some abbreviations that are used throughout the manuscript:

BoCs	Basins of convergence
BE	basin entropy
BBE	boundary basin entropy
R3BP	Restricted three-body problem
N–R	Newton–Raphson
ZVCs	Zero-velocity curves

1.2. Literature review

The planar circular restricted three-body problem (PCRTBP) holds a prominent and captivating position in the fields of celestial mechanics and dynamical astronomy. It explores the intricate motion of a test particle within the gravitational field of two primary bodies, both in circular orbits around their common centre of gravity, as originally formulated by Szebehely in Szebehely (1967). This problem finds applications in a wide array of research disciplines, spanning chaos theory, molecular physics, planetary physics, stellar systems and galactic dynamics. Its continual relevance and profound implications make it an area of continued exploration.

In this paper, we delve into a specific variant of this problem, namely, the circular restricted three-body problem, where the primary bodies are modelled as magnetic dipoles and we introduce the Yukawa correction to the Newtonian gravitational force. Although Newton's gravitational theory has demonstrated remarkable accuracy and predictive power in numerous cases, many modified theories of gravity and unified theories have emerged, suggesting deviations from the Newtonian law of universal gravitation, commonly known as the inverse square law. Recently, many articles have been published considering extra effects such as variable mass, modified potential, stokes drag, oblateness and other perturbations. Some are: Abouelmagd et al. (2016), Abouelmagd (2018), Abouelmagd et al. (2020), Mittal et al. (2023), Sachan et al. (2023), Zotos et al. (2020a,b) and the earlier works of Melnikov (1993, 1996, 2002), have introduced various alterations stemming from the introduction of additional fields or postulating the existence of new massive particles.

The Yukawa potential, proposed by Yukawa (1935), modifies the Newtonian gravitational potential, allowing for an effective non-relativistic representation of the strong interactions between particles. In the context of the two-body problem, the gravitational effect on the secondary body, while considering the Yukawa correction, can be characterized by a modified potential energy, expressed as $V(r) = V_N(r) + V_Y(r)$. Here, $V_N(r)$ represents the Newtonian potential, defined as $-\frac{GMm}{r}$, while $V_Y(r)$ accounts for the Yukawa correction, described

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POSITIONAL AND THEORETICAL ASTRONOMY

Investigating Attraction Zones in the Photogravitational Four-Body Problem: Effects of Asteroid Belt and Small Perturbations in Coriolis and Centrifugal Forces

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Abstract—In this study, we have examined the effects of small perturbations on the Coriolis force and centrifugal force in the photogravitational restricted four-body problem within the circular asteroid belt. We investigate the existence, parametric evolution, and stability of equilibrium points considering various parameters. Our findings reveal that a small perturbation in the centrifugal force significantly influences the location of equilibrium points, while a perturbation in the Coriolis force has no impact on their location. To illustrate the permissible region of motion for the infinitesimal mass relative to the Jacobi constant, we plot the zero-velocity curves. Furthermore, we conduct a comprehensive analysis to determine the influence of the Coriolis force (α) and centrifugal force (β) on the geometry of the basins of convergence (BoCs). In order to quantify the unpredictability of the BoCs, we thoroughly study the basin entropy. Significantly, we have found the presence of unpredictable (fractal) regions in close proximity to the boundaries of the basins of convergence.

Keywords: coriolis force, centrifugal force, Newton-Raphson Basins of Convergence, basin entropy, fractal

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1. INTRODUCTION

Over the past few decades, the Restricted Four-Body Problem (R4BP) has been extensively studied by numerous researchers. The R4BP examines the motion of a test particle, referred to as the infinitesimal mass, in the presence of gravitational forces from three masses known as primaries. Researchers have primarily focused on two configurations: the Euler configuration and the Lagrange configuration. In the Euler configuration, the primaries are aligned in a straight line, whereas in the Lagrange configuration, the primaries form the vertices of an equilateral triangle. Several researchers have investigated the existence and stability of equilibrium points in the R4BP, including studies by [3, 12, 19, 24, 30]. In this study, we specifically explore the Lagrange configuration of the R4BP, incorporating radiation pressure and asteroid belts, as well as small perturbations in the Coriolis and centrifugal forces.

The effects of small perturbations in the Coriolis and centrifugal forces on the stability of equilibrium points in the restricted three-body problem have been examined by [4] and the nonlinear stability of equilibrium points by [5]. These studies reveal that the collinear points are unstable, while the triangular points are stable for most mass ratios within the range of linear stability, with a few exceptions. In recent times, many researchers have investigated the R4BP under various perturbations, such as [9, 20, 23, 28].

The presence of asteroid belts in our solar system has inspired researchers to explore their impact on dynamical systems. Scholars have extensively studied the effects of asteroid belts/circumstellar dust/circular clusters of material points in the restricted three-body problem (R3BP), as observed in the works of [1, 14, 25]. It has been observed that asteroid belts have a significant impact on the system. For instance, [16] examined the effects of radiation pressure, oblateness, and asteroid belts in the R3BP, while [22] included the effects of asteroid belts in the R4BP, considering the Manev parameter.

Investigating the influence of various perturbing parameters on the domain of basins of convergence associated with equilibrium points, using the Newton–Raphson iterative scheme, unveils essential prop-

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ORIGINAL PAPER

On the security of DLCSP over $GL_n(\mathbb{F}_q[S_r])$

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Received: 19 August 2020 / Accepted: 19 August 2021 / Published online: 30 August 2021

Abstract
Discrete logarithm problem (DLP) and Conjugacy search problem (CSP) are two important tools for designing public key protocols. However DLP is used over commutative as well as non-commutative platforms but CSP is used only over non-commutative platforms. To harden the security of cryptosystems using DLP and CSP as base problems, various authors have combined these two problems to form a new problem called Discrete logarithm with conjugacy search problem (DLCSP). It has been used to design key exchange protocols and signature schemes over the general linear group with entries from group ring, that is, $GL_n(\mathbb{F}_q[S_r])$. In this paper, we show that, if someone can solve DLP in polynomial time over some finite extension of $\mathbb{F}_q$, then DLCSP over $GL_n(\mathbb{F}_q[S_r])$ can also be solved in polynomial time with non-negligible probability.

Keywords Discrete logarithm problem · Conjugacy search problem · Matrices over finite fields · Group rings

1 Introduction

Discrete logarithm problem (DLP) and conjugacy search probem (CSP) are two important tools for designing algebraic cryptographic primitives. Let G be a finite cyclic group generated by α. Given an element $\beta \in G$, the problem of finding an integer t such that $\beta = \alpha^t$ is known as DLP. DLP is computationally intractable and

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BOUNDS FOR CODES DETECTING REPEATED BURSTS IN UNEQUAL BLOCKS

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(*Received 19 November 2022*)

Abstract : In the present age, huge dependence on technology makes the transmission and reception of data of utmost importance. During this process, errors get incorporated and error control techniques are required to identify or correct these errors. For that, redundancy is added to the transmitted vector. For an efficient system, the redundancy should be as low as possible. In this paper, we obtain bounds on the redundant digits of a binary linear code that detects 2-repeated bursts of different lengths in two blocks of unequal lengths. An illustration of such a code is also given.

Keywords: Error, Syndrome, Repeated burst, Error detection, Parity-check.

2020 Mathematics Subject Classification: 94B20; 94B65.

1. Introduction. In this era of the digital world, data is stored and transmitted extensively. All the time, transmission and reception of data is a major concern for data scientists. While transferring data through noisy channels, errors get introduced. These errors need to be detected or corrected. Such errors may be in random single digits or may be clustered. Researchers have been putting great efforts to develop methods to handle errors. Many codes have been developed to deal with different types of errors (Abramson, 1959, Bose and Ray-Chaudhuri, 1960 and Reed and Solomon, 1960). Hamming (Hamming, 1950), developed codes for single error correction. Initially, Fire (Fire, 1959), referred to clustered errors as open loop bursts to give a more general concept. An open loop burst of length b is a vector in which non-zero components occur as b consecutive digits, the first and the last digit being non-zero. Burst errors may appear in different forms: CT-burst (Chien and Tang, 1965), b(fixed) burst (Dass, 1980), repeated b(fixed) burst (Dass and Garg, 2009).

Berardi, Dass and Verma, (2009) introduced the concept of repeated bursts of length b or less. An m-repeated burst of length b is a vector in which non-zero components

Intuitionistic fuzzy set entropy: A novel measure for uncertainty management in complex group decision-making

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Abstract

To measure the amount of uncertainty present in the data, fuzzy set plays crucial role and to predict the hidden information of any fuzzy set, entropy plays significant role. This research work proposes a new entropy measure specifically designed for intuitionistic fuzzy sets (IFS). The validation process verifies the efficacy of the proposed measure. In addition, specific case studied illustrates the practical applications of the proposed entropy measure in real-world multi-criteria group decision making as proposed measure has been integrated with TOPSIS methods. The findings highlight the importance of entropy measures in effectively managing uncertainty and diversity.

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Dynamical Analysis of Stochastic Predator-prey Model with Scavenger

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Abstract

In this paper, we studied the dynamic properties of predator-prey and scavenger three species system by using ergodic invariant measures. Pengyu Ma. find the five points of dynamical bifurcation of the stochastic model, which happened between extinction and survival of each species. Environmental noise was added and proved by the fact that driving force produced by environmental noise influence the system and it was find that system may extinct or partially extinct. Here, we have analysed the stochastic bifurcation phenomena of the prey-predator with scavenger system from the nature of dynamic bifurcation. The phase plots and time diagram plotted for the different values of parameters. We have verified all the results by numerical simulations.

Keywords: stochastic dynamical bifurcation; invariant sets; stochastic process; Lyapunov exponents; ergodic invariant probability measures.

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ORIGINAL ARTICLE

HEAT TRANSFER WILEY

Insight into the dynamics of a Newtonian fluid through a rectangular domain with an emphasis on heat transfer

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Abstract

Fluid flow coupled with temperature effects has attained prime importance due to its huge applications in different fields like casting and welding industries, geothermal extraction, and lubrication technologies. The present study is a novel numerical method for computations for fluid flow with temperature effects in a rectangular domain. A control volume method is employed as a numerical method for solving continuity, momentum, and energy equations. Owing to the difficulties associated with solving these governing equations, numerical computations are presented in the computational grid by using the control volume method. A modified algorithm is suggested for the current problem. The magnitude of the velocity, temperature, and pressure at different nodes in horizontal and vertical directions of the computational domain is investigated. Along the diagonal nodes, the pressure declines and then grows consistently. The temperature for mercury ($Pr = 0.015$) is higher than for water ($Pr = 6.57$) at a particular node.

KEYWORDS

bottom to the top boundary, finite volume discretization, flow variables, left to the right boundary, prandtl number, revised simple algorithm, reynolds number

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IoMT Tsukamoto Type-2 fuzzy expert system for tuberculosis and Alzheimer's disease

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ABSTRACT

Accurate disease monitoring is an extremely time-consuming task for medical experts and technocrats involved, requiring technical support for diagnostic systems. To overcome this situation, we developed an Internet of Medical Things (IoMT) based on Tsukamoto Type 2 Fuzzy Inference System (TT2FIS) that can easily handle diagnostic and predictive aspects in the medical field. In the proposed system, we developed a Tsukamoto type 2 fuzzy inference system that takes the patient's symptoms as input factors and the medical device as the output factor of the result. The aim of this work is to demonstrate the usefulness of type 2 fuzzy sets in Tuberculosis and Alzheimer's disease diagnostic system. Numerical calculations are also performed to illustrate the applicability of the proposed method. A validation of the proposed derivation of the proposed IoMT model is also discussed in the results and conclusions section.

Introduction

The health care is a vital lead in a peace-loving and actual life for a human wellbeing. The world health organization illustrated that wellbeing as a state of psychological and physical suitability without diseases and sickness. Human healthcare is a process of keeping the health with anticipation involving correct diagnosis. The data of the patient, billing, case history, medicine dossing and routine management in care affect the health of the patients.

Tuberculosis (TB) is a pervasive infectious disease primarily affecting the lungs, caused by the bacterium *Mycobacterium tuberculosis*. It is transmitted through airborne particles expelled when individuals with active pulmonary TB cough, sneeze, or spit. Despite being both preventable and curable, TB remains a major global health challenge. According to WHO, current estimates suggest that approximately one-quarter of the world's population harbors latent TB infection. Of these individuals, 5–10 % will develop symptomatic TB disease over their lifetime, underscoring the critical need for effective diagnostic and preventive strategies. Those with latent TB do not exhibit symptoms and are not infectious, but the transition from latent to active TB can occur if not properly managed, potentially leading to severe health outcomes.

Treatment usually includes a course of antibiotics, with the disease being completely curable if the patient receives them in the right way. Otherwise, TB may cause death, which reunderstands the importance of correct and timely diagnosis. In communities where the disease is common, babies and young children are vaccinated with Bacille Calmette-Guérin. It is effective in preventing severe forms of TB in children, such as TB meningitis and miliary disease, but its efficacy in preventing pulmonary TB, which is the most common form in adults, varies significantly.

Globally, the burden of TB is unevenly distributed, with significant disparities in incidence rates across different regions. High-burden countries often face challenges related to healthcare access and socio-economic barriers that complicate efforts in TB control and elimination. This variability in vaccine efficacy and the significant proportion of latent infections that could become active are key factors motivating ongoing research and innovation in TB diagnostics and treatment strategies, such as the development of more effective vaccines and novel therapeutic approaches. According to the WHO's 2022 data, India bears a significant burden of tuberculosis (TB), reflecting its status as one of the countries with the highest TB incidence globally. Table 1 and Fig. 1 provides a detailed breakdown of TB prevalence and incidence rates within India's vast population of approximately 1.417 billion.

Alzheimer's disease is a progressive neurodegenerative disorder, akin to how coronary artery disease affects the heart, Alzheimer's targets the brain. It primarily results from the damage and

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Hybrid approach of type-2 fuzzy inference system and PSO in asthma disease

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ABSTRACT

This research work presents a hybrid approach combining a type-2 fuzzy inference system with particle swarm optimization (PSO) to develop a type-2 fuzzy optimized inference system, specifically tailored for asthma patient data. Addressing the inherent uncertainty in medical diagnostics, this model enhances traditional type-1 fuzzy logic by incorporating ambiguity into linguistic variables and utilizing type-2 fuzzy if-then rules. The system is trained to minimize diagnostic error in asthma disease identification. Applied to a dataset comprising eight medical entities from asthma patients, the model demonstrates substantial accuracy improvements. Numerical computations validate the system, showing a decrease in error rate from 1.445 to 0.03, indicating a significant enhancement in diagnostic precision. These results underscore the potential of our model in medical diagnostic problems, providing a novel and effective tool for tackling the complexities of asthma diagnosis.

Introduction

Asthma, a long-time period inflammatory sickness characterized by using triggered bronchospasms and reversible airflow obstruction, offers giant diagnostic challenges because of its complicated and multifactorial nature. Symptoms such as wheezing, chest tightness, coughing, and shortness of breath, frequently exacerbated at night or during exercise, are inspired by means of environmental and genetic factors. As said by the World Health Organization in 2019, asthma impacted approximately 262 million people worldwide, ensuing in 455,000 deaths. This alarming statistic underscores the urgency for progressed diagnostic methodologies to efficiently navigate the uncertainties inherent in scientific diagnostics.

Related works

The prime problem in computational theory is the L.A. Zedah's 1965 foundational paper on 'Fuzzy Sets' with a new approach to cope with uncertainty and imprecision and foundation for the growth of fuzzy logic[1]. In 1975, Zadeh widens the span of fuzzy logic thru 'The Concept of a Linguistic Variable' which presents a brand-new manner of thinking about inexact reasoning and opens up clean prospects for similarly research[2]. In 2005, Sierra and Coello paintings on enhancing PSO based totally multi-goal optimization the usage of crowding, mutation, and ∈-dominance represents a huge leap in optimizing complicated systems[4]. In 2006, Feng delivered the concept of self-producing RBFNs using evolutionary PSO getting to know, mixing neural networks with evolutionary computation in a singular way[5]. In 2008, Huang and Dun's development of a dispensed PSO-SVM hybrid device for characteristic choice and parameter optimization marks a sizable development within the integration of machine mastering and optimization strategies[8]. In 2008, Martínez and Gonzalo's paper on 'The Generalized PSO' opens new doors in PSO evolution, showcasing the adaptability of PSO in fixing complex problems[9]. In 2011, Valdez et al. added a stepped forward evolutionary technique the usage of fuzzy good judgment for combining PSO and genetic algorithms, showcasing the synergy among those optimization techniques[12]. In 2012, Patel et al.'s choice assist gadget for diagnosing allergies severity the usage of fuzzy logic demonstrates the realistic utility of fuzzy good judgment in medical diagnostics[16]. In 2013, Melin et al. Worked at the most effective design of fuzzy category structures using PSO with dynamic parameter version showcases the integration of fuzzy good judgment with optimization strategies[17]. In 2013, Mendel's educational on widespread kind-2 fuzzy good judgment structures simplifies those

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Multi-stage multi-generation based product adoption: An analysis using numerical methods}

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Abstract

In Today's neck-to-neck competitive environment, every firm plans to launch a successive version of its product on a frequent basis. This process has been widely studied in recent past and many proposals can be seen in literature. Also, plenty of works are available with respect to multi-stage diffusion dynamics. However, very less attention has been given to the theme wherein, both these aforesaid concepts have been studied together. This study is an attempt to model the both concept under one canopy. Furthermore, due to non-availability of closed form solutions, authors have utilized a well-known numerical method technique of Runge-Kutta for the analytical part. Real life

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Generalization of Riemann-Liouville Fractional Operators in Bicomplex Space and Applications

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Abstract In this article, we generalize the Riemann-Liouville fractional differential and integral operators that can be applied to the functions of a bicomplex variable. For this purpose, we consider the bicomplex Cauchy integral formula and some contours in bicomplex space. We elaborate these operators through some examples. Also, we contemplate some significant properties of these operators which include a discussion of bicomplex analytical behavior of generalized bicomplex functions through Pochhammer contours, the law of exponents, generalized Leibniz rule along with a depiction of the region of convergence, and generalized chain rule for Riemann-Liouville fractional operators of bicomplex order. We give an application of our work in the construction of fractional Maxwell's type equations in vacuum and source-free domains equipped with the Riemann-Liouville derivative operator. For this, we define bicomplex *grad*, *div*, and *curl* operator with the help of these newly defined operators. The advantage of this fractional construction of Maxwell's equation is that it may be used to build fractional non-local electronics in bicomplex space. By considering bicomplex vector fields for the respective domains, we reduce the number of these fractional Maxwell's type equations by half, which makes it easier to extract electric and magnetic fields from the bicomplex vector fields.

Keywords Idempotent Representation, Bicomplex Gamma and Beta Functions, Functions of Bicomplex Variable, Riemann-Liouville Operators of Bicomplex Order

1 Introduction

There has been a separate development of theory in both bicomplex analysis and fractional calculus but to present a concept in these two fields together is a new effort in itself. In this work, the study of Riemann-Liouville fractional operators has been presented in the context of bicomplex analysis. In 1892, *Segre* defined bicomplex numbers as special generalization of complex numbers concern with four dimensional space. The theory of bicomplex number emerged with an important utilitarian mathematical tool [1, 2]. An analogy of several complex phenomena was explored in [3–7]. An investigation of the Schrödinger equation and its solution by an analytical method in the framework of bicomplex numbers were found in [8]. In [9], the author proposed bicomplex Fibonacci quaternions with some significant formulae and inequalities. Various integral transforms in bicomplex sense were proposed with their applications in [10, 11] etc.

In [12], the authors worked on reconstruction of high probability bicomplex sparse signal. from a reduced number of bicomplex random samples. With various types of standard metric, a construction of zero mean curvature complex surfaces in bicomplex numbers was given in [13]. In [14], a classification of singularities of bicomplex holomorphic functions with residue theorem for bicomplex holomorphic functions was described. A bicomplex-valued twin-multistate Hopfield neural network (BTMHNN) was introduced in [15] for reduction of the number of weight parameters.

Fractional calculus originated from a question asked by *L'Hôpital* to *Leibniz* through a letter in which it was asked that how to define the $(1/2)^{th}$ derivative of a function. Later various mathematicians such as *Euler, Laplace, Fourier, Abel, Liouville, Riemann,* and *Laurent* etc. made significant efforts in

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Biocompatibility assessment of bovine serum albumin conjugated manganese dioxide nanoparticle and their therapeutic role against microwave radiation induced haematological toxicity in male Wistar rats

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Abstract

Microwave (MW) radiations are widely used in communications, radar and medical treatment and thus human exposure to MW radiations have increased tremendously, raising health concerns as MW has been implicated in induction of oxidative stress condition in our body. Few metallic nanoparticles (NPs) have been shown to mimic the activity of antioxidant enzymes and hence can be applied for the modulation of adverse effects caused by MW. Present study aimed to assess the biocompatibility of Bovine serum albumin (BSA) conjugated manganese dioxide nanoparticles (MNP*) and to counteract the impact of MW on the haematological system of male Wistar rats. Experiments were conducted in two sets. Set I involved biodistribution and antioxidant activity evaluation of MNP* at different doses. Results showed a dose-dependent increase in antioxidant potential and significant biodistribution in the liver, spleen, kidney, and testis, with no organ damage, indicating its biocompatibility. Experiment set II constituted the study of separate and combined effects of MW and MNP* on haematological parameters, oxidative status, and genotoxic study in the blood of rats. MW exposure significantly altered red blood cell count, hemoglobin, packed cell volume percentage, monocyte percentage, aspartate aminotransferase, Alanine aminotransferase and uric acid. MW also induced significant DNA damage in the blood. A significant increase in lipid peroxidation and a decrease in antioxidant enzyme superoxide dismutase was also observed in MW exposed group. However, these alterations were reduced significantly when MNP* was administered. Thus, MNP* showed biocompatibility and modulatory effects against MW-induced alterations in the haematological system of rats.

Keywords: BSA conjugated manganese dioxide nanoparticle; Microwave radiations; biocompatibility; free radical scavenging; modulatory effect.

Abstract

Globalisation has led to the hybridisation of culture all over the world. Globalization facilitates and simultaneously engenders cross-cultural interaction on a global scale. As a result, the interaction between diverse cultures leads to the emergence of a hybrid culture. The paper aims to understand the impact of hybridisation, due to globalisation from social and psychological perspectives. The paper has adopted the qualitative research methodology, revising various secondary sources to understand the impact of the transformative impact of globalisation on hybridisation. The research underscores the requisite to balance the cultural diversity and cultural identity aspects to a fruitful and harmonic cultural transformation at the social and psychological levels.

Keywords: Globalisation, Hybrid, Social, Phycology, Global, Culture.

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EMPOWERING LEADERSHIP ILLUMINATED: A META-ANALYTICAL EXPLORATION OF ITS CORRELATION WITH ORGANIZATIONAL COMMITMENT (2011-2021)

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Abstract

In a decade-spanning meta-analysis, this study explores the intricate relationship between Empowering Leadership (EML) and Organizational Commitment (OC). Synthesizing 12 primary studies, our findings reveal a significant positive correlation ($r = 0.35$, $p < 0.05$). Employing the random-effects model ensures methodological rigor, yielding minimal heterogeneity ($I2 = 0.00\%$) and no discernible publication bias. The ensuing discussion underscores the transformative influence of empowering leadership on commitment, advocating for its strategic assimilation into organizational frameworks. Future recommendations endorse targeted leadership development initiatives, while this study sets the stage for ongoing scholarly dialogue.

Keywords: *Empowering Leadership, Organizational Commitment, Meta-Analysis*

INTRODUCTION

In the intricate tapestry of organizational dynamics, leadership emerges as the masterful weaver, crafting the narrative that defines an institution. Amidst the diverse array of leadership styles, one that has recently garnered significant attention is the concept of "Empowering Leadership." This isn't just a managerial trend; it symbolizes a unique approach marked by trust, autonomy, and the strategic art of delegation. As our organizational landscape undergoes constant evolution, understanding the intricate threads that bind empowering leadership to individual commitment within an organization becomes not just important, but imperative.

Embarking on this academic exploration is not a conventional endeavor; it is an odyssey through a decade, from 2011 to 2021, utilizing the powerful lens of meta-analysis. Our goal? To unravel the complex relationship between empowering leadership (EML) and organizational commitment (OC), see Figure 1. This undertaking involves a meticulous synthesis of data drawn from the vast repositories of Mendeley, Scopus, and Google Scholar. This meta-analytical journey goes beyond isolated studies, seeking overarching patterns, correlations, and revelations that transcend the boundaries of individual research. Far more than an academic pursuit, this meta-analysis serves as a guiding light, illuminating the transformative potential of EML in cultivating steadfast OC.

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UNVEILING THE NEXUS: A META-ANALYTICAL EXPLORATION OF THE RELATIONSHIP BETWEEN AUTHENTIC LEADERSHIP AND ORGANIZATIONAL COMMITMENT

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ABSTRACT

In the ever-evolving realm of organizational behavior, the intricate interplay between leadership styles and employee outcomes remains a central focus of scholarly exploration. This meta-analysis delves into the nuanced relationship between "Authentic Leadership" (AL) and "Organizational Commitment" (OC) over the period from 2011 to 2021. Drawing from a comprehensive selection process encompassing 24 primary studies, our investigation, rooted in data from Mendeley, Scopus, and Google Scholar, unveils a positive association between AL and Organizational Commitment. Employing the Random Effects Model, our analysis yields a moderate correlation coefficient (r = 0.43), emphasizing a strategic connection. The exploration extends to publication bias analysis, indicating the reliability and generalizability of our findings. As organizations navigate the dynamics of leadership and commitment, our meta-analysis provides valuable insights for scholars and practitioners alike.

Keywords: *Authentic Leadership, Organizational Commitment, Meta-analysis, Random Effects Model, Publication Bias.*

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EXPLORING THE DYNAMICS OF EMPOWERING LEADERSHIP AND TURNOVER INTENTION: A META-ANALYTICAL PERSPECTIVE (2011-2021)

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ABSTRACT

This meta-analysis explores the relationship between Empowering Leadership and Turnover Intention from 2011 to 2021. Adhering to PRISMA guidelines, six studies (k=06) were meticulously selected, and the Random Effects Model was applied for analysis. Results show a consistent negative correlation (r=-0.32), emphasizing the strategic role of Empowering Leadership in reducing turnover intentions. Confidence intervals, prediction intervals, low heterogeneity (I^2: 0.00%), and non-significant publication bias support result robustness. Our findings guide organizational leaders in fostering a culture of Empowering Leadership for enhanced commitment and stability amidst talent retention challenges.

Keywords – Empowering Leadership, Turnover Intention, Meta-Analysis

1. INTRODUCTION:

In the ever-evolving landscape of organizational dynamics, the influence of leadership styles on employee outcomes has garnered significant attention. Among these styles, "Empowering Leadership" stands out for its emphasis on delegation, trust-building, and fostering employee autonomy.

This study delves into the relationship between empowering leadership and turnover intention, a critical precursor to employee turnover. With its focus on empowering employees through autonomy and decision-making authority, empowering leadership is believed to play a pivotal role in shaping employees' intentions to stay or leave an organization.

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"EMPOWERING LEADERSHIP AND JOB SATISFACTION: A META-ANALYTICAL EXPLORATION SPANNING 2011-2021"

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ABSTRACT

This meta-analytical study delves into the intricate relationship between Empowering Leadership (EML) and Job Satisfaction (JS) across 13 primary studies. Employing rigorous statistical methodologies, including the Galbraith plot, effect size analysis, and the Trim and Fill Method, our research substantiates a statistically significant and moderate positive correlation between EML and JS. The findings unveil a robust connection that withstands scrutiny, highlighting the transformative potential of EML on employee satisfaction. As organizations navigate the complex landscape of leadership dynamics, this research not only contributes empirical insights but also serves as a strategic compass, guiding leaders towards fostering empowering practices for enduring organizational success.

KEYWORDS: *Empowering Leadership, Job Satisfaction, Meta-Analysis.*

1. INTRODUCTION:

In the ever-evolving landscape of organizational dynamics, empowering leadership (EML) has emerged as a pivotal focus within scholarly discourse. Leadership practices that endorse employee empowerment, delegate authority, and cultivate an environment conducive to

Navigating Turnover Tides: A Decade-long Meta-analysis of the Impact of Authentic Leadership on Employee Turnover Intentions (2011-2021)

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Abstract

In the dynamic landscape of organizational behaviour and management, understanding leadership styles' impact on employee outcomes is crucial. This research delves into the relationship between Authentic Leadership and Turnover Intention through a comprehensive meta-analysis spanning a decade (2011-2021). The study, guided by PRISMA guidelines, amalgamates findings from 14 primary studies, revealing a nuanced and robust correlation. The negative overall correlation of -0.30 underscores Authentic Leadership's protective influence against Turnover Intention. Reporting bias analysis, heterogeneity measures, and practical implications for organizations enhance the credibility of the findings. As organizations strive for talent retention, cultivating Authentic Leadership emerges as a strategic imperative.

Keywords: authentic leadership, turnover intention, meta-analysis

Introduction

In the dynamic landscape of organizational behaviour and management, the exploration of leadership styles and their impact on employee outcomes has become imperative. One such leadership approach that has gained substantial attention is "Authentic Leadership." Rooted in the principles of transparency, self-awareness, and ethical decision-making, authentic leadership is postulated to foster positive employee attitudes and behaviours.

A critical aspect of organizational effectiveness lies in understanding and mitigating turnover intentions among employees. Turnover intention, often considered a precursor to actual turnover, carries significant ramifications for organizational stability, productivity, and the overall work environment. Consequently, there is a growing interest in scrutinizing the relationship between authentic leadership and turnover intention.

The proposed research endeavours to contribute to the existing body of knowledge by conducting a meta-analysis, synthesizing findings from a decade-long span, ranging from 2011 to 2021. The chosen timeframe allows us to capture a comprehensive understanding of the evolving dynamics between authentic leadership and turnover intention, considering potential shifts in organizational cultures, leadership practices, and external influences over the years.

1.1 Rationale for the Meta-Analysis:

1.1.1 Cumulative Insight: Meta-analysis offers a systematic and comprehensive approach to amalgamate findings from individual studies, providing a more nuanced understanding by synthesizing a diverse range of research outcomes.

1.1.2 Temporal Analysis: Examining the relationship over an extended period facilitates the identification of trends, variations, and potential modifications in the authentic leadership-turnover intention dynamics, offering insights into the adaptability and sustainability of this leadership style.

1.1.3 Holistic Perspective: By incorporating studies from various industries, geographical locations, and organizational contexts, the meta-analysis aims to provide a holistic perspective on how

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Saudi firms' performance dynamics: Organizational learning, innovation, and the dual roles of firm size and type

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Abstract

The objective of this research paper is to propose a robust framework for understanding the correlation between organizational learning, innovation, and the performance of Saudi Arabian firms, encompassing both financial and non-financial aspects. Additionally, the study evaluates how factors such as “firm type” and “firm size” influence organizational learning, innovation, and overall firm performance. For this study, we distributed a questionnaire to Jeddah, Saudi Arabia's private firm employees for a year. Analysis involved 815 complete sets, utilizing Structural Equation Modeling (SEM) through Confirmatory Factor Analysis (CFA) to explore relationships among latent variables via path analysis. Organization learning significantly enhances both financial and non-financial performance. Additionally, innovation positively influences firm performance. The combined impact of organizational learning and innovation strongly influences overall firm performance. Introducing the mediating variable "type of firm" enhances the relationship between organizational learning, innovation, and firm performance, as depicted in Model 2. The result of path analysis shows that “firm size” as moderating variable is significantly negatively related with innovation and firm performance. This study contributes by exploring the interplay of organizational learning, innovation, and their impact on firm performance, particularly within the emerging Saudi context, enhancing existing knowledge.

Keywords: Organization learning, innovation, firm financial and non-financial performance, Confirmatory factor analysis, Structural equation modeling.

خلاصة

الهدف من هذه الورقة البحثية هو التوصية بإطار شامل للتعرف على العلاقة بين التعلم التنظيمي والابتكار على أداء
في هذه .(المالية وغير المالية)الشركات السعودية الدراسة، قمنا بتوزيع استبيان على موظفي الشركات .الخاصة في جدة بالمملكة العربية السعودية لمدة عام مجموعة كاملة، باستخدام نموذج 815شمل التحليل من خلال تحليل العامل (SEM)المعادلات الهيكلية لاستكشاف العلاقات بين المتغيرات (CFA)التوكيدي التعلم التنظيمي يعزز بشكل .الكامنة عبر تحليل المسار بالإضافة إلى ذلك، .كبير الأداء المالي وغير المالي يؤثر .يؤثر الابتكار بشكل إيجابي على أداء الشركة التأثير المشترك للتعلم التنظيمي والابتكار بقوة على نوع "إن تقديم المتغير الوسيط .الأداء العام للشركة يعزز العلاقة بين التعلم التنظيمي والابتكار "الشركة وتساهم .2وأداء الشركة، كما هو موضح في النموذج هذه الدراسة من خلال اكتشاف التفاعل بين التعلم التنظيمي والابتكار وتأثيره على أداء الشركة مع السياق السعودي الناشئ، وتعزيز المعرفة الموجودة.

الكلمات المفتاحية: التعلم التنظيمي، الابتكار، الأداء المالي وغير المالي للشركات، التحليل العاملي التوكيدي، نمذجة المعادلات الهيكلية.

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CSR and its impact on Employee Engagement

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Abstract - ***An important factor influencing employee engagement is corporate social responsibility, or CSR. Studies reveal that CSR programs allow workers to contribute more of their entire self to the workplace, which strengthens their sense of loyalty and belonging to the company. The connection between CSR and employee engagement in firms is further examined, showing how the two are positively correlated. To further illuminate the relationship between CSR and engagement levels, studies of executive and management level personnel are conducted to determine the influence of CSR on various organizational levels. Insights into the practical aspects of CSR and its effects on engagement are also provided by examining the ramifications of CSR activities on employee engagement in a sample of Indian enterprises. Lastly, a direct relationship has been shown in large-scale companies between CSR and employee engagement, highlighting the significance of CSR in encouraging employee commitment.***

Keywords - CSR, employee's engagement, employee's satisfaction, employee's perception

----------X----------

INTRODUCTION

Any employer must prioritize employee engagement, much as employees must prioritize job satisfaction. And one of the major obstacles to productivity is employee disengagement. Additionally, because of the dynamic character of the workplace, the causes of disengagement also frequently alter, necessitating ongoing brainstorming on the part of the HR department. Additionally, it is not just the workplace that affects employee engagement; external variables also play a role. The degrees of engagement are affected equally by trends, culture, socioeconomic factors, disruptive events, attitudes, and beliefs. Since approximately US$280 billion is lost each year as a result of employee disengagement, the HR department must constantly adapt or improvise. However, one thing that stands out about the millennial age is that societal concerns are given priority. Whether it be increased understanding of the current environmental disaster or acceptance of the socio-economic issues. It is an aspect of self-actualization, according to Maslow's hierarchy of needs, and the millennial wants to be a part of something significant.

By virtue of Section 135 of the Indian Companies Act of 2013, India is the first country in the world to have legislated CSR for enterprises whose net value is INR 5 billion or more (about US$ 68 million or above) or whose net profit is INR 50 million or above (US $679983.50 or above). There are 16 000–17 000 of these groups, according to a 2016 estimate, and the nation has been generous with its CSR investment. Over INR 1 trillion, or roughly $13.8 billion, was spent on CSR in the period 2014–19. According to the CSR research (Thacker, H, CSR Policies throughout the World, 2019), India, the United States, and Denmark are three of the top contributors to CSR. Business like Tata, Infosys, Wipro, NTPC, BPCL, Jindal Group, Vedanta, etc. have created communities around their operational regions and given generously. CSR initiatives may be those that are outlined in a company's act or those that are chosen during board meetings. These initiatives typically have an impact on customers, suppliers, the environment, communities, and workers. Another country with a high spirituality index is India. According to a study, India comes in second place for spirituality, behind Canada. In addition, India has been a part of Indian culture from ancient times (Sudhir, R, 2009). It goes beyond the traditional definition of charity and is more closely related to proactive strategies for equity and sustainability.

Corporate social responsibility, or CSR, is becoming one of the key elements that draw in and keep millennial employees. The employees seek employment in which they may make a positive impact on society in some way. In other words,

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A STUDY OF USERS OF FINANCIAL STATEMENTS IN INDIA'S PERCEPTIONS OF THE IMPACT OF IFRS ON THE QUALITY OF FINANCIAL INFORMATION

Ashok Sharma, Research Scholar. University of Rajasthan, Jaipur

ABSTRACT

When the former government of P V Narasima Rao and its new economic policy were proclaimed in 1991, the significance of international accounting standards in India became apparent. The policies relating to foreign commerce, Foreign Direct Investment (FDI), etc., were drastically altered as a result. The dramatic change in India's economic climate over the past three decades has drawn more attention to accounting standards as a way to ensure accurate and honest financial reporting by corporate entities. India is a significant rising global economy, and its government has committed to adopting IFRS as of April 1, 2011. In actuality, IFRS and national standards convergence sparked global demand. Even though the transition from I-GAAP to IFRS was not without its difficulties, corporations stand to gain significantly from adopting IFRS. In India, rules, regulations, and formatting all changed as a result of IFRS convergence. Although IFRS were not declared mandatory in India during 2011, certain businesses are nevertheless adhering to them due to legal requirements in other countries (Gupta, 2012). Prior to 2016, very few businesses voluntarily adopted IFRS. Convergence has taken place in India in the shape of IND-AS, an Indian adaptation of IFRS. As the designated ministry for harmonising Indian GAAP with IFRS (IND-AS), the Ministry of Corporate Affairs (MCA) has been chosen.

Key words:
accounting standards, IFRS

INTRODUCTION

The end product of financial accounting system is financial statement. Financial statements are prepared and presented annually and it is also part of the process of financial reporting (Vora,2017). Provision of preparing and submission of these statements to the concerned parties is known as financial reporting. Financial reporting enables the users who otherwise are not accessible to the books of accounts of the company. The statements prepared for the sake of communicating economic information of the company to the stakeholders is called corporate communication or corporate reporting or financial reporting. Financial reporting includes broad and other mediums of financial reporting besides financial statements. Financial reporting should provide information that is useful to various stakeholders i.e., present and potential investors, creditors and other users to make rational investment, credit and similar decisions. Financial statements communicate accounting information to the users as it is considered as central features of financial reporting. By focussing on the needs of users of financial statements, the American Accounting Association, 1966, defined accounting as "the process of identifying, measuring and communicating economic information to permit informed judgments and decisions by the users of information." Financial reporting provides information about the management stewardship, the assets and liabilities, equity, income, expenses and cash flows (Beest et.al.,2009). The objective of accounting and financial reporting is to disclosure of the economic activities of the organization to its users. It is also viewed by (IASB, 2008) that financial reporting is prepared to provide information concerning economic entity. Financial reporting also provides information about an entity's assets, liabilities, equity, income and expenses that is useful to users of financial statements in assessing the prospects for future net cash inflows to the reporting and in assessing management stewardship of the entity's economic resources (IASB, 2018). Financial statements are the authorized documents through which corporates communicate their financial health to the outside world. Companies will provide information to its stakeholders through annual reports and quarterly reports. Annual reports consist of major aspect of business operations, logistics which

A STUDY ON THE IMPACT OF THE GST (GOODS AND SERVICES TAX) ON THE INDIAN ECONOMY

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ABSTRACT
The Goods and Services Tax (GST) is a comprehensive idea that streamlines the intricate tax system while fostering and bolstering a country's economic growth. The production, sale, and consumption of products and services are all subject to the GST, a comprehensive national tax. The Constitution (One Hundred and Twenty-Second Amendment) Bill, 2014, also referred to as the GST Bill or Goods and Services Tax Bill, begins the introduction of a Value Added Tax across the country of India. GST will be an indirect tax at all stages of manufacturing in order to achieve system homogeneity. State and federal taxes would be merged into a single tax payment after GST was implemented. It would also improve India's standing both domestically and internationally. GST would reduce the overall tax burden on consumers, which is currently estimated to be between 25 and 30 percent. Under this system, the ultimate tax is the responsibility of the customer, but an efficient system of input tax credits guarantees that there will be no cascading of taxes—tax on tax paid on inputs used to produce goods. GST would consolidate these taxes and establish a uniform market throughout the entire country, removing the need to pay multiple taxes like excise duty, service tax, and VAT at the federal and state levels, respectively. A GST system with multiple taxes included will produce effective cross-credit utilisation. The existing system taxes output, whereas the GST will attempt to tax consumption.

Key words:
Goods and Services Tax, tax burden

INTRODUCTION
The introduction of Goods and Services Tax (GST) is a very significant step in the field of indirect tax reforms in India. In the pre GST regime, there was multiplicity of indirect taxes. The central excise duty and service tax was levied by the Central Government, while VAT and Entry Tax was levied by the State Government. Moreover, there was cascading effect of taxes, i.e. tax on tax, at various stages as credit of taxes levied by one government was not available against payment of taxes levied by the other. GST is a huge reform for indirect taxation in India, the likes of which the country has not seen post Independence. GST will simplify indirect taxation, reduce complexities,and remove the cascading effect. It will have a huge impact on businesses both big and small, and change the way the economy functions. GST is a comprehensive indirect tax levy subsuming all central and state levies with a single unified value added tax transforming the nation into one single market. Major Central and State taxes are subsumed into GST which will reduce the multiplicity of taxes, and thus bring down the compliance cost. With GST, the burden of CST will be phased out.
As per Statement of Objects and Reasons appended to the Constitutional Amendment bill the object of GST is :
a) to have common national market, and
b) avoid cascading effect of taxes.

RELEVANT ACTS PASSED BY THE PARLIAMENT AND STATES
Roll out date for GST is fixed at 1st July, 2017. Following are Acts under GST which were passed and received the President‟s assent on 12th April, 2017-
1) The Central Goods and Service Tax Act, 2017(CGST),
(2) The Integrated Goods and Service Tax Act, 2017(IGST),
(3) The Union Territory Goods and Service Tax Act, 2017(UTGST),
(4) The Goods and Service Tax(Compensation to States) Act, 2017(Compensation Cess).

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The Importance, Scope and Elements of Financial Management

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Department of ABST
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ABSTRACT

Financial management provides the foundation for proper fund utilisation and strategic planning to uphold fiscal supervision. Managing finances is crucial since it adds value to an organisation and strengthens the customer relationship. Financial management involves managing cash movement, risk management and managing credit. The Imagine a financial institution (banks or Non-banking financial institutions) operating under the strict supervision of the central bank. Since the Central Banks control the monetary mechanism, they can regulate the general functioning of banks by tweaking repo/reverse repo rate values, etc. Banks essentially earn profits from the difference in interest income earned from extending loans and interest paid by their customers.

Key Words : Concepts, Scope, Importance and lements

Concept of Financial Management

Financial management refers to the strategic planning, organising, directing, and controlling of financial undertakings in an organisation or an institute. It also includes applying management principles to the financial assets of an organisation, while also playing an important part in fiscal management.

Financial management is the operational process of a company that wants to acquire and utilise the funds efficiently which is required for company activities. It is primarily focusing on the efficient management of funds in the enterprise. According to the layman, businesses' financial management is known as corporation finance/business finance as practised by businesses. And you should know about the concept of financial management to become a financial expert..The

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A Review of Drivers and Barriers to the Adoption of Electric Vehicles in India

*Naveen Kumar
**Vani Kanojia

Abstract

This paper attempts to develop a theoretical framework with the help of a comprehensive review of studies related to attributes of consumer adoption of electric vehicles by extracting the drivers and barriers thereto, which may have positive and negative effects on the consumers' decision to adopt the new technology over conventional one. Research papers from different search engines have been explored with multiple keywords and finally, ninety-six research studies have been considered that substantiate perceptions of consumers as well as a theoretical framework for the adoption of electric vehicles. Thus, the paper examines the previous research conducted on the theme, synthesizes them, tries to highlight the gap between the earlier research with respect to the perceptions of consumers about adoption of electric vehicles and proposes a conceptual framework describing the effect of drivers and barriers to adoption of electric vehicles on the utility of electric vehicles. That may have practical implications for the strategists to have better understanding of consumers' behaviour towards electric vehicles in India where the adoption of electric vehicles is still in its infancy.

Keywords: Electric Vehicles, theoretical framework, drivers, barriers, utilities, and India.

1. Introduction

The rapid progress of the global economy and technology through advancement of human development, it has also caused enormous harm to the world's natural ecosystem. It is obvious that with the increase in the population of any nation, the demand for vehicles also tends to increase. As per Chan, C. C. (2002), In the next 50 years, the world's population will increase from 6 billion to 10 billion, and the number of automobiles will increase from 700 million to 2.5 billion. As the demand for vehicles is increasing day by day in developing countries with an expansion of urbanization and per capita income. This will further intensify the level of local air pollution, carbon emissions, and congestion (Woodcock, J et al.,2009; Rao, Z. et al.,2013. The globe has already shown how crucial renewable energy is as an essential step to help alleviate the effects of global warming. To address this problem, the only way is to switch to the electric vehicle (EV) mode. Switching from conventional transportation to a much cleaner alternative provides the benefits of not the only a cleaner environment but also gives freedom from noise pollution. The obvious question that emerges from here is - what are Electric Vehicles (EVs)? In the broader sense, electric vehicle (EV) could be defined as a vehicle on a road that involves 'electric propulsion '. An electric vehicle includes a fuel-cell electric vehicles (FCEVs), hybrid electric vehicles (HEVs) and battery electric vehicles (BEVs). Some recent developments in electric vehicles are PHEVs. Electric vehicles includes vehicles from different technologies with slight differences like Battery electric vehicles(BEVs), can be characterised by having battery grid charging system with zero emission and independent from crude oil whereas fuel-cell electric vehicle (FCEVs) can be characterized with a fuel cell operating systems mainly sourced from hydrogen with an ultra-low emissions and hybrid electric vehicles (HEVs) which depends on both sources electric battery and internal combustion system which able to provide longer driving range (refer table1).

Table 1: Types of Vehicles'

Vehicle Type	Description	Benefits
FCEV	An EV that uses fuel cell operating system and is sourced from hydrogen	Ultra-low emission, better fuel economy, higher efficiency than a conventional vehicle
HEV	An EV that uses both the source electric battery, and internal combustion system	Lower emission, better fuel economy, less expensive to run, and provide higher driving range than similar conventional vehicles
BEV	EV derive power from electrical battery packs only and charged through an electrical outlet with a plug.	zero emissions, inexpensive to run, and no use of fuel as compared to a conventional vehicle.
PHEV	EV with a internal combustion engine and more powerful electric batteries.	lower emissions, bet ter fuel economy, less expensive to run, and offers flexibility of fuel source

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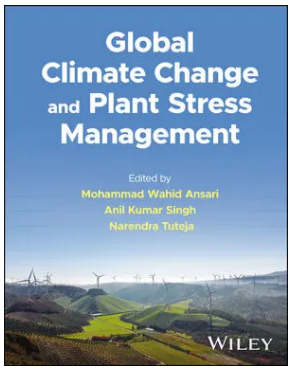

Global Climate Change and Plant Stress Management

Mohammad Wahid Ansari, Anil Kumar Singh, Narendra Tuteja

E-Book	978-1-119-85854-6	July 2023	**$160.00**
Hardcover	978-1-119-85852-2	July 2023	**$200.00**
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Description

Global Climate Change and Plant Stress Management
Understand the impact of climate change on plant growth with this timely introduction

Climate change has had unprecedented consequences for plant metabolism and plant growth. In botany, adverse effects of this kind are called plant stress conditions; in recent years, the plant stress conditions generated by climate change have been the subject of considerable study. Plants have exhibited increased photosynthesis, increased water requirements, and more. There is an urgent need to understand and address these changes as we adapt to drastic changes in the global climate.

Global Climate Change and Plant Stress Management presents a comprehensive guide to the effects of global climate change on plants and plant metabolism. It introduces and describes each climate change-related condition and its components, offering a detailed analysis of the resulting stress conditions, the environmental factors which ameliorate or exacerbate them, and possible solutions. The result is a thorough, rigorous introduction to this critical subject for the future of our biome.

Readers will also find:

- Analysis of global climate change impact on various agricultural practices
- Socio-economic consequences of climate change and plant stress conditions, and possible solutions
- Strategies for sustainable agriculture

Global Climate Change and Plant Stress Management is essential for researchers, scientists, and industry professionals working in the life sciences, as well as for advanced graduate students.

About the Author

Mohammad Wahid Ansari is Assistant Professor in the Department of Botany, Zakir Hussain Delhi College, University of Delhi,

India. He has researched and published widely on plant biology and stress tolerance.

Anil Kumar Singh is Principal Scientist at the Indian Council of Agricultural Research-National Institute for Plant Biotechnology, New Delhi, India. He has researched extensively into plant adaptations and environmental responses, as well as plant stress tolerance and related subjects.

Narendra Tuteja is Visiting Scientist at the International Centre for Genetic Engineering and Biotechnology, New Delhi, India. He has published extensively on plant stress tolerance, mango malformation and related subjects.

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Chapter 4 - Chromium: A pervasive environmental contaminant and its removal through different remediation techniques

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What do these dates mean?

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Abstract

Chromium (Cr) is a well-known pervasive element that predominantly exists as Cr(III) and Cr(VI) in the environment. Of these two species, the latter form is of great concern due to its mobility, solubility, and toxicity. Both species are easily transformable in the environment under different chemical influences. The natural sources of Cr are

11 Microplastics Pollution
A Perspective on the Source, Fate, Impact, Identification and Extraction from the Environment

Pradeep Kumar, Pinky, Naseeb, Ankush Yadav and Kashyap Kumar Dubey

11.1 INTRODUCTION

Plastics have many attractive properties such as being durable, cheap, water-tight and lightweight. Because of these interesting properties, the manufacturing and consumption of plastics are increasing continuously. Now, plastic is present in all ecosystems of Earth, but only a small part are distinguishable as environmental issues (Yu et al., 2018). Through different processes, plastics in the environment break down into smaller particles and form microplastics (Hahladakis et al., 2018; Wiesinger et al., 2021). The small, water-insoluble particles of plastic debris having a size less than 5 mm are called microplastics. These microplastics affect aquatic life, soil and plants (Nicholson et al., 2022). It is a global issue because it can enter the food chain through plants and aquatic species. Due to their large surface area and water-insoluble nature, microplastics are susceptible to many substances, including heavy metals (Yuan et al., 2022; Ziani et al., 2023).

Due to their widespread distribution, microplastics constitute a global problem (Alimba and Faggio, 2019). Over 359 million tons (Mt) of plastics were produced globally in 2018, up from 348 Mt in 2017 (Plastics Europe, 2019). Global plastic manufacture has significantly increased since the 1950s, when plastic products were widely available, from 0.5 Mt/year in 1960 to 348 Mt/year in 2017. China is the world's top manufacturer of plastics, accounting for 30% of global plastic output in 2018 with 107.7 Mt (Plastics, 2019). By 2030, plastic emissions to the aquatic environment were forecasted for 173 nations by Borrelle et al. (2020), who predicted that these emissions would range from 20 to 53 Mt/year. Because microplastics are multiple disruptors with a variety of physical-chemical characteristics, understanding their impact is very complicated. On the one hand, microplastics act as vectors of transport for toxic chemicals in ecosystems, but on the other, they are a mixture of dangerous chemicals that are voluntarily added during their production as additives to improve polymer properties and lengthen their life. The key additives of concern utilized in the plastics industry, what happens once microplastics are released into the environment, and their ensuing impacts on human health when linked to micro- and nanoplastics are all still mostly unknown at this time.

11.1.1 Sources of Microplastics

Microplastics originated from primary and secondary sources (Figure 11.1). Primary sources of microplastics include the particles in cosmetic and medical products. Secondary microplastics are produced due to breakdown of plastics in tiny particles through different physical, chemical and biological processes (Rogers, 2022). Primary microplastics can enter the water through sewage sludge and spillage of plastic resin powders, and it can also enter soil when sewage sludge containing synthetic fibers from household products is applied to land (Kallenbach et al., 2022). Secondary

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Chemical Management of Industrial Hazardous and Non-hazardous Waste

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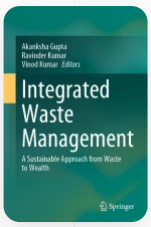

Integrated Waste Management

Samiksha, Kamal Kumar Bisht, Akanksha Gupta, Ravi Kant & Ravinder Kumar

Abstract

Management of industrial waste in the period of ever-growing industrialization is one of the greatest challenges against researchers and policymakers owing to the adverse effect of unmanaged waste on the environment and the ecosystem. Gaseous emission from industries is often correlated with global warming, whereas solid and liquid hazardous waste produced by industries causes water and soil pollution. This chapter focuses on the multifaceted field of industrial waste management, emphasizing the role of chemistry in repurposing hazardous waste substances for numerous applications such as catalysis. Types

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An Opportunity for the Entrepreneurs in Waste Management

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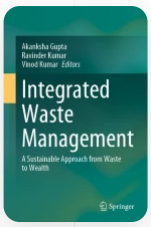

Integrated Waste Management

Monika Kherwal, Vinod Kumar, Ravi Kant, Sarika Tejasvi & Vijay Kumar Goel

Abstract

This chapter focuses on the use of advances in technology reforms and eco-friendly approaches to efficiently tackle the detrimental environmental consequences associated with an overabundance of waste. For the socioeconomic advancement of humanity and the community, sustainable development is imperative. Entrepreneurial ideas, academic researchers, and governmental initiatives are the key to waste management. The present discourse provides an in-depth look at entrepreneurship within the arena of waste management, including a thorough analysis of diverse possibilities available to

Mathura and Vrindavan through social entrepreneurship and green temple initiatives

Google Scholar

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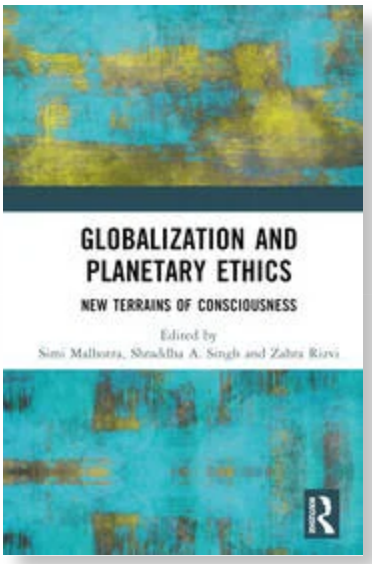

PREVIEW BOOK

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Globalization and Planetary Ethics

New Terrains of Consciousness

Edited By Simi Malhotra, Shraddha A. Singh, Zahra Rizvi

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Biography

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Shraddha A. Singh is Associate Professor at the Department of English, Zakir Husain Delhi College, University of Delhi, India. She works on literary theory and genre fiction with a special interest in Margaret Atwood's oeuvre. She has worked on international projects, has several publications and has presented papers at national and international seminars and conferences. Her latest publication is titled *Speculation and Detection: Explorations in Genre Fiction* (2022, Worldview Publications). She is a published bilingual poet and has read her poetry at the Sahitya Akademi (Indian Academy of Letters).

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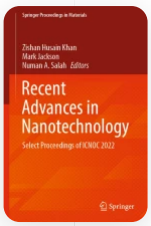
Critics' Reviews

Shipping Options

SCAPS-Based Analysis of ZrS_2/CZTS/MoS_2/Si Tandem Solar Cell Parameters

| Conference paper | First Online: 08 September 2023

| pp 163–168 | Cite this conference paper



Recent Advances in Nanotechnology

(ICNOC 2022)

Shubhra Gupta, Gayatri Shishodia & P. K. Shishodia

Part of the book series: Springer Proceedings in Materials ((SPM,volume 28))

Included in the following conference series:
International Conference on Nanotechnology: Opportunities and Challenges

Abstract

The SCAPS-based simulation of monolithic two terminal transition metal chalcogenide (TMC) has been performed for tandem solar cell. The tandem device has been designed by

Article Google Scholar

8. Burdick J, Glatfelter T (1986) Spectral response and I–V measurements of tandem amorphous-silicon alloy solar cells. Solar Cells 18(3):301–314

Article CAS Google Scholar

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STUDY OF CONDUCTING POLYMER PEDOT: PSS AND ITS OPTICAL AND ELECTRICAL PROPERTIES

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Abstract:

This chapter briefly describes the theoretical background pertinent to Poly(3,4ethylenedioxythiophene): poly (styrene sulfonic acid) (PEDOT: PSS) conducting polymer. It begins with the theoretical fundamentals of polymers, conducting polymer, PEDOT: PSS and proceeds with PEDOT: PSS polymer thin films. This chapter also discusses influence of the molecular structure on electrical property of PEDOT: PSS with understanding of HOMO and LUMO. The chapter further elaborates optical properties of PEDOT: PSS by discussing its spectroscopic properties and also describes the prospective of thin films for electrical application.

Keywords: PEDOT:PSS, conductivity, polymer, molecular structure and optical properties.

Introduction:

Polymers are a large class of materials consisting of many small molecules (called monomers) which are linked together to form long chains. Lengths of these chains in commercial polymers may vary from 1000 to 10,000 units. Humans have used the versatility of polymers for centuries in the form of oils, tars, resins, and gums. Because of their large size, polymers are classified as macromolecules. Cellulose is an example of a polymeric material which must be substantially modified before processing with the usual methods used for plastics. Every day plastics such as polyethylene and poly(vinyl chloride) have replaced traditional materials like paper, metal, glass, wood and copper for a wide variety of applications. Some plastics, such as nylon and cellulose acetate, are formed into fibers [1-4].

The process of formation of polymers from respective monomers is called polymerization. The monomers generally have a parent compound with a double chemical bond that opens up to form a single bond during the polymerization reaction that forms the polymers. For example,

Floral Nectar Microbiome: An Untapped Aspect and Its Overall Impact on Plants in Changing Global Scenarios

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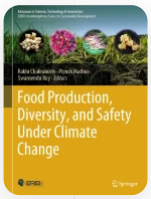
| pp 179–185 | Cite this chapter



Food Production, Diversity, and Safety Under Climate Change

Akanksha Madan, Sarita Kumari & Savindra Kumar

Part of the book series: Advances in Science, Technology & Innovation ((ASTI))

Abstract

Sugar-rich floral nectar is an apt medium to support the growth of microbes. Bacterial and yeast communities are common nectar-inhabiting organisms. When residing in nectar, these microbes utilize nectar metabolites for their growth and survival, and secrete

Tucker CM, Fukami T (2014) Environmental variability counteracts priority effects to facilitate species coexistence: evidence from nectar microbes. Proceedings of the Royal Society B: Biological Sciences 281(1778):20132637

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CHAPTER 10

APPLICATION OF CLAY IN CONSTRUCTION INDUSTRY

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Abstract

Clay is a finely-grained natural stone or soil material, for example, stone and wood. It has been used for construction and development for thousands of years. It is made of at least one earth mineral (like kaolinites or smectites), now and again with little amounts of quartz, metal oxides, and natural matter. Clay is shaped gradually because of enduring and disintegration of rocks containing the mineral gathering known as feldspar. Clay is one of the oldest structure materials utilized for construction. The capacity of this regular material to harden under specific circumstances makes it conceivable to involve it for different purposes in the development of various structures. The defining ingredient of loam is clay, which is one of the oldest building materials on Earth among other antiquated, normally occurring geologic materials, for example, stone and natural materials like wood. About 66% of the total population, traditional societies, and even well-developed nations live or work in buildings made up of clay. Clay is

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RESEARCH ARTICLE

WILEY

In-vitro toxicity of cyclophosphamide and etoposide intermediates/metabolites produced by three white rot fungi

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Funding information
Department of Biotechnology, Ministry of Science and Technology, Government of India

Abstract

Aim of the present study is to determine the *in-vitro* cell cytotoxic effect of native and transformed cancer drugs (cyclophosphamide and etoposide) using three different white rot fungi (*Ganoderma lucidum*, *Phanerochaete chrysosporium* and *Trametes versicolor*). At 3, 6, 9, 12 and 15 days, experiments were done on a mouse monocyte macrophage cell line (Raw 264.7). After biodegradation, the altered compounds were found to be harmful to the Raw 264.7 cells. The maximal cytotoxicity of cyclophosphamide transformed products (TPs) were determined to be 2.4%, 7.3% and 7% respectively, against *G. lucidum*, *P. chrysosporium* and *T. versicolor*, respectively. With *G. lucidum*, *P. chrysosporium* and *T. versicolor*, the etoposide toxicity was 1.5%, 8% and 2.7% respectively. *P. chrysosporium*-mediated biodegradation resulted in the maximum toxicity, at 8%, on the 12th day for etoposide and 7.3% on the 3rd day for cyclophosphamide. After biodegradation by fungi, the toxicity of these two anticancer agents was reduced in the form of metabolites, but each fungus showed unique capacity for toxicity removal.

KEYWORDS
anticancer drugs, cytotoxicity, etoposide, treatment, white-rot-fungi (WRF)

1 | INTRODUCTION

Anticancer drug pollution is a new type of emerging water contaminant. The overuse of anticancer treatments has increased in hospitals as a result of the rising burden of cancer patients (Cristovao et al., 2020). Hospital effluent discharged by admitted patients and municipal effluent discharged by out-patients are the primary sources of antineoplastic drug residue in the aquatic ecosystem, with levels ranging from 11 to 22000 ng.L^{-1}. As a result, because anticancer medications have the potential to cause mutagenesis or carcinogenic effects, the hazard to aquatic biota has also raised significantly (Dehghanpour et al., 2020; Huo et al., 2020; Yadav et al., 2021).

Cyclophosphamide and etoposide are the most frequently utilized anticancer medicines. These are alkylating agents and topoisomerase inhibitors that contribute significantly to the arrest of rapidly dividing cells cell cycle. Several recent publications have confirmed the presence of these two anticancer agents and their metabolites in aquatic environment samples at concentrations ranging from 2.2 ng.L^{-1} to 616 g.L^{-1} (Azuma, 2018; Česen et al., 2015; Ferrando Climent, 2016; Martín et al., 2014). They have the potential to affect the aquatic microorganisms by interfering with their normal function and inducing a variety of changes that include genomic instability, and physiochemical changes (Česen et al., 2016a; Novak et al., 2017).

The European Medical Agency (EMA) established a threshold value for the occurrence and risk of antineoplastic chemical exposure to aquatic life based on risk assessment studies. The EMA recommends a threshold value of antineoplastic incidence of 0.01 g.L^{-1} for risk exposure. Under the Resource Conservation and Recovery Act, the United States Environmental Protection Agency (USEPA) established particular standards for the management of antineoplastic chemicals in the environment. Resource conservation and Recovery Act (RCRA) classified anticancer agents as "P" or "U" hazardous substances based on their toxicity such as acrolein (P003), cyclophosphamide (U058), mitomycin-c (U010) etc. Anticancer agents that are capable of causing

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RESEARCH ARTICLE

Human health impacts attributable to inhalation exposure of particulate matter (PM_{10} and $PM_{2.5}$) during the Holi festival

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ABSTRACT

Objective: The present study focuses on residential areas of Delhi to identify the elevated levels of ambient PM_{10} and $PM_{2.5}$ due to biomass burning followed by the coloring activity in the Holi festival celebrated at the end of the winter season. This study also focuses on the health risk assessment and mortality among different age groups due to the change in particulate matter levels during the Holi festival in Delhi, India.

Materials and Methods: Secondary data of particulate matters have been procured from the Central Pollution Control Board (CPCB), Delhi Pollution Control Committee (DPCC), and Indian Institute of Tropical Meteorology (IITM), Pune for the period of the pre-, during, and post-Holi period for the year 2018-2020 at four selected residential locations in Delhi, India. The health impacts of particle inhalation were quantified using the AirQ + models.

Results: The results indicated the levels of PM_{10} and $PM_{2.5}$ rise about 3-4 times higher during the Holi festival than on normal days, resulting in health risks and causing an excess number of mortality and Asthma cases in Delhi. Such cases were also found to be higher in 2018, followed by 2019 and 2020 at all the selected locations in Delhi.

Conclusions: The study linked the increasing particulate levels in the Holi festival with the increased health risk through short-term exposure of the population. The excess number of cases (ENCs) of mortality, all causes of mortality among adults (age $>$ 30 years) associated with short-term exposure to particulate were also identified.

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KEYWORDS
PM_{10}; $PM_{2.5}$; Holi festival; residential sites; AirQ+ model; health risk and mortality

Introduction

Air pollution has always been a global issue, especially particulate matters (PM) that are evidently monitored and reported for several decades. PM is a mixture of solid and liquid particles suspended in the atmosphere (Abulude 2016). PM can be emitted from variety of natural or anthropogenic sources. Natural sources of PM include pollen, biogenic emissions from trees, sea spray and airborne dust. Natural calamities like volcanic eruption, dust storms, grassland and wildfires also contribute a significant fraction of particles directly into atmosphere (Perrino et al. 2009; Novack et al. 2020). Anthropogenic sources includes emissions from industries, vehicles, road dust, power generation, construction works, incinerators, and factories (Guttikunda and Goel 2013; Saxena et al. 2019; Sharma and Chandel 2020; Sonwani et al. 2021a, 2021b; Sonwani et al., 2022; Sonwani et al., 2023). PM is not a specific chemical entity like many other pollutants but rather a mixture of various particles which shows different properties and compositions. These particles are of different shape and size ranges from ultrafine, fine and course mode. Coarse particles, generally designated as PM_{10} ($PM \leq 10\mu m$), because of their larger sizes tend to deposit on ground and hence their life time in atmosphere is less. On the other hand, $PM_{2.5}$ ($PM \leq 2.5\,\mu m$) or fine particles remain suspended in atmosphere, and participate in long range transport with air masses. Whereas, the ultra-fine particles (UFPs) are considered as $PM_{0.1}$ ($PM \leq 0.1\,\mu m$). Due to their large surface area and smaller sizes UFPs predominate over other PMs in the atmosphere in terms of their number (Kumar et al. 2014). It has been evident that, apart from different size and shape of PM, it's reactivity and toxicity depends on their chemical composition (Harrison and Yin 2000; Sonwani et al. 2022; Gardner and Deepanjali 2012). These particles remain suspended in the atmosphere and behave differently and can be transported to long distances (Zhang et al. 2018; Saxena et al. 2021). On the basis of origin and evolution processes, PM can also be categorized into primary that directly released from their sources (such as combustion, construction and mining activities), and secondary particles that produced through various photochemical reactions of their precursors such as volatile organic compounds (VOCs), sulfur oxides (SO_x), and nitrogen oxides (NO_x) (Vijay Bhaskar et al. 2008; Mangia et al. 2015; Alanen et al. 2017; Saxena and Sonwani, 2020). Both the categories creates a huge amount of the particulate matter, causing human health related issues after their exposure (Afghan et al. 2020; Gupta and Ramanathan 2019; Maji et al. 2018; Amaral et al.

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Synthesis, Characterization and Evaluation of Antimicrobial Activity, Phytotoxicity, Molecular Docking & Dynamic Simulations of Benzothiazole Functionalized C–C Linked Pyrazolyl-Thiazoles

Nisha Kamra,[a] Suman Rani,[a] Kiran,[d] Sumit Thakral,[a] Mahavir Parshad,[a] Prateek Tyagi,[b] Deepansh Sharma,[c] Jayant Sindhu,[d] and Devinder Kumar*[a]

Synthesis of phenyl/benzothiazole functionalized C–C linked pyrazolyl-thiazoles has been achieved from non-lachrymatory α-tosyloxy pyrazolylketones with different thioamides. The pyrazolyl-thiazoles were characterized by spectroscopic studies and evaluated for antimicrobial activity and phytotoxicity. Compound **6n** displayed better activity with MIC value of 0.0045 μmol/mL against Gram-positive bacteria *B. cereus* in comparison to the standard drug Ciprofloxacin (0.0047 μmol/mL). Compound **6i** displayed better activity against fungal strain *C. albicans* (MIC = 0.0152 μmol/mL) in comparison to the standard drug Fluconazole (0.0204 μmol/mL). Compound **6o** diplayed 95% cell viability against Mouse Fibroblast cell line and 100% plant seed germination. Docking studies at the topoisomerase II DNA gyrase B (PDB ID: 1KZN) and *C. albicans* (PDB ID: 1IYL) were used to investigate potential interactions between the most active compound and the receptor protein. The stability of the compounds with 1KZN and 1IYL by molecular dynamic simulations showed that **6r**, **6n** and **6i** present leading structures for next drug development because of their simple synthesis and useful bioactivity.

Introduction

Pyrazoles and thiazoles-based frameworks play a significant role as structural components in many naturally occurring physiologically relevant compounds. These molecules and their derivatives are assocaited with broad spectrum biological activities includuing anti-tumor, anti-microbial, anti-viral, anti-tubercular, insecticidal, anti-inflammatory, anti-diabetic and analgesic.[1–10] The synthesis of these structural frameworks has gained substantial interest in recent years, with the goal of developing additional pharmacophores with robust biological profiles.[11,12] Clubbing pyrazole and thiazole functionality into single strucutral entity resulted in to promising anti-cancer, anti-inflammatory, analgesic, anti-tubercular, anti-alzheimer, anti-diabetic, anti-microbial, anti-mycobacterial and EP_1 receptor antagonists activtiy.[10–20] The benzothiazoles have been reported to play a vital role in enhancing the biological properties.[21–23] In relvence to biological studies molecular simulations are gaining importance.[24]

The current study aimed at the development of phenyl/benzothiazole functionalized C–C linked pyrazolyl-thiazoles to develop better anti-bacterial and phytotoxic compounds. Synthesis of pyrazolyl-thiazoles has been achieved *via* reaction of α-tosyloxy pyrazolylketones with thioamide instead of using lachrymatory α-haloketones. All the synthesized compounds were characterized by spectral studies and were evaluated for anti-microbial, phytotoxicity and docking intraction with Human Peroxiredoxin 5 active site (PDB ID: 1HD2) to investigate potential interactions between these drugs and the receptor. DNA gyrase is used as a target for further research because it is involved in DNA supercoiling. Additionally, molecular dynamic simulations were carried out to establish the stability of the docked protein-ligand complexes.

Results and Discussion

Chemistry

Firstly, the formation of 4-acetylpyrazoles (**3**) has been accomplished in good yield by reacting a mixture of phenylhydrazine/2-benzothiazolylhydrazine (**2**), pentane-2,4-dione (**1**) and dimethylformaldehyde-dimethylacetal following modified procedure under solvent-free condition.[25–27] The 4-acetylpyrazoles (**3**) thus formed were reacted with hydroxy(tosyloxy)benzene (HTIB) in acetonitrile to afford the precursors *i.e.*, α-tosyloxy pyrazolylketones (**4**) required for the synthesis of pyrazolyl-thiazoles. Utilizing α-tosyloxy pyrazolylketones (**4**) over α-halo pyrazolylketones is advantageous from enviornmental, health,

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Simulation and Fabrication of Higher-Mode Lamb Wave Acoustic Devices for Sensing Applications

*Manisha Bharati, Lokesh Rana, Reema Gupta, Anjali Sharma, Pradip K. Jha, and Monika Tomar**

Recently Lamb wave devices have originated as an alternate acoustic device for high-frequency wireless sensing applications. Their potential for sensing devices, including biomedical diagnostics and environmental monitoring as a wireless and passive device, calls for further analysis of the device with higher sensitivity. ZnO-based sensor has always been of research interest due to its biocompatibility, sensing abilities, and yet cost-effectivity. A Lamb wave device based on $ZnO/SiO_2/Si$ membrane has been theoretically simulated using finite element analysis method (FEM) to study the higher modes, as higher working frequency leads to higher sensitivity of the device toward sensing applications. Optimized properties are identified and utilized for the fabrication of Lamb wave devices. It is observed that for optimized parameters of $ZnO/SiO_2/Si$ Lamb device, higher antisymmetric modes are not only advantageous for high sensitivity applications but also more stable within the given operating conditions. Experimentally obtained results indicate close matching with theoretical results.

1. Introduction

Surface acoustic wave (SAW) devices are known to be advantageous for a number of applications including radar, mobile communication, wireless sensing in ambient conditions, etc. Besides these, SAW devices are also advantageous due to the stability of fundamental frequency and miniaturized size. Different types of acoustic waves have been utilized for the fabrication of devices based on their applications such as Rayleigh waves in acoustic wave resonators for gas sensing,[1–4] Love waves for biosensing in liquid media and seismology,[5,6] Lamb waves for biosensing, damage detection, and environmental monitoring,[7–10] acoustic plate modes (APM) for biosensing applications.[11]

SAW devices fabricated on a membrane with a thickness less than or equal to the acoustic wavelength are known as Lamb wave devices. In these types of devices, instead of acoustic waves traveling on the surface, the whole membrane with piezoelectric film participates in wave propagation. As the membrane thickness is smaller than the acoustic wavelength, the wave propagates on both upper and lower surfaces of the membrane and superposition of which leads to the generation of antisymmetric and symmetric modes.[12] As the thickness of the membrane is less than the wavelength, unlike the Rayleigh wave, the damping effect due to liquid sensing does not play any significant role in the case of Lamb wave. This makes Lamb wave efficient for liquid and biomolecule sensing applications. Besides that, wireless gas sensing is a well-established application for most of the SAW-based sensors.[3,13,14]

Furthermore, depending upon the elastic constant, piezoelectric constant and dimension of the device, higher-order Lamb wave modes can be obtained. These modes are introduced due to material nonlinearity or contact acoustic nonlinearity and are identified by the presence of nodal plane, parallel to the surfaces of the membrane. As these modes correspond to higher acoustic velocity and hence the high sensitivity of the

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RESEARCH ARTICLE

POLYMER ENGINEERING AND SCIENCE WILEY

Physicochemical evaluation of polyvinyl alcohol films crosslinked with saturated and unsaturated dicarboxylic acids: A comparative study

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Abstract

In this study, crosslinked films of polyvinyl alcohol (PVA) were prepared using two dicarboxylic acids: saturated succinic acid (SA) and unsaturated maleic acid (MAL) as crosslinkers. The crosslinking capabilities of these acids were compared through physical, chemical, mechanical, morphological, thermal analysis, and swelling measurements to investigate their impact on the physicochemical properties of the resulting films. Attenuated total reflectance fourier transform infrared spectroscopy (FTIR) confirmed the occurrence of an esterification reaction between PVA and the dicarboxylic acids. Based on the degree of crosslinking and thermal properties, it was noted that the crosslinking achieved with maleic acid is more effective for PVA compared with succinic acid. The crosslinking degree of PVA-MAL was determined to be 6.47 times higher than that of the PVA-SA film. In terms of thermal stability, the decomposition temperature for crosslinked PVA-MAL was measured at 365.57°C, whereas PVA-SA exhibited a slightly lower decomposition temperature of 362.58°C. The findings indicate that the PVA-MAL film displays lower crystallinity and a higher contact angle (80.60°) in contrast to PVA-SA (76.0°) and PVA (30.4°). Atomic force microscopy analysis indicated that the PVA-SA film exhibited more surface roughness compared with the smoother PVA-MAL film. Also, crosslinked films displayed enhanced elasticity and resilience in comparison with neat PVA, which may be due to the difference in crosslinking density, disruption in intermolecular hydrogen bonding due to crosslinking, and incorporation of flexible crosslinkers.

Highlights

- PVA was crosslinked using SA and MAL.
- Unsaturated MAL exhibited superior crosslinking density over saturated SA.
- PVA-SA film exhibited a porous surface compared to PVA-MAL film.
- PVA crosslinked with unsaturated MAL showed higher thermal stability than SA.
- Both the films showed enhanced elasticity and resilience compared with neat PVA.

KEYWORDS

carboxylic acids crosslinked PVA, physicochemical properties of polymer, PVA

20

Recent Perspectives of Drought Tolerance Traits

Physiology and Biochemistry

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20.1 Introduction

Climate change and global warming cause environmental stress, which affects plant growth and production. Environmental stresses are of two types: biotic and abiotic stresses. Salinity stress, water stress, temperature stress, pH stress, and heavy metal stress are referred to as abiotic stress (Wang et al. 2003; Wania et al. 2016). These stresses affect plants at every developmental stage from germination to maturity. Drought is a type of water stress in which soil faces a lower level of water concentration. Drought is a meteorological phenomenon in which a spell of precipitation is insufficient. Water deficiency results in harmful impacts on plant growth and production, especially at reproductive phase, as reported in legumes (Golldack et al. 2014; Farooq et al. 2016). Harmful effects caused by drought stress include disturbance in water uptake due to low diffusion pressure and high diffusion pressure deficit, loss of turgor pressure, cellular dehydration, disturbed cell elongation and division, reduced metabolism rate, increased oxidative damage, and decreased yield. Also, it affects the activity of enzymes and ion balance (Anjum et al. 2017; Hussain et al. 2018). These effects depend on the duration, severity of stress, and the sensitivity of plants (Zhu 2002). Drought stress depends on various factors such as insufficient rainfall, water holding capacity of the soil, high light intensity and temperature, and evapotranspiration. Drought is of two types: physiological drought and physical drought. Physiological drought, also called pseudo-drought, is a condition where plants are not able to absorb water due to high salt concentration in the soil, whereas soil contains sufficient amounts of water. Physical drought is a real drought; this is a condition in which the water level in the soil is very low (Passioura and Angus 2010; Salehi-Lisar and Bakhshayeshan-Agdam 2020). Not only water uptake, nutrient uptake is also affected during drought stress. Nutrients are a basic need for plant growth, and a lack of nutrients negatively affects plant growth and development (Da Silva et al. 2011). Major sources of drought stress include abnormal rainfall, global warming, and shifts in monsoon pattern (Seleiman et al. 2020). Global warming results in increased temperature, which enhances the water deficiency in plants as this increased temperature increases the evapotranspiration rate in plants and decreases the internal water (Sultan et al. 2019). Due to global warming, carbon dioxide levels increased in the environment, which results in enhanced photosynthetic rate (Brown et al. 2018). Some of the reasons behind disturbed patterns of rainfall or less rainfall are urbanization, industrialization, and urbanization (Fatima et al. 2020). Rainfall dependent Crop land faces more drought conditions. Less or no rainfall largely affects plant production (Konapala et al. 2020). Plants develop different resistance mechanisms to manage drought stress. Improves morphological, physiological, and biochemical traits, cellular signaling pathway, physical adaptation (Osakabe et al. 2014; Yadav et al. 2020). Cuticular wax accumulation is found as a potent defense against drought stress in many plants (Borisjuk et al. 2014). Some acclimatization strategies plants follow are (i) drought escape plants complete their life cycle before onset of drought, (ii) drought avoidance (formation of thick critical wax deposition and modifications of leaf into spines), and (iii) drought tolerance. These mechanisms made plants survive and adapt during drought stress (Levitt 1980). This chapter provides information about drought stress responses and recent advances in tolerance mechanisms involving physiological and biochemical traits.

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Ethylene Mediates Plant-Beneficial Fungi Interaction That Leads to Increased Nutrient Uptake, Improved Physiological Attributes, and Enhanced Plant Tolerance Under Salinity Stress

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24.1 Introduction

Global climate change majorly affects agricultural yield. Rising population of the world creates constraints to cope with the food needs. There is a need to improve plant productivity in a way that it can cope with the changing climate (Dahal et al. 2019). Various abiotic factors include drought, heat, cold, salinity. Rise in temperature and irregular rainfall result in reduced available water in the soil, which creates drought condition as the water level decreases, soil salt increases, and salinity stress arises (Wang and Frei 2011). Salinity stress is a major abiotic stress that harms the plants globally (Munns et al. 2020). During salinity stress, water uptake by plants is greatly affected as osmotic pressure gets disrupted. According to the present scenario, 20% of cultivable land face salinity stress, and this percentage is rising continuously (Otlewska et al. 2020). High salinity stress leads to over accumulation of ions, which results in oxidative damage and also affects physiological processes like photosynthesis, respiration, stomatal movement (Annunziata et al. 2017). Stomatal movement gets affected due to salinity stress, evapotranspiration gets reduced as stomata undergo closure, and reactive oxygen species (ROS) gets accumulated. Production and accumulation of ROS lead to cell death as they affect biomolecules, e.g. oxidation of protein, DNA (Moller et al. 2007). To overcome the harmful effects of ROS accumulation, plants have some enzymatic and non-enzymatic components. These compounds include superoxide dismutase (SOD), glutathione reductase (GR), glutathione transferase (GST), ascorbate peroxidase (APX), catalase (CAT), ascorbic acid (AsA), glutathione (GSH), carotenoids, and flavonoids (Parida and Das 2005). Ethylene is one of the phytohormones that regulate plant growth and development. Ethylene shows a triple response: inhibition of hypocotyl and root elongation, exaggerated tightening of apical hook, and swelling of hypocotyl (Guzman and Ecker 1990). Along with its role in plant growth and development, ethylene is also involved in abiotic and biotic stress responses. An increased endogenous level or exogenous treatment of ethylene was found beneficial in mitigating salinity stress. It is found that ethylene biosynthesis or signaling inhibited plants become more sensitive toward salinity stress (Gharbi et al. 2017). Plant microbes play an important role in mitigating the harmful impacts of stress on the growth and production of plants (Kaushal and Wani 2016). These microbes produce hormones that trigger endogenous phytohormones in plants. Also, the growth and release of nutrients are improved. These microbes elevate the synthesis of antioxidants and osmolytes, which reduce the osmotic damage (Barnawal et al. 2016). Fungi show superior results in alleviating abiotics' stress conditions. *Piriformospora indica* enhances antioxidant enzymes and plant growth to decrease stress levels in plants (Baltruschat et al. 2008). This chapter provides an insight into the role of fungi and ethylene in improving production under stress conditions. Also, it provides information on mechanism and signaling to understand stress tolerance.

24.2 Plant Response Towards Salinity Stress

Plants show salinity stress response in four different forms: morphological, physiological, biochemical, and molecular responses. Salinity stress influences the growth and development of plants. It affects plants at every developmental stage, right from seed germination up to flowering and reproduction. Salinity stress results in reduced water and nutrient uptake;

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Role of Chemical Additives in Plant Salinity Stress Mitigation

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25.1 Introduction

Agricultural production is greatly affected by environmental stress conditions. One of the main environmental stresses that cause major reductions in cultivable land area and cause agricultural losses by reducing plant growth is salinity stress (Parida and Das 2005). It was found that soil salinity increased by 100 mha from 1986 to 2016 globally, and it is increasing by 2 mha year^{-1}, approximately (Ivushkin et al. 2019). Soil is considered saline when the electrical conductance (EC) exceeds 4 dsm^{-1} at 25 °C in the root zone. Main and the most abundant ion during salinity stress is sodium (Na^+); other ions include calcium (Ca^{2+}), magnesium (Mg^{2+}), chloride(Cl^-), and sulfates (SO_4^{2-}). Access to these ions affects plant growth (Gupta et al. 2021). Oster and Jayawardane (1998) reported that salinity stress not only affects soil physical properties but also affects the physiological and biochemical function of plants through the negative influence of osmotic and ionic components. Salinity stress causes ion toxicity, which results in high osmotic potential, and this high osmotic potential reduces the water absorption from soil (Machado and Serralheiro 2017). Many plants have tolerance mechanisms that get activated when plants get exposed to salinity stress. This tolerance mechanism makes plants acclimatize under stressful conditions. Mechanism involves changes in the development process, activation of defense and repair systems, synthesis of osmolytes, altered metabolism, and redirection of physiological processes (Acosta-Motos et al. 2017). Some of the studies reported that to understand mechanisms of alleviation of stress impact at tissue and organ levels, it is necessary to know signal processes at these levels to activate adaptive processes. Improving salt tolerance at the microlevel is important to make plants acclimatize (Manchanda and Garg 2008). Impact of salt stress depends on the concentration of salt, sensitivity of crop, and genetic makeup of plants (Munns 2005). Plants have mechanisms to reduce the effects of oxidative stress caused by salinity by reducing the reactive oxygen species (ROS) accumulation (Dalton et al. 1993). Plants show high antioxidant enzyme activity during salt stress. These enzymes reduce or detoxify ROS. For example, ascorbate peroxide (APX) regulates H_2O_2 level (Meloni et al. 2003; Matamoros et al. 2006). Plant priming is one of the most successful methods to enhance plants tolerance toward environmental stress. Plant priming using chemical additives against abiotic stress is called chemical priming. Mode of application plays an important role in the efficiency of chemical priming. Primed plants show more tolerance against environmental stress as compared to non-primed plants. Chemicals used as priming agents are sodium nitroprusside, melatonin, polyamines, hydrogen peroxide, and sodium hydrosulfide (Savvides et al. 2016). This chapter highlights the importance of chemical priming under salinity stress conditions and the application and mode of action used during chemical priming. Recent advances in salinity stress tolerance are discussed.

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Numerical Investigation using Fibonacci Wavelet Collocation Method for Solving Modified Unstable Nonlinear Schrödinger Equation

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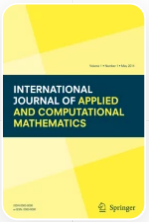

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Abstract

In this work, we used the backward Euler difference formula with the Fibonacci wavelets collocation method to find approximate solutions to the modified unstable nonlinear Schrödinger equation. The time derivative term of the modified unstable nonlinear Schrödinger equation is estimated using the backward Euler difference formula, and the space derivative term is estimated using the Fibonacci wavelets collocation method. This method reduces the modified unstable nonlinear Schrödinger equation to a finite system of linear equations. We use three examples to illustrate the method's accuracy and efficiency

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Contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by both the authors. The first draft of the manuscript was written by Mohd Rafiq under supervision of Abdullah. All authors read and approved the final manuscript. Abdullah supervised the project.

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Ethics declarations

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Not applicable.

Conflict of interest

The authors have no relevant financial or non-financial interests to disclose.

Additional information

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