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## **Loknete Vyankatrao Hiray Arts, Science & Commerce College**

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### **Criteria 3- Research, Innovations and Extension**

#### **3.4- Extension Activities**

3.4.1 Extension activities are carried out in the neighbourhood community, sensitizing students to social issues, for their holistic development, and impact thereof during the last five years. (QIM)

## LIST OF RESEARCH PAPERS PUBLISHED

**ACADEMIC YEAR 2020-21**

| Sr. No. | Title of the Paper   | Name of the Author   | Subject   | Name of the Journal   | ISSN No.  |
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| 1.      | "Transition metal incorporated, modified bismuth oxide (Bi <sub>2</sub> O <sub>3</sub> ) nano photo Catalyst for deterioration of rosaniline hydrochloride dye as resource for Environmental rehabilitation"         | Prof.Dr.K.H.Kapadnis | Chemistry | Journal of the Indian Chemical Society  | 0019-4522 |
| 2.      | "Antibacterial Applications of Biosynthesized AgNP   | Prof.Dr.K.H.Kapadnis | CHEMISTRY | Material Science Research India   | 0973-3469 |
| 3.      | "INTERPRETATION OF VISCOMETRIC, THERMODYNAMIC AND ACOUSTIC PROPERTIES OF SODIUM FLUORIDE IN AQUEOUS SOLUTIONS OF DEXTROSE AT DIFFERENT MOLARITIES AND TEMPERATURES   | Prof.Dr.K.H.Kapadnis | CHEMISTRY | Journal of the Maharaja Sayajirao University of Baroda                          | 2277-5730 |
| 4.      | "Study of Soft Skill Development Programme in Higher Education System",  | Prof.Dr.K.H.Kapadnis | Chemistry | International Journal for Research in Applied Science & Engineering Technology, | 2321-9653 |
| 5.      | "Fabrication of thin film sensors by spin coating using sol-gel LaCrO <sub>3</sub> Perovskite material modified with transition metals for sensing environmental pollutants, greenhouse gases and relative humidity" | Prof.Dr.K.H.Kapadnis | Chemistry | Environmental Challenges  | 2667-0100 |



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| 6.  | SPECTROPHOTOMETRIC STUDY OF SCREEN PRINTED %CuO:SnO <sub>2</sub> NANO-COMPOSITE POWDER FIRED AT HIGH TEMPERATURE”  | Prof.Dr.K.H.Kapadnis    | Chemistry | Vidyabharati International Interdisciplinary Research Journal | 2319-4979, |
| 7.  | “Electrical and structural characterization of annelid tin oxide thick films prepared by screen printing technique”  | Prof.Dr.K.H.Kapadnis    | Chemistry | journal of advanced scientific research                       | 0976-9595  |
| 8.  | “Simple Calculation based Method for Lattice Parameters in Tetragonal System using Powder XRay Diffraction Data”   | Prof.Dr.K.H.Kapadnis    | Chemistry | journal of advanced scientific research                       | 0976-9596  |
| 9.  | “Research Study of I.Q.A.C and N.A.A.C in Indian Higher Education System”  | Prof.Dr.K.H.Kapadnis    | Chemistry | journal of advanced scientific research                       | 0976-9597  |
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| 11. | Density and Viscosity of LiCl, LiBr, LiI and KCl in Aqueous Methanol at 313.15 K   | Thansing Bhavsing Pawar | Chemistry | Oriental Journal of Chemistry                                 | 2231-5039  |
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| 13. | Synthesis, Characterization, Molecular Structure, And Homo-Lumo Study of 2-Phenylquinoxaline: A DFT Exploration   | Thansing Bhavsing Pawar | Chemistry | World Journal of Pharmaceutical Research               | 2277-7105                                       |
| 14. | Solvent-free grindstone synthesis of four new (E)-7-(arylidene)-indanones and their structural, spectroscopic and quantum chemical study: a comprehensive theoretical and experimental exploration                              | Thansing Bhavsing Pawar | Chemistry | Molecular Simulation ( Taylor & Francis Group)         | Print ISSN: 0892-7022<br>Online ISSN: 1029-0435 |
| 15. | DFT computational insights into structural, electronic and spectroscopic parameters of 2-(2-Hydrazineyl)thiazole derivatives: a concise theoretical and experimental approach   | Thansing Bhavsing Pawar | Chemistry | Journal of Sulphur chemistry ( Taylor & Francis Group) | Print ISSN: 1741-5993<br>Online ISSN: 1741-6000 |
| 16. | Transition Metals Ni 2+, Fe 3+ Incorporated Modified ZnO Thick Film Sensors to Monitor the Environmental and Industrial Pollutant Gases   | Thansing Bhavsing Pawar | Chemistry | Oriental Journal of Chemistry                          | ISSN: 0970-020 X                                |
| 17. | Efficient Synthesis, Spectroscopic and Quantum Chemical Study of 2,3-Dihydrobenzofuran Labelled Two Novel Arylidene Indanones: A Comparative Theoretical Exploration  | Thansing Bhavsing Pawar | Chemistry | Material Science Research India                        | ISSN: 0973-3469                                 |
| 18. | Molecular Structure, Frontier Molecular Orbitals, MESP and UV-Visible Spectroscopy Studies of Ethyl 4-(3,4-dimethoxyphenyl)-6-methyl-2-oxo-1,2,3,4-tetrahydropyrimidine-5-carboxylate: A Theoretical and Experimental Appraisal | Thansing Bhavsing Pawar | Chemistry | Material Science Research India                        | ISSN: 0973-3469                                 |

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| 22. | "Synthesis, spectroscopic characterization, XRD crystal structure, DFT and antimicrobial study of (2E)-3-(2,6 dichlorophenyl)-1-(4-methoxyphenyl)-prop2-en-1-one."  | Mrs.N. V.Sadgir         | Chemistry | Springer Nature applied science  | 2523-3963                            |
| 23. | Synthesis, Spectroscopic Characterization, Quantum Chemical Study and Antimicrobial Study of (2e) -3-(2, 6-Dichlorophenyl) -1-(4Fluoro) -Prop-2-En-1-One  | Mrs.N. V.Sadgir         | Chemistry | Material Science Research India  | <u>0973-3469</u>                     |
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| 27. | Fabrication, characterization and exploration of cobalt (II) ion doped, modified zinc oxide thick film sensor for gas sensing characteristics of some pernicious gases         | Satish A. Ahire | Chemistry | Journal of the Indian Chemical Society              | 0019-4522 |
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| 31. | Molecular Structure, FT-IR Spectra, MEP and HOMO-LUMO Investigation of 2-(4-Fluorophenyl)-5-phenyl-1, 3,4-oxadiazole Using DFT Theory Calculations                             | Dr.S.L.Dhonnar  | Chemistry | Advanced Journal of Chemistry-Sec. A                | 2645-5676 |

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# Transition metal incorporated, modified bismuth oxide (Bi<sub>2</sub>O<sub>3</sub>) nano photo catalyst for deterioration of rosaniline hydrochloride dye as resource for environmental rehabilitation

Prashant Bhimrao Koli<sup>a</sup>, Sachin Girdhar Shinde<sup>b</sup>  , Kailas Haribhau Kapadnis<sup>c</sup>, Anita Parashram Patil<sup>d</sup>, Madhukar Panditrao Shinde<sup>e</sup>, Subhash Dharmraj Khairnar<sup>f</sup>, Dipti Bhikan Sonawane<sup>c</sup>, Raju Shivaji Ingale<sup>g</sup>

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## Highlights

- Sol-gel synthesis of Co<sup>2+</sup>, Ni<sup>2+</sup> modified Bi<sub>2</sub>O<sub>3</sub> nanoparticles.
- Photo degradation of Rosaniline Hydrochloride (R-HCl) dye by modified Bi<sub>2</sub>O<sub>3</sub> photocatalyst.
- Improved surface area and lower band gap energy of 3% Co<sup>2+</sup>, Ni<sup>2+</sup> Bi<sub>2</sub>O<sub>3</sub> removed 97% of R-HCl dye in aqueous media.
- LC-MS analysis of degraded dye sample confirmed mineralization of R-HCl dye.
- Detection of ROS by scavenging study and reusability for multiple cycles.

## Abstract

The work presented here deals with the fabrication of bare Bi<sub>2</sub>O<sub>3</sub> and modified Bi<sub>2</sub>O<sub>3</sub> photocatalyst. The Bi<sub>2</sub>O<sub>3</sub> material was modified with selected transition metals Co<sup>2+</sup>, Ni<sup>2+</sup> with the 1% and 3% atomic weight percent insitu doping method via co-precipitation strategy. These three catalysts were successfully utilized for the waste water purification via photocatalytic degradation route. These all fabricated materials were precisely characterized by characterization techniques such as XRD, SEM, TEM, BET, IR and UV-DRS. The characterization techniques reveal the successful synthesis of material and effective modification of bismuth oxide lattice. Since, surface area for modified Bi<sub>2</sub>O<sub>3</sub> was found to be enhanced in comparison to the bare Bi<sub>2</sub>O<sub>3</sub>, as well as declined band gap energy for modified Bi<sub>2</sub>O<sub>3</sub> clearly indicates the successful doping of Co<sup>2+</sup>, Ni<sup>2+</sup> metals. The bare Bi<sub>2</sub>O<sub>3</sub> and modified Bi<sub>2</sub>O<sub>3</sub> catalyst were employed for photocatalytic degradation



## **Antibacterial Applications of Biosynthesized AgNPs: A Short Review (2015-2020)**

**ANITA P. PATIL<sup>1</sup> and KAILAS H. KAPADNIS<sup>2\*</sup>**

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### **Abstract**

Bacterial resistance to a wide spectrum of antimicrobial medicines has evolved as a major public health concern. Antibiotics are medications that are used to kill microorganisms that could cause serious illness or death. Nanotechnology has exploded as a significant and appealing field of research, with innovative features and functionalities in a variety of fields. Silver is a versatile antibacterial and anticancer medicinal agent in the form of nanoparticles. Silver Nanoparticles (AgNPs) have been implicated in a wide variety of medicinal benefits. This review article addresses antibacterial applications of biosynthesized AgNPs that have been researched over the last decade. AgNPs' antimicrobial potential against a variety of bacterial agents is discussed.



### **Article History**

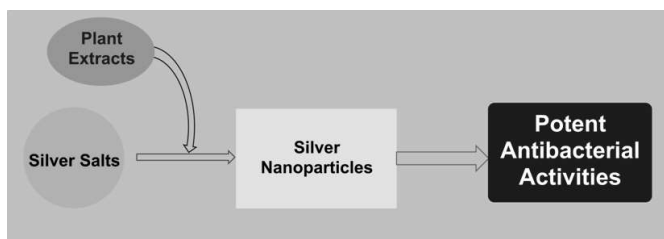
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Antibacterial;  
Biosynthesis;  
Medicinal;  
Silver Nanoparticles.

### **Graphical Abstract**



### **Introduction**

Thinking about the commonness of different diseases, infections brought about by any type of

microorganism ought not to be messed with; they can go through fundamental changes and cause serious medical problems. Antimicrobial resistance

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## INTERPRETATION OF VISCOMETRIC, THERMODYNAMIC AND ACOUSTIC PROPERTIES OF SODIUM FLUORIDE IN AQUEOUS SOLUTIONS OF DEXTROSE AT DIFFERENT MOLARITIES AND TEMPERATURES

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### Abstract:

In the present work interpretations of viscosity, density and ultrasonic velocity of sodium fluoride in aqueous solutions of Dextrose at different molarities and temperatures are summarised. The nature and magnitudes of solute- solute and solute- solvent have been taken into account by reporting the data of apparent molar volume ( $\phi_v$ ), slope ( $S_v$ ) and coefficients of Jones-Dole and modified Jones-Dole equation, adiabatic compressibility ( $\beta_{ad}$ ), limiting apparent molar compressibility ( $\phi_{0k}$ ), apparent molar compressibility ( $\phi_k$ ), specific acoustic impedance ( $Z$ ), relative association ( $RA$ ). The plots also support the interpreted results.

**Keywords:** Solute-solute, solute-solvent interactions, alkyl halide solution, dextrose, Jones- Dole equation.

### Introduction:

The physico-chemical behavior between non-ionic solutes and ionic solvent is clearly disclosed by interactive forces between them [1]. Being a multidimensional use of carbohydrates, its study becomes a point of immense interest in various fields like foods, pharmaceutical and chemical industries [2-4]. Fluoride has been playing a significant role in improvement of oral and dental health during the past five decades. Our knowledge of dental caries and its mechanism, and the role of fluoride in this process have evolved during recent years. The use of fluoride mouthwash was recommended for children receiving orthodontics or radiotherapy [9-12]. It is well known that most of the biochemical processes take place in aqueous medium consequently investigation on thermodynamic and acoustic properties of sodium fluoride in ternary system seems to be very crucial for the interpretation of ion-ion, ion-solvent, and solute-solvent interaction in mixed solvent system. Being of a great practical importance in many industrial process, density, viscosity and ultrasonic velocity and some derived parameters of aqueous sodium fluoride with dextrose with different molarities at temperatures 298.15, 301.15, 304.15 and 304.15K have been taken into account. As far as physiological processes are concerned, the study of dextrose and lactose is very significant. They play the role in the configuration of biological molecules [13-14].

### Materials and Methods:

Sodium fluoride (Sigma Chemicals with 99.9 % purity) used was vacuum dried. Dextrose (99.5% purity) was also obtained from Sigma Chemicals. All chemicals were used as received from manufacturer without further purification. The solutions of different molarities of dextrose were prepared by dissolving accurately weighed dextrose in (0.1M, 0.2M, 0.4M and 0.6M) aqueous solutions of sodium fluoride.

Double armed pycnometer having capacity  $18 \text{ cm}^3$  was used to determine the densities of all solutions. Calibration of pycnometer was carried out by using triply distilled water at temperatures 298.15K, 303.15K, 308.15K and 313.15K with densities 0.9970, 0.9956, 0.9940 and  $0.9922 \text{ g.cm}^{-3}$  respectively [5]. The pycnometer filled with air bubble free experimental liquids was kept in a transparent walled water bath of thermal stability  $\pm 0.01 \text{ K}$  for 10-15 minutes to obtain thermal equilibrium. The liquid levels in the two arms were recorded with the help of a travelling microscope that could be read to  $\pm 0.1 \text{ mm}$ . The estimated accuracy of density measurements of solutions was  $\pm 0.00005 \text{ g.cm}^{-3}$ .

The viscosity measurements were made using a commercial Ubbelohde viscometer. Lee et al. [6-7] and Nikam et al. [8] have made use of this type of viscometer earlier. Viscometer was calibrated with triply distilled water with 0.890, 0.797, 0.719, and  $0.652 \text{ mPa.s}$  as its viscosities at 298.15K, 303.15K, 308.15K and 313.15K respectively [5]. A thoroughly cleaned and perfectly dried viscometer filled with experimental liquid was placed vertically in a thermostat. After attaining thermal equilibrium, the efflux times of flow of liquids were recorded with a digital stop watch correct to  $\pm 0.01 \text{ s}$ . Since all flow times were greater than 300 s, the kinetic energy corrections were not applied. To evaluate viscometer constants, the length of the capillary of the viscometer ( $l$ ) term is to be corrected as  $l' = l + 0.5r$ ,  $r$  being the radius of the viscometer capillary. Since  $l$  is much larger (50-60mm) as



# Study of Soft Skill Development Programme in Higher Education System

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**Abstract:** *Soft skill development programme has been implemented in colleges and universities in India. The moral value created by soft skill development programme among all students in colleges and universities enhances emotional intelligence and inculcate the rational values. Soft skill development programme nurtures the personality development in college students. The vital role of skill development programme lies to perform and to construct a stage or forum between students and society through teachers or mentors. Soft skill is fundamental and type of training education given to students and employers so that they will act as potential carrier of manpower to commercial and market scenario. The human skill works mainly through intellectual and emotional level; if a skill based education is given to students in their early level definitely it completes the needs of society. Hard and soft skill based training gives a bright future to student's life through management of different things and soft skill components like time, communication, presentation, skill to establish and maintain interpersonal relationships. It increases positivity and adaptability among students, as a result soft skill development programme provides a tool to live and livelihood to students at an early stage for their life.*

**Keywords:** *Soft skill development programme, training, hard and soft skills, higher education, presentation skill etc.*

## I. INTRODUCTION

Soft skills are people's skills or personality skills. Soft skills are "non-technical, intangible, personality specific skills" which determines the individual strength as leader, listener and negotiator [1]. Soft skills are the traits and abilities of attitude and behavior rather than of knowledge or technical aptitude [2]. Skill development programme has two main coins viz; skills which are soft and hard in nature. There are different soft skill components like oral or spoken skills, written communication, honesty, teamwork, self-motivation, work ethic, critical thinking, risk taking, flexibility or adaptability, leaderships, interpersonal, questioning skills, creativity, influencing skills, research skills, organization skills, problem solving skills, multicultural skills, computer skills, academic skills, detail orientation, qualitative and quantitative skills, teaching or training skills, time management, ability to analyze strength and weakness[3]. In development of soft skills and hard skills, many of the soft and hard skills parameters are under considered like communication skill, teamwork skill, interpersonal relationships, meeting management skills, facilitating skills, selling skills, leadership skill, mentoring skills, presentation skills, self-management skills, growth management, self-awareness, emotion regulation, self-confidence, stress management, resilience, skills to forgive and forget, patience, persistence and perseverance, perceptiveness and SWOT analysis.

## II. LITERATURE SURVEY

Soft skills are essential to students as well as employers in bureaucratic society. Between students and employers, soft skills are also important for job seekers. Soft skill is needful not only enhance carrier graph but also interpersonal development, teamwork, removing communication gap. The educational eligibility certificate is not the means of wages to obtain at regular time. The personal, professional and practical qualities developed due to soft skills are also an important part. The top five soft skills that employers want to their employees are as under,

- 1) Communication-oral, speaking capability, written, presenting and listening.
- 2) Courtesy-manners, etiquette, business etiquette, gracious, says please and thank you, respectful.
- 3) Flexibility-adaptability, willing to change, lifelong learner, accepts new things, adjusts and teachable.
- 4) Integrity-honest, ethical, high morals, has personal values, does what is right.
- 5) Interpersonal skills-nice, personal, sense of humor, friendly, nurturing, empathetic, has self-control, patient, sociability and warmth [4].







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## Environmental Challenges

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# Fabrication of thin film sensors by spin coating using sol-gel LaCrO<sub>3</sub> Perovskite material modified with transition metals for sensing environmental pollutants, greenhouse gases and relative humidity

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## Highlights

- Sol-gel synthesis of modified LaCrO<sub>3</sub> thin film by in-situ doping method.



- Comparative gas sensing study of modified LaCrO<sub>3</sub> sensor for greenhouse gases.
- The modified LaCrO<sub>3</sub> sensor has rapid response and recovery time for CO, CO<sub>2</sub> and LPG.
- Modified LaCrO<sub>3</sub> sensor has superior selectivity for relative humidity.
- Excellent recycling for greenhouse gases by modified LaCrO<sub>3</sub> sensor.

## Abstract

In this study, we are reporting the fabrications of undoped LaCrO<sub>3</sub> and Ni<sup>2+</sup>, Fe<sup>3+</sup>, Co<sup>2+</sup> modified LaCrO<sub>3</sub> thin films by spin coating method using the sol-gels prepared for these thin film samples. The structural properties of the spin coated LaCrO<sub>3</sub> thin films measured by X-ray diffractometer (XRD), which confirms the formation of orthorhombic LaCrO<sub>3</sub> nanoparticles. The morphological properties of the prepared films were investigated by the ease of scanning electron microscopy (SEM), and high-resolution transmission electron microscopy (HR-TEM) where the orthorhombic and crystalline LaCrO<sub>3</sub> nanoparticles were observed. Energy dispersive x-ray analysis (EDAX) was utilized for the determination of elemental composition. The prepared material was found to be in perfect elemental composition. The surface area and BJH pore distribution was observed by Brunauer-Emmett-Teller (BET) analysis. The Ni<sup>2+</sup>, Fe<sup>3+</sup>, Co<sup>2+</sup> modified LaCrO<sub>3</sub> thin film found with high surface area of 86.32 m<sup>2</sup>/g. Optical properties of both prepared materials investigated by ultraviolet differential reflectance spectroscopy (UV-DRS) to compare band gap energy of prepared sensors. It is observed that due to modification of transition metals, band gap energy of modified LaCrO<sub>3</sub> sensor is found to be declined. The electrical properties were carried out to confirm semiconducting behaviour of LaCrO<sub>3</sub> semiconductor. The thin films were subjected for gas sensing study of CO, CO<sub>2</sub>, NO<sub>2</sub>, LPG, toluene vapours and petrol vapours. The modified LaCrO<sub>3</sub> sensor found to be highly sensitive for CO<sub>2</sub>, CO, and NO<sub>2</sub> gases with response 82.14 (300°C), 74.52 (200°C) and 65.18% (150°C) respectively. The relative humidity from 10 to 90% at 20Hz found to be efficient for modified LaCrO<sub>3</sub> sensor. In summary it can be stated that transition metal doping is successful to tune the band gap energy, porosity and surface area of modified LaCrO<sub>3</sub> sensor. Due to this the sensor properties

## SPECTROPHOTOMETRIC STUDY OF SCREEN PRINTED %CuO:SnO<sub>2</sub> NANO-COMPOSITE POWDER FIRED AT HIGH TEMPERATURE

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### ABSTRACT

Thick films of pure SnO<sub>2</sub> and composite 1%, 3%, 5%, 7% and 9 % CuO incorporated into pure SnO<sub>2</sub> were prepared by standard screen printing technique. All samples prepared on glass support/substrate were dried and fired at 500°C at 5 hours in muffle furnace. Thick films of SnO<sub>2</sub> and composite 1%, 3%, 5%, 7% and 9 % CuO incorporated into pure SnO<sub>2</sub> were characterized by SEM, EDAX, XRD, FTIR and UV to study surface morphology, elemental analysis, crystalline Phases of films, vibrational and spectroscopic study respectively. The spectrophotometric parameters such as absorbance and absorption coefficient were studied. The UV-visible spectrophotometric study was undertaken in terms of absorbance and absorption coefficient with varying percentage composition.

**Keywords:** morphology, spectrophotometric study, absorbance, absorption coefficient, etc.

### Introduction

It has been evident that screen printing technique which was introduced in the later part of 1950s is most popular and versatile chemical method to deposit thick films on glass or alumina substrate described by Krishnan et al., (2005). According to Guidi et al., (2002) screen printing technique is popular technique to construct robust, compact and relatively cheap hybrid circuit for different applications like gas sensor, electric appliances, transistors and optical devices. Different methods have been investigated and developed to grow pure SnO<sub>2</sub> and different composites material of CuO incorporated into pure SnO<sub>2</sub> such as Spray pyrolysis, Vacuum evaporation, chemical vapour deposition, magnetron sputtering, pulsed laser deposition, sol-gel technique and screen printing technique as stated in Joseph et al., (1996) & Jaydev et al., (1998). Among all screen printing method has found to gain popularity for the formation of superconducting oxide films. Borse R. (2008) in his reference book talked about the advantages of thick film techniques includes fast processing, economical use of paste and low cost. Being metal oxides have non-stoichiometric structure, defects in crystal lattice, different morphology and crystallite pattern finds a great deal in electrical and optical devices. The result demonstrated by Shukla (2012), on absorption spectra of tin

oxide nanoparticles obtained in UV-Visible region shows blue shift in the absorption edge at 268 nm as compared to bulk. The relative peak shift is useful in different applications like thick film resistor and gas sensing. As discussed by Verma et al., (2013) and Hassan et al., (2019) The band gap and absorption edge modification of tin oxide takes place when different dopant material like CuO, ZnO, TiO<sub>2</sub>, WO<sub>3</sub>, ZrO<sub>2</sub> and many other binary and ternary phase are added into different varying concentration. The good results are obtained by Dhineshababu et al., (2016) in their research article and put forward that pure CuO has absorption edge at 219 nm when CuO nanoparticles were prepared from sonochemical process; this is because of direct transition of electrons. In this paper a nano powder sample of CuO:SnO<sub>2</sub> composite material has investigated for structural and spectroscopic analysis in terms of absorbance and absorbance coefficient with minimal concentration to maximum concentration in solvent phase similarly described into Hazar S. et al (2016) about solvent phases.

### Materials and methods

#### i. Preparation of SnO<sub>2</sub> Thick Film

Tin-oxide and composite thick films of cuprous oxide (CuO) blended in tin oxide with percentage composition were prepared on glass substrate with particular dimension by using

# Electrical and Structural Characterization of Fired SnO<sub>2</sub> Thick Films by Screen Printing Technique

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**Abstract:** Thick films of SnO<sub>2</sub> were prepared by Standard Screen printing method on glass substrates and films are annealed at 450<sup>0</sup>C in air atmosphere. Electrical characterization was studied in static system. This paper revealed that SnO<sub>2</sub> is n-type semiconductor obeying negative temperature coefficient (NTC) characteristics. Thick films of SnO<sub>2</sub> were characterized by SEM, EDAX, XRD, FTIR and UV to study surface morphology, elemental analysis, crystalline Phases of films, vibrational and optical modes respectively.

**Keywords:** Thick Films, Screen printing method, XRD, SEM, EDAX.

## I. INTRODUCTION

The air is a mixture of different pollutant gases. Nowadays in order to monitor these gases different techniques are used. Micro-sensors constructed with SnO<sub>2</sub> material is found to be more versatile because of its use in transistors, electrodes, gas sensors, liquid crystal displays, catalysts, photovoltaic devices, photo sensors, antistatic coatings, polishing and ceramic glazes [1]. Tin oxide is useful due to high degree of transparency in the visible spectrum, low operating temperature, strong thermal stability and more stable in higher oxidation state (+4) thereby a good oxidising agents in organic synthesis. Tin oxide is colourless, diamagnetic and amphoteric solid with n-type semiconductor having wide band gap 3.7 eV [2]. Krishnakumar. T. et. al., have reported that tin oxide exist as tetragonal (SnO<sub>2</sub>) cassiterite oriented in most sharp XRD peak (110) in mineral form and rhomarchite (SnO) form oriented in most sharp XRD peak (101). Tin oxide semiconductor has space group P4<sub>2</sub>/mmm and unit cell parameters are a=4.737 Å, c=3.185 Å [3]. In crystal lattice of SnO<sub>2</sub>, Sn<sup>4+</sup> ions are six co-ordinated octahedrally surrounded with three co-ordinated trigonal planer O<sup>2-</sup> ions.

## II. LITERATURE SURVEY

Tin element 50 hides everywhere in our nature often in movie relics: from *The Wizard of Oz*'s Tin Man to tin can radio often spotted in tree houses. It exist in crystalline β and brittle α form at low temperature, two other exist at high temperature and pressure [4]. Nanostructured material has been extensively applied in technological applications because of their novel characteristic electronic, optical and mechanical properties and unique shape [5]. Gas sensitive materials of metal oxide having porous structure of thick films have been extensively studied and implemented for their gas response to oxidising and reducing gases. Practical gas sensors are made up porous material such as SnO<sub>2</sub>, ZnO, WO<sub>3</sub>, In<sub>2</sub>O<sub>3</sub> etc. Among all tin oxide (SnO<sub>2</sub>) of tetragonal phase material is universally accepted gas sensor [6].

It provides a high surface volume ratio and exact mechanism of gas sensing based on adsorption-desorption phenomenon. Tin oxide blended with other metal oxide i.e. binary oxide solid mixtures are found be more versatile than doped with noble metal and single counterpart. Semiconductor based chemiresistors are mostly investigated known as chemiresistive gas sensors. These fabricated sensors have excellent sensitivity, very short response time and low cost [5-6].

## III. EXPERIMENTAL

### A. Preparation of SnO<sub>2</sub> Thick Films:

Tin-oxide thick films were prepared on glass substrate with particular dimension by using standard screen-printing technique [7-13]. The SnO<sub>2</sub> powder (99.99 %) of loba grade was weighed and dried in air at 450<sup>0</sup>C for 5 hr. The calcined SnO<sub>2</sub> powder was mixed and crushed thoroughly with glass frit acts as permanent binder and ethyl cellulose acts as a temporary binder. The mixture was then mixed with butyl carbitol acetate as organic vehicle to form the paste. The paste was then screen printed onto the surface of glass substrate. The details of the technique are described elsewhere [9]. After screen printing the films were dried under IR- lamp for 1 hr. and then fired at 450<sup>0</sup>C for 5 hrs. The thickness of the films was observed in the range of 20μm–30μm.

# Simple Calculation based Method for Lattice Parameters in Tetragonal System using Powder X-Ray Diffraction Data

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**Abstract:** A crystal is a substance in which the particles are arranged in an orderly repeating, three dimensional system. The crystal lattice is the three dimensional arrangement of a solid crystal. There are seven crystal systems namely triclinic, monoclinic, orthorhombic, tetragonal, trigonal, hexagonal and cubic. The seven crystal system consists of 32 classes. Among all tetragonal system seven point group or crystal class tetragonal pyramidal, tetragonal disphenoidal, tetragonal dipyramidal, tetragonal trapezohedral, ditetragonal pyramidal, tetragonal-scalenohedral, ditetragonal dipyramidal. Tetragonal system is characterized by different faces and bond angles. The edge length of crystal are represented by  $a$ ,  $b$  and  $c$ . The angles at which faces intersect are represented by Greek letters  $\alpha$ ,  $\beta$ , and  $\gamma$ . For tetragonal systems like tin oxide (IV) are as shown in fig 1. They are designed are  $a=b \neq c$  and  $\alpha=\beta=\gamma$ . The dimensions are  $a=b=4.731\text{\AA}$  and  $c=3.189\text{\AA}$  along with  $\alpha=\beta=\gamma=90^\circ$ . The present research paper gives the way of obtaining calculation for lattice parameter in tetragonal system like tin oxide (IV).

**Keywords:** Crystal system, lattice parameters, tetragonal system, tin oxide (IV) etc.

## I. INTRODUCTION

Lattice constant determination is important tool to study crystal structure, phase identification, solubility range, physical properties and solvus curve determination [1]. A structure refers to internal arrangement of particle and not the external appearance of crystal lattice.

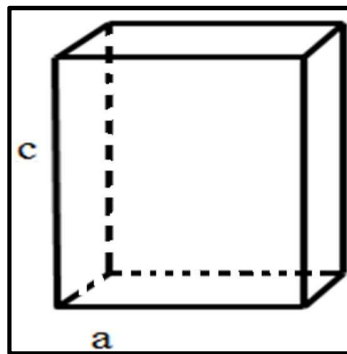


Fig. 1 lattice parameters representation in tetragonal unit cell system

Lattice parameters are the length between two points on the corners of a unit cell. There are some well-known method for determination of lattice parameters viz; Kossel method [2], the method of highly divergent method [3] and the bond method [4]. Quasi-multiple X-ray diffraction is one of the reliable techniques to determine lattice parameters. Some of the researchers developed and reported their significant contribution about Quasi-multiple X-ray diffraction in respective articles [5-8]. Quasi-multiple X-ray diffraction is based on measuring the angle between two diffraction peaks corresponding to two previously chosen reflections satisfying conditions similar to multiple X-ray diffraction in the coplanar geometry [8]. The extrapolation method in the derivation of accurate unit-cell dimensions of crystal lattice decorated by Nelson-Riley method has most versatile method to calculate lattice parameters [9]. Here in this article we are also able to calculate lattice parameters  $a$  &  $c$  in tetragonal system with simple interconverting method. The purpose of this article is to describe and develop a simple method of calculating lattice parameters from powder X-ray diffraction data on a crystal with known structure.

# Research Study of I.Q.A.C and N.A.A.C in Indian Higher Education System

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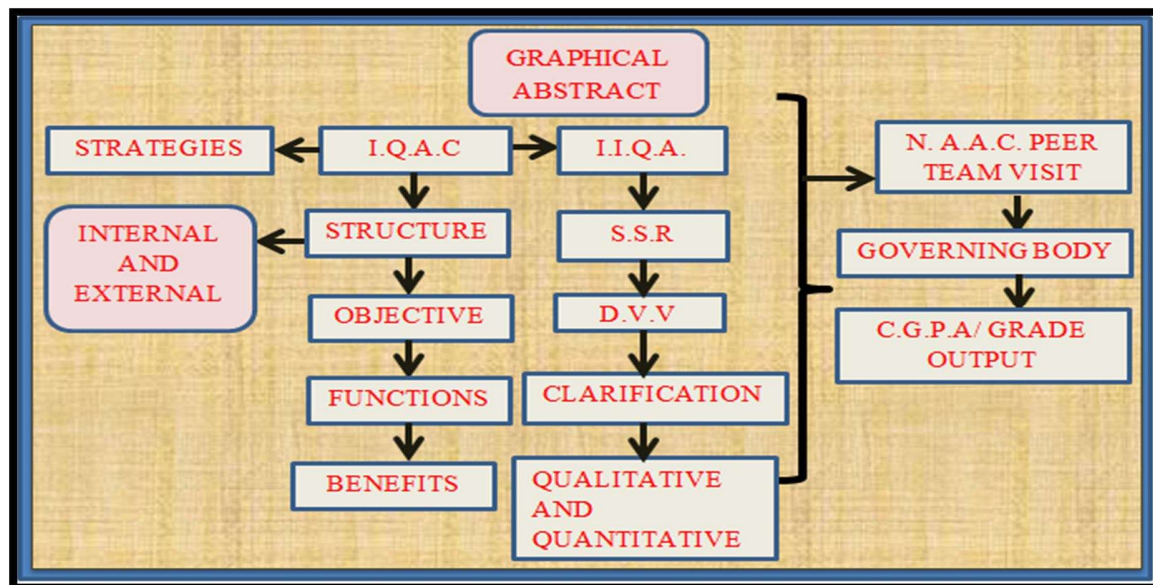
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**Abstract:** Indian higher education system has an epic tradition from old time. Higher education is given to students of all types with background of economically rich or poor class, highly talented to lower class in academics, strongly bonafied in work to those thinking upto bread and butter, students who follow the path of ritualism and one who forms the basis of modern culture. The need and purpose of higher education also depends on how students are passionate towards their life for progress of society. Their were different tools to interpret the importance of higher education in ancient days like dedication of teacher to his students under the patronage of governing bodies such as ruler or king. In ancient time there was direct control of king and his deployed authorities for older higher education system. In todays higher education system at all Indian universities and colleges, I.Q.A.C has similar role to connect and compare the quality and assurance of higher education for betterment of Indian government and society.



**Keywords:** I.Q.A.C., N.A.A.C., higher education, flowsheets etc

## I. INTRODUCTION

The picture of indian higher education has been changing after Indian independence. The education policy was depend on historical, political, social and economical situation as stated and said by Devi & Singh (2018). After establishment of University Grants Commission (U.G.C) in year 1956, some remarkable changes in H.E.I has been adpoted. Different comissions were set up to evaluate the quality of education such as Kothari commission, Radhakrishnan commission, Indian education policy (1986) and new education policy. It is necessary to protect, monitor, observe the quality of education at university and college level for students and stakeholders. Therefore it should be mandatory to establish a internal quality assurance cell (I.Q.A.C) at H.E.I.s which able to communicate internally and exernally to stakeholders as described by Nikam (2016) . U.G.C has introduced I.Q.A.C at colleges and universities with U.G.C-XI plan and XII plan focuses on access, equity, quality, promotion of talent and skill development as reffered on behalf of bhat (2018).






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## Current Research in Green and Sustainable Chemistry

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# Design, fabrication, antitubercular, antibacterial, antifungal and antioxidant study of silver doped ZnO and CuO nano candidates: A comparative pharmacological study

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## Highlights

- Structural characterization by XRD, HR-SEM, EDAX and HR-TEM analytical techniques.



- Antibacterial activity against four bacterial strains namely *Staphylococcus aureus*, *Bacillus subtilis*, *Bacillus megaterium*, and *Escherichia coli*, antifungal activity against four fungal strains namely *Rhizopus oryzae*, *Mucor mucido*, *Aspergillus niger*, and *Candida albicans* and antitubercular activity against *Mycobacterium tuberculosis*.
- Strong inhibition of bacterial and fungal strains was observed for Ag-doped NPs.
- 5%Ag/ZnO NPs were found to be highly potent against all tested bacterial and fungal agents.
- Additionally, OH and DPPH radicals' scavenging study for the evaluation of the antioxidant potential of synthesized nanoparticles.

## Abstract

In the present study, ZnO, CuO, CuO/ZnO, 5% Ag/CuO, 10% Ag/CuO, 5%Ag/ZnO, and 10% Ag/ZnO NPs were synthesized to develop bio-nano medicines with potent antibacterial, antifungal, and antioxidant properties. XRD, HR-SEM, EDAX, and HR-TEM spectral analyses were used to establish the structural characteristics of the synthesized NPs. According to the XRD study, the average particle size for CuO NPs was 23.42nm, for ZnO NPs it was 28.00nm, and for CuO/ZnO nanocomposite; 25.58nm. The agglomeration of NPs in ZnO and CuO NPs, as well as the presence of agglomeration and nanorods in the CuO–ZnO nanocomposite, were identified using HR-SEM. In the present study, CuO NPs have a cubic crystal structure, whereas ZnO NPs have a hexagonal crystal structure, as confirmed by HR-TEM. Both cubic and hexagonal crystal lattices were found in the CuO/ZnO nanocomposites. The Ag incorporation into the ZnO and CuO NPs was confirmed using the EDAX. Disc diffusion assay was used to access the antibacterial and antifungal activities whereas REMA assay was used to establish MIC values. Antibacterial analyses were performed against *S.aureus*, *B.subtilis*, *B.megaterium*, *Escherichia coli*, and *M.tuberculosis*, while antifungal studies were conducted on *R.oryzae*, *M.mucido*, *A.niger*, and *C.albicans*. The antimicrobial activities of ZnO NPs were found to be more influenced by Ag incorporation than CuO NPs. The optimal dopant for



## Density and Viscosity of LiCl, LiBr, LiI and KCl in Aqueous Methanol at 313.15K

Volume 37, Number 5

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### ABSTRACT:

The densities and viscosities of electrolytes are essential to understand many physicochemical processes that are taking place in the solution. In the present research, the densities and viscosities of lithium halides, LiX (X = Cl, Br, I) and KCl in (0, 20, 40, 50, 60, 80 and 100) mass % of methanol + water at 313.15K were calculated employing experimental densities ( $\rho$ ), the apparent molar volumes ( $\phi_v$ ) and limiting apparent molar volumes ( $\phi_v^0$ ) of the electrolytes. The ( $\phi_v^0$ ) of electrolyte offer insights into solute-solution interactions. In terms of the Jones-Dole equation for strong electrolyte solution, the experimental data of viscosity were explored. Viscosity coefficients A and B have been interpreted and discussed. The B-coefficient values in these systems increase with increase of methanol in the solvents mixtures. This implied that when the dielectric constant of the solvent decreases, so do the solvent-solvent interactions in these systems.

### KEYWORDS:

Apparent Molar Volume; Density; Viscosity

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### Introduction

The density and viscosity data of electrolyte solutions have been extremely valuable in determining whether or not ion-solvent interactions exist in aqueous and non-aqueous solutions.<sup>1</sup> For a better knowledge of many physicochemical processes that occur in the chemical industry and in nature, Crystallization, desalination, waste water treatment, pollution control, oil recovery, heat and mass transfer, fluid flow, mineral transport and deposition, corrosion, and other processes all rely on the transport properties (viscosity and thermal conductivity) of aqueous electrolyte solutions in a wide range of solvent concentrations, solution temperatures, and pressures. In many applications, these processes take place at high temperatures and pressures. For understanding ion-solvent interactions, temperatures and concentration dependencies of the viscosity of aqueous electrolyte solutions are indeed important.<sup>2-9</sup>

Viscosity is one of the important transport properties of electrolyte solutions and belongs to a dynamic state property, while density is one of the key thermodynamic features of electrolyte solutions and contributes to an equilibrium property.<sup>10-12</sup> Researchers have explored the use



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# Microwave prompted solvent-free synthesis of new series of heterocyclic tagged 7-arylidene indanone hybrids and their computational, antifungal, antioxidant, and cytotoxicity study

Vishnu A. Adole<sup>a</sup>, Rahul A. More<sup>b,1</sup>, Babu S. Jagdale<sup>c</sup>, Thansing B. Pawar<sup>c</sup>  , Santosh S. Chobe<sup>c</sup>, Rahul A. Shinde<sup>a</sup>, Sunil L. Dhonnar<sup>c</sup>, Prashant B. Koli<sup>d</sup>, Arun V. Patil<sup>e</sup>, Abhijit R. Bukane<sup>a</sup>, Rajesh N. Gacche<sup>f</sup>

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## Highlights

- Microwave prompted eco-friendly synthesis of new series of 7-heteroarylidene indanone derivatives.
- Antifungal screening against four fungal strains namely *Rhizophus oryzae*, *Mucor mucido*, *Aspergillus niger*, and *Candida albicans*.
- Antioxidant activity of the 7-heteroarylidene indanone derivatives using DPPH and OH assay.
- Very low to negligible cytotoxicity activity of the 7-heteroarylidene indanone derivatives.
- Structural, electronic, UV–Visible and vibrational assignments using theoretical and experimental comparison.
- Correlation between LUMO energies and antifungal studies.

## Abstract

In this study, we report the expeditious synthesis of ten new antifungal and antioxidant agents containing heterocyclic linked 7-arylidene indanone moiety. The solvent-free microwave technique, ample substrate scope, superfast synthesis, and very simple operation are noteworthy features of this protocol. Antifungal activities of the newly synthesized compounds were evaluated against four fungal strains namely *Rhizophus oryzae*, *Mucor mucido*, *Aspergillus niger*, and *Candida albicans*. Most of the compounds were shown strong

**SYNTHESIS, CHARACTERIZATION, MOLECULAR STRUCTURE,  
AND HOMO-LUMO STUDY OF 2-PHENYLQUINOXALINE: A DFT  
EXPLORATION****Ravindra H. Waghchaure<sup>1\*</sup> and Thansing B. Pawar<sup>2</sup>**

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422 208, India.

**ABSTRACT**

Quinoxalines are a versatile class of nitrogen containing heterocyclic compounds and they constitute useful intermediates in organic synthesis. In this paper, we report the synthesis of 2-phenylquinoxaline (2PQXL) from orthophenylene diamine and phenacyl bromide. The synthesized 2-phenylquinoxaline is characterized by <sup>1</sup>HNMR spectral technique. Computational investigation is studied by using density functional theory (DFT) at B3LYP/6-311G(d,p) basis set. The geometry of the 2PQXL molecule is optimized by using B3LYP/6-311G(d,p) basis set and the geometrical parameters like bond lengths and bond angles have been computed and discussed. Various quantum chemical parameters are determined on the basis of frontier molecular orbital study for the better understanding of chemical behaviour of the

title molecule. Molecular electrostatic potential (MEP) is plotted to locate the reactivity sites of the title molecule. A TD-DFT method at B3LYP/6-311G(d,p) has been employed to determine absorption energies along with oscillator strength. In addition, some thermodynamic parameters are also been computed at the same level of theory.

**KEYWORDS:** 2-Phenylquinoxaline, B3LYP/6-311G(d,p), TD-DFT, Molecular electrostatic potential.



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## Articles

# Solvent-free grindstone synthesis of four new (*E*)-7-(arylidene)-indanones and their structural, spectroscopic and quantum chemical study: a comprehensive theoretical and experimental exploration


**Vishnu A. Adole** ✉, Ravindra H. Waghchaure, Sandip S. Pathade, Manohar R. Patil, Thansing B. Pawar & Bapu S. Jagdale

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## ABSTRACT

In the present examination, four new compounds of (E)-7-(arylidene)-indanone skeleton have been synthesised using a grindstone chemistry approach; environmentally viable protocol. For a detailed molecular structure description, some quantum-chemical calculations of (E)-7-(arylidene)-indanones were performed by using the density functional theory method with a basis set B3LYP/6-311G(d,p). The optimised molecular geometry, quantum and structural entities such as bond length, bond angle, total energy, electron density distribution in highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital (LUMO), charge distribution, electronegativity, absolute hardness, softness, electrophilicity, chemical potential, charge transfer in molecules have been computed. All the compounds are well characterised using analytical methods; proton magnetic resonance (PMR) and carbon magnetic resonance (CMR) spectroscopy. Absorption energies, oscillator strength, and transitions of all four molecules have been calculated at TD-B3LYP/6-311G(d,p) level of theory for B3LYP/6-311G(d,p) optimised geometries. The molecular electrostatic surface potential plots have been computed for the better understanding of reactive sites. Some thermodynamic functions were also explored using theoretical calculations. All the calculations have been computed in the gas phase.

**Q KEYWORDS:** DFT B3LYP/6-311G (d,p) HOMO-LUMO molecular electrostatic surface potential grindstone synthesis

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## Articles

# DFT computational insights into structural, electronic and spectroscopic parameters of 2-(2-Hydrazineyl)thiazole derivatives: a concise theoretical and experimental approach

Vishnu A. Adole , Thansing B. Pawar &amp; Bapu S. Jagdale

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## ABSTRACT

It has been uncovered that compounds containing thiazole moiety display noteworthy biological properties, which have attracted the attention of many researchers in chemical biology as well as in medicinal chemistry. In the current examination, ten 2-(2-hydrazineyl)thiazole derivatives were studied using density functional theory (DFT). The geometry of all ten molecules was optimized by employing the DFT method with the B3LYP/6-311G (d,p) basis set. For the detailed structural and spectroscopic examination, the (*E*)-4-phenyl-2-(2-(1,2,6,7-tetrahydro-8*H*-indeno[5,4-*b*]furan-8-ylidene)hydrazineyl)thiazole (**PIFHT**) was studied as a representative molecule. The bond lengths and bond angles of the **PIFHT** molecule were discussed for the detailed understanding of the structural entities. The electronic parameters of all ten molecules were analyzed by computing HOMO and LUMO pictures. Using frontier molecular orbital analysis, spectroscopic and quantum chemical parameters were evaluated and discussed to explore the chemical reactivity of the molecules. Besides, absorption energies, oscillator strength, and electronic transitions of **PIFHT** molecule were explored using time-dependent density-functional theory (TD-DFT) at the B3LYP/6-311G (d,p) level of theory in the gas phase, dichloromethane, and dimethyl sulfoxide solvents. The TD-DFT computed theoretical UV-Visible spectra of the **PIFHT** molecule were compared with the experimental UV-Visible spectra. The scaled vibrational frequencies were compared with the experimental frequencies for the assignment of the vibrational bands. The comparisons between computed and experimental UV-Visible and IR spectral results are gratifying. The molecular electrostatic surface potential plots were computed for locating the reactivity sites. Mulliken atomic charges were also studied for acquiring insights into charge density.







## Transition Metals $\text{Ni}^{2+}$ , $\text{Fe}^{3+}$ Incorporated Modified ZnO Thick Film Sensors to Monitor the Environmental and Industrial Pollutant Gases

**RAVINDRA HARIBHAU WAGHCHAURE<sup>1,2\*</sup>, PRASHANT BHIMRAO KOLI<sup>3</sup>,  
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### ABSTRACT

Zinc oxide is known as multifaceted material due to its special physical and chemical properties. Present research deals with the fabrication of undoped ZnO, 1.5%  $\text{Fe}^{3+}$  doped ZnO, and 1.5%  $\text{Ni}^{2+}$  doped ZnO nanoparticles by low-cost co-precipitation method. These prepared materials were utilized to prepare thick film sensors by employing a screen printing technique. The structural confirmations of these materials were performed by various nano-characterization techniques. The structural properties were investigated by XRD to confirm the nanoscale ZnO as well as the average crystal dimensions. The surface morphological properties of undoped and modified ZnO were analyzed by SEM and TEM methods. The average volume pores over prepared materials and surface area were concluded from the  $\text{N}_2$  adsorption-desorption experiment (BET analysis). The  $\text{Fe}^{3+}$  doped ZnO has the highest surface area among all the prepared sensors i.e. 23.55  $\text{m}^2/\text{g}$ . The  $\text{Fe}^{3+}$  doped ZnO and  $\text{Ni}^{2+}$  ZnO nanomaterials were observed to show declined band gaps in comparison to the undoped ZnO material. All the prepared sensors were employed for the gas sensing study of gases like  $\text{NH}_3$ , LPG, formaldehyde vapors, toluene vapors,  $\text{CO}$ ,  $\text{CO}_2$ , and  $\text{NO}_2$ . The  $\text{CO}_2$  and  $\text{NH}_3$  vapors found to be very sensitive towards  $\text{Fe}^{3+}$  doped ZnO with 76.62% and 76.58% sensitivity respectively. The  $\text{Ni}^{2+}$  doped ZnO sensor sensitivity for  $\text{CO}_2$  and  $\text{NH}_3$  was recorded as 71.20% and 70.23% respectively. The LPG,  $\text{CH}_2\text{O}$ , and toluene vapors' sensitivity was also studied for the modified ZnO sensor. Besides, modified ZnO utilized as a relative humidity sensor with an RH variation of 10-90%. The impedance versus humidity curves recorded for all sensors. The  $\text{Fe}^{3+}$  doped ZnO nanomaterial at 10 Hz was found to be an effective humidity sensor. The response and recovery were found to be very rapid in  $\text{Fe}^{3+}$  doped ZnO for  $\text{NH}_3$ ,  $\text{CO}_2$ ,  $\text{NO}_2$ , and LPG vapors.

**Keywords:** Modified ZnO sensor,  $\text{CO}_2$ ,  $\text{NO}_2$ ,  $\text{NH}_3$  gas sensing, Humidity sensor, BET, TEM.





## Efficient Synthesis, Spectroscopic and Quantum Chemical Study of 2,3-Dihydrobenzofuran Labelled Two Novel Arylidene Indanones: A Comparative Theoretical Exploration

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BAPU SONU JAGDALE<sup>1\*</sup>, THANSING BHAVSING PAWAR<sup>2</sup>,  
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Commerce College Panchavati (Affiliated to SP Pune University, Pune), Nashik-422 003, India.

### Abstract

Indanone and 2,3-dihydrobenzofuran scaffolds are considered as special structures in therapeutic science and explicitly associated with various biologically potent compounds. In the present disclosure, we report the synthesis of two new 2,3-dihydrobenzofuran tethered arylidene indanones via an environmentally adequate and viable protocol. The two compounds revealed in this have been characterized well by analytical methods; proton magnetic resonance (PMR), carbon magnetic resonance (CMR). The Density Functional Theory (DFT) study has been presented for the spectroscopic, structural and quantum correlation between (E)-2-((2,3-dihydrobenzofuran-5-yl)methylene)-2,3-dihydro-1H-inden-1-one (DBDI) and (E)-7-((2,3-dihydrobenzofuran-5-yl)methylene)-1,2,6,7-tetrahydro-8H-indeno[5,4-b]furan-8-one (DBTI). Optimized geometry, frontier molecular orbital, global reactivity descriptors, and thermodynamic parameters have been computed for DBDI and DBTI. DFT/B3LYP method using basis set 6-311++G (d,p) has been employed for the computational study. Mulliken atomic charges are established by using 6-311G (d,p) basis set. Besides, molecular electrostatic potential for DBDI and DBTI is also explored to locate the electrophilic and nucleophilic centres.



### Article History

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DFT, 6-311++G(d,p);  
HOMO-LUMO;  
Molecular Electrostatic  
potential;  
(E)-2-((2,3  
Dihydrobenzofuran-5-yl)  
Methylene)-2,3-Dihydro-  
1H-Inden-1-One;  
(E)-7-((2,3  
Dihydrobenzofuran  
5-yl)Methylene)  
1,2,6,7-Tetrahydro-8H  
Indeno[5,4-b]Furan-8  
one,;

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# Molecular Structure, Frontier Molecular Orbitals, MESP and UV-Visible Spectroscopy Studies of Ethyl 4-(3,4-dimethoxyphenyl)-6-methyl-2-oxo-1,2,3,4-tetrahydropyrimidine-5-carboxylate: A Theoretical and Experimental Appraisal

Vishnu Ashok Adole<sup>1</sup> , Bapu Sonu Jagdale<sup>1\*</sup> , Thansing Bhavsing Pawar<sup>2</sup> , Bhatu Shivaji Desale<sup>1</sup>

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## Article Metrics

## ABSTRACT:

In the current investigation, we wish to report a combined study on the theoretical and experimental investigation of structural, molecular, and spectral properties of ethyl 4-(3,4-dimethoxyphenyl)-6-methyl-2-oxo-1,2,3,4-tetrahydropyrimidine-5-carboxylate (EDMT). The EDTM molecule is synthesized and characterized by UV-Visible, FT-IR, <sup>1</sup>H NMR, <sup>13</sup>C NMR, DEPT, and mass spectral techniques. The density functional theory (DFT) investigation was performed by using the B3LYP level of theory at 6-311++G (d,p) basis set. Frontier molecular orbital (FMO) analysis is likewise examined. An TD-DFT method was used for the UV-Visible spectral analysis by using the B3LYP level and 6-311++G (d,p) basis set in the DMSO solvent. Experimental and theoretical UV-Visible spectra were compared in the present study. Various reactivity descriptors are discussed. Besides, Mulliken atomic charges, molecular electrostatic surface potential (MESP), and some valuable thermodynamic functions are studied.



## **Molecular Structure, Electronic, Chemical and Spectroscopic (UV-Visible and IR) Studies of 5-(4-Chlorophenyl)-3-(3,4-dimethoxyphenyl)-1-phenyl-4,5-dihydro-1H-pyrazole: Combined DFT and Experimental Exploration**

**SANDIP S. PATHADE<sup>1</sup>, VISHNU A. ADOLE<sup>2</sup>,  
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### **Abstract**

The current examination deals with a detailed investigation on the computational study of 5-(4-chlorophenyl)-3-(3,4-dimethoxyphenyl)-1-phenyl-4,5-dihydro-1H-pyrazole (CPMPP) by using density functional theory (DFT). CPMPP is synthesized and characterized by UV-Visible, FT-IR, <sup>1</sup>H NMR, and <sup>13</sup>C NMR spectroscopic methods. The molecular structure, optimized geometrical parameters, and vibrational assignments have been established employing the DFT method, the B3LYP method, and the 6-311++G (d,p) basis set. Frontier molecular orbital (FMO) analysis and various global reactivity parameters are also discussed for the better comprehension of the chemical reactivity. Theoretical and Experimental; UV-Visible analysis is compared and a good deal of agreement is found. Experimental vibrational frequencies were compared with the theoretical IR spectrum to mark the correct vibrational assignments. Molecular electrostatic surface potential (MESP) and Mulliken atomic charges are computed at the same level of theory to locate the charge density. Absorption energies, excitation energy, oscillator strength, and transitions have been computed at TD-B3LYP/6-311++G (d,p) level of theory for B3LYP/6-311++G (d,p) optimized geometry.



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### **Keywords:**

DFT;  
Gaussian;  
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Vibrational Assignments;  
5-(4-Chlorophenyl)-3-(3,4-dimethoxyphenyl)-1-phenyl-4,5-dihydro-1H-pyrazole.

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## Experimental and Theoretical Studies on the Molecular Structure, FT-IR, NMR, HOMO, LUMO, MESP, and Reactivity Descriptors of (*E*)-1-(2,3-Dihydrobenzo[*b*][1,4]dioxin-6-yl)-3-(3,4,5-trimethoxyphenyl)prop-2-en-1-one

RAHUL ASHOK SHINDE<sup>1,2</sup>, VISHNU ASHOK ADOLE<sup>2\*</sup>,  
BAPU SONU JAGDALE<sup>1,2</sup> and THANSING BHAVSING PAWAR<sup>1</sup>

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### Abstract

The present research deals with the synthesis, characterization and density functional theory (DFT) study of (*E*)-1-(2,3-dihydrobenzo[*b*][1,4]dioxin-6-yl)-3-(3,4,5-trimethoxyphenyl)prop-2-en-1-one (DTMPP). For the computational investigation, DFT method at B3LYP/6-311++G(d,p) basis set has been used. Herein, structural properties like molecular structure, bond lengths, and bond angles of the DTMPP have been explored. The all-important examination of the electronic properties; HOMO and LUMO energies were studied by the time-dependent DFT (TD-DFT) method. The experimental and theoretical spectroscopic investigation on FT-IR, <sup>1</sup>H NMR, and <sup>13</sup>C NMR has been unveiled in the present research. To study the chemical behaviour of the DTMPP, Mulliken atomic charges, molecular electrostatic surface potential, and reactivity descriptors have been explored. The dipole moment of the DTMPP is 1.27 Debye with C<sub>1</sub> point group symmetry and -1225.77 a.u. E(B3LYP) energy. The most electropositive carbon and hydrogen atoms in the DTMPP are C<sub>14</sub> and H<sub>27</sub> respectively. The C<sub>1</sub>-C<sub>6</sub> bond is the longest (1.4089 Å) C=C bond in the DTMPP. The oxygen atom O<sub>33</sub> is having short contact interaction with the hydrogen atom H<sub>44</sub> with a distance of 3.3258 Å. The molecular electrostatic potential plot predicts the positive electrostatic potential is around hydrogen atoms. The FT-IR assignments were made by comparing the experimental



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### Keywords:

(*E*)-1-(2,3  
Dihydrobenzo[*b*][1,4  
Dioxin-6-yl)-3-(3,4,5-  
Trimethoxyphenyl)Prop-  
2-En-1-One,  
B3lyp/6-311++G(D,P);  
Dft;  
Molecular Structure;  
Molecular Electrostatic  
Surface Potential.

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[Home](#) > [Monatshefte für Chemie - Chemical Monthly](#) > ArticleOriginal Paper | [Published: 15 May 2021](#)

# Superfast synthesis, antibacterial and antifungal studies of halo-aryl and heterocyclic tagged 2,3-dihydro-1H-inden-1-one candidates

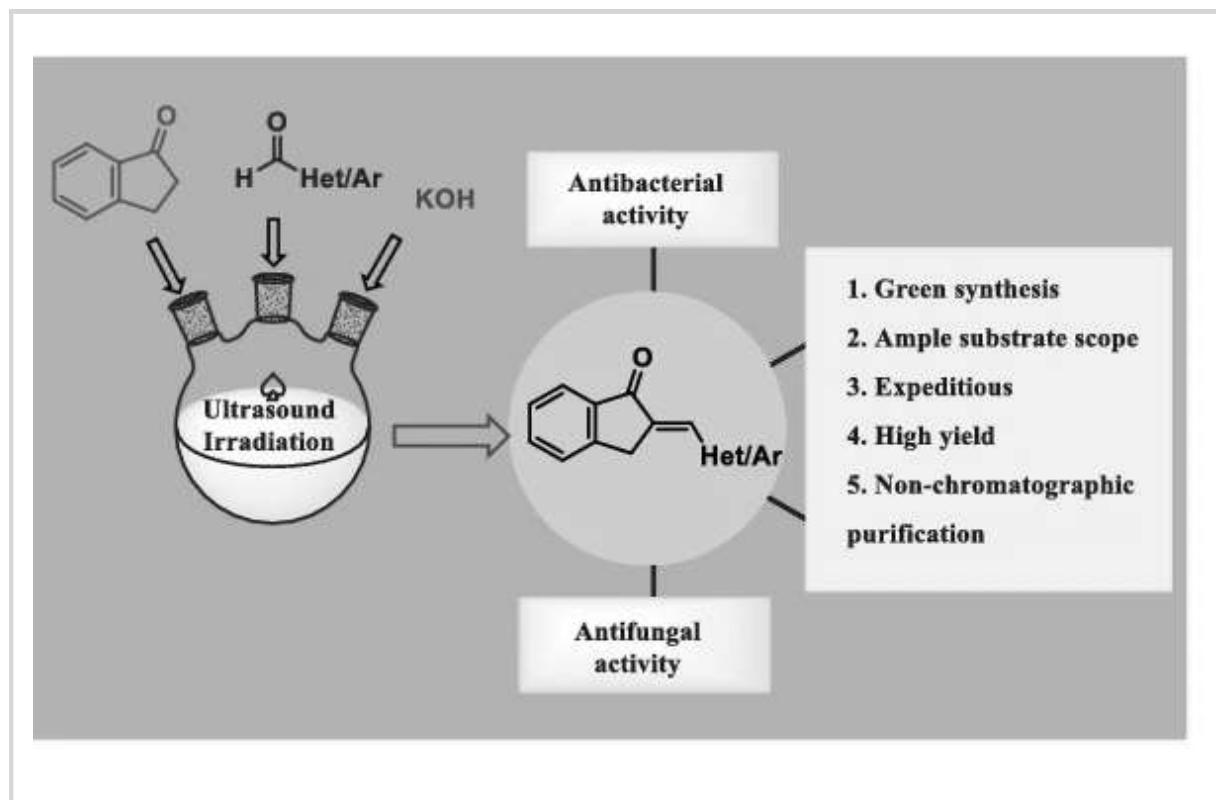
[Rahul A. Shinde](#), [Vishnu A. Adole](#), [Bapu S. Jagdale](#)  & [Thansing B. Pawar](#)[Monatshefte für Chemie - Chemical Monthly](#) **152**, 649–658 (2021)**243** Accesses | **11** Citations | **1** Altmetric | [Metrics](#)

## Abstract

We describe a successful synthesis of halo-aryl and heterocyclic labelled 2,3-dihydro-1H-inden-1-one derivatives, as well as their antibacterial and antifungal properties. A total of 15 derivatives from 2,3-dihydro-1H-inden-1-one were synthesized by grinding, stirring, and ultrasound irradiation methods. The findings revealed that the ultrasound technique is increasingly satisfactory in terms of time and synthetic performance. The synthesized compounds have been tested for their antimicrobial activities against two

Gram-positive (*Staphylococcus aureus* and *Bacillus subtilis*) and two Gram-negative bacteria (*Escherichia coli* and *Proteus vulgaris*), and also two fungal agents (*Aspergillus niger* and *Candida albicans*). Most of the compounds were found to exert potent antibacterial action with broad-spectrum antibacterial activity. Likewise, few compounds were revealed to have potent antifungal properties against *A. niger* and *C. albicans*. The synthesized compounds were characterized by FT-IR,  $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR, and HRMS spectral techniques.

#### Graphic abstract







## Research Article



# Synthesis, spectroscopic characterization, XRD crystal structure, DFT and antimicrobial study of (2E)-3-(2,6-dichlorophenyl)-1-(4-methoxyphenyl)-prop-2-en-1-one

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### Abstract

The single crystal of synthesized (2E)-3-(2, 6-dichlorophenyl)-1-(4-methoxyphenyl) prop-2-en-1-one is characterized by FT-IR, UV-visible, <sup>1</sup>H NMR, HRMS techniques. The molecular structure was elucidated by using single-crystal X-ray diffraction technique. The title compound crystallizes in the orthorhombic crystal system of P-2<sub>1</sub> 2<sub>1</sub> 2<sub>1</sub> space group where the unit cell parameters are a = 6.4704 (4) Å, b = 12.9304 (8) Å, c = 16.7181 (11) Å, α = 90°, β = 90°, γ = 90° and Z = 4. The molecular geometry, vibrational frequencies (FT-IR) of title compound have been calculated using the DFT/(B3LYP) method with 6-311++ G (d, p) basis set and compared with the experimental data which shows good agreement. TD-DFT approach is used to compute the UV-visible spectrum. The HOMO–LUMO energy gap, experimentally (4.1096) and theoretically calculated (4.09096) are nearly same. The chemical reactivity parameters have also been studied. The results obtained from the DFT analysis show good agreement with experimental data. The synthesized compound was also screened for antimicrobial activity and it shows moderate antimicrobial activity.

**Graphic abstract** (2E)-3-(2,6-dichlorophenyl)-1-(4-methoxyphenyl)prop-2-en-1-one is prepared and characterize with single crystal diffraction technique. The properties were theoretically and experimentally studied and results show good agreement. Synthesized compound possesses moderate antimicrobial activity against selected pathogens for study.

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## Synthesis, Spectroscopic Characterization, Quantum Chemical Study and Antimicrobial Study of (2E) -3-(2, 6-dichlorophenyl) -1-(4-Fluoro) -prop-2-en-1-one

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### Abstract

In the present work (2E) -3-(2, 6-dichlorophenyl) -1-(4-Fluoro) -prop-2-en-1-one was Prepared by Claisen-Schmidt condensation. Synthesized molecules were characterized by using FTIR, <sup>1</sup>H NMR spectroscopy. Molecular geometry, Vibrational frequency of title compound were calculated using the DFT/B3LYP method with 6-311++G (d, p) basis set. The experimentally obtained FTIR spectra were in good agreement with calculated infrared spectrum. The FMO and molecular electrostatic potential were performed to study the reactivity of molecules at the same level of theory. The synthesized compound shows moderate antimicrobial activity.



### Article History

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DFT, Gaussian-03,  
Chalcone, FMO,  
UV-Visible.

### Introduction

The Chalcone is a simple scaffold found in many naturally occurring compounds mainly in flavonoids and isoflavonoids in plants or can be synthesized in laboratory by different methods. Basically chalcones are alpha, beta unsaturated ketone, in which two aromatic rings joined at 1 and 3 position

(1,3-diphenyl-2E-propene-2-one). The two rings of chalcones are interconnected by electrophilic nature of alpha beta unsaturated carbonyl system, which are having complete delocalisation on both aromatic rings. It exists as cis and trans isomer in which trans isomer is thermodynamically more stable. They display a wide range of pharmacological

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## SYNTHESIS, CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY OF CHALCONES, PYRAZOLINES AND PYRIMIDINE DERIVATIVES

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### ABSTRACT

A new series of chalcones and their derivatives like pyrazolines, aminopyrimidine, and thiazine have been synthesized. All the synthesized compounds were characterized by spectroscopic methods and screened for their antimicrobial activity they show moderate antimicrobial activity.

**KEYWORDS:** chalcones, pyrazolines, thiazines, Anti-microbial activity.

### INTRODUCTION

Chalcone is  $\alpha$ ,  $\beta$  unsaturated carbonyl compound in which two aromatic rings joined by three carbons ( $\alpha$ ,  $\beta$  unsaturated carbonyl system).<sup>[1]</sup> The Presence of  $\alpha$ ,  $\beta$  unsaturated carbonyl group is responsible for various biological activities like antimicrobial, antifungal, antibacterial<sup>[2-3]</sup>, anti-inflammatory<sup>[4]</sup>, antimalarial<sup>[5]</sup> anti-tubercular<sup>[6]</sup> antidiabetic<sup>[7]</sup> antileishmanial.<sup>[8]</sup>

Commonly chalcone can be synthesized by aldol and Claisen-Schmidt reaction of substituted benzaldehyde with substituted acetophenone under basic condition. There are many more methods that have been reported for the synthesis of chalcones.

Chalcone act as the central core for the synthesis of various heterocycles like pyrazolines, oxazolines, thiazine, amino pyrimidine, etc. which shows promising biological activity.

## A Review On Air Pollution Problem In India and BS Norms

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Date of Submission: 25-07-2020

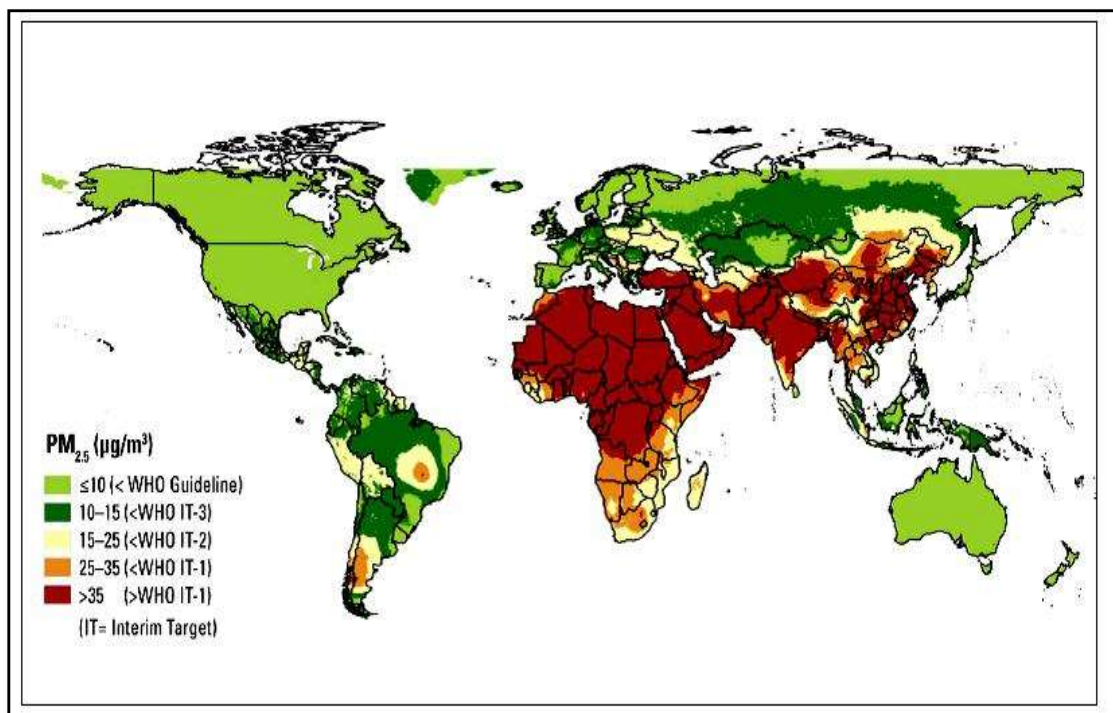
Date of Acceptance: 05-08-2020

**ABSTRACT-** As world air get worse, India's struggling to breath some of the fabled cities of India are now among the most polluted in the world and to control air pollution is a major problem with India. Bharat stage emission norms (BS-VI) will help India to reduce air pollution by vehicle emission it looks like silver lining to dark cloud. This paper try to cover aspect of struggling air pollution problem of India and regulation related to vehicle exhaust air pollution.

**Keywords-** Air pollution, Bharat stage emission standards, BS-VI, IQAR report, PM.

### I. INTRODUCTION-

Air pollution is a very serious health issue across the world and India. According to the WHO report 9 out of 10 people breathing polluted air, which seriously causes human health<sup>[1]</sup>. One third of death from lungs, cancer and stroke diseases are due to air pollution. India is ranked 5<sup>th</sup> among the most pollutant country according to the IQAR report and out of 30, 21 cities ranked among the top of the polluted cities in the world. Indian capital Delhi is Ranked first in most polluted cities<sup>[2]</sup>.



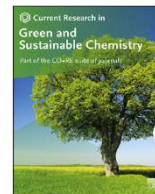
**Figure .1** Annual average PM 2.5 conc. In 2017 relative to WHO guideline (Source –state of global air /2019)<sup>[3]</sup>





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journal homepage: [www.elsevier.com/journals/  
current-research-in-green-and-sustainable-chemistry/2666-0865](http://www.elsevier.com/journals/current-research-in-green-and-sustainable-chemistry/2666-0865)

# Designing of screen-printed stannous oxide (SnO<sub>2</sub>) thick film sensors modified by cobalt and nitrogen elements for sensing some toxic gases and volatile organic compounds

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## ARTICLE INFO

## Keywords:

Modified SnO<sub>2</sub> sensor

VOC- Sensing

NO<sub>2</sub> gas sensing

TEM

BET

## ABSTRACT

The present research deals with fabrication of undoped SnO<sub>2</sub>, Co<sup>2+</sup> doped SnO<sub>2</sub> and nitrogen doped SnO<sub>2</sub> nanostructures. These three materials were prepared by cost effective co-precipitation method. While the thick film sensors of the prepared materials was design by screen printing photolithography technique. The fabricated materials were characterized by several techniques. The structural properties of the screen-printed thick films measured by X-ray diffractometer (XRD), which confirms the formation of tetragonal SnO<sub>2</sub> nanoparticles with average particle size between 15 and 17 nm. The morphological properties of fabricated thick of SnO<sub>2</sub> were studied by scanning electron microscopy (SEM), and high-resolution transmission electron microscopy (HR-TEM) to get surface and lattice characteristics of prepared material. The EDS technique was utilized to get the elemental composition of the prepared thick film sensors. While the UV-DRS technique was used to get the band gap energy of undoped SnO<sub>2</sub> and modified SnO<sub>2</sub> sensors. Additionally, the materials were investigated by means of Brunauer-Emmett-Teller (BET) study, and from BET results the cobalt modified SnO<sub>2</sub> has found to be higher surface area. These all-prepared sensors were applied for gas sensing results of NO<sub>2</sub>, LPG, CO and volatile organic compounds (VOC'S). The modified sensors found to be very effective at NO<sub>2</sub> and VOC gas vapors with 80.23% and 69.13% gas response for cobalt modified SnO<sub>2</sub> was observed. The tested gases NO<sub>2</sub> and VOC found to be very selective modified sensors. Reusability and recycling results demonstrate that Co<sup>2+</sup> doped SnO<sub>2</sub> is very efficient, long time stable and reproducible sensor at NO<sub>2</sub> and VOC gases at minimum gas concentration and moderate temperature.

## 1. Introduction

In the recent years there is huge increase in pollution level due to rapid urbanization and industrialization. Alternatively, the pollution leads to increase various types of pollutants around the atmosphere with remarkable concentration. The various pollutants present in atmosphere leads to produce serious environmental and human health hazards. Thus, concentration of these various pollutants present in the form of various gases like CO<sub>2</sub>, NO<sub>2</sub>, CO, VOC (volatile organic compounds). In addition to these there are other common gas vapors also present in the surrounding may combine with many atmospheric gases imparts serious combination of molecules leads to enhance serious health hazards.

Hence, the concentration of these toxic gases must be detected at the small scale level like parts per million. Although now days there are various strategies have been developed to sense the toxic concentration of various gases at minute concentration. For gas detection many sensors have been developed such as chemiresistors bases sensors, optical gas sensors, colorimetric gas sensors, electrochemical gas sensors, capacitance based gas sensors and acoustic based gas sensor etc. Out of these sensors the chemiresistors based sensors are based on semiconducting materials. The semiconductors based have high merits due to low cost synthesis, high efficiency, high gas response ratio and less hazardous in environmental ethics.

In the recent decades there a huge utilization of semiconducting

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# Fabrication, characterization and exploration of cobalt (II) ion doped, modified zinc oxide thick film sensor for gas sensing characteristics of some pernicious gases

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## ARTICLE INFO

### Keywords:

Co<sup>2+</sup> doped modified ZnO sensor

NO<sub>2</sub>

H<sub>2</sub>S sensor

TEM

Pernicious gases

## ABSTRACT

The present research deals with the synthesis of zinc oxide (ZnO) nanoparticles by the co-precipitation (CPT) method. The CPT method was successfully utilized for the synthesis of ZnO nanoparticles. The structural properties of undoped ZnO and cobalt doped ZnO were confirmed by employing an X-ray diffraction (XRD) study, from which the average particle size for each prepared material was calculated from the Debye Scherer formula. The average particle size confirms the nano range fabrication of undoped and cobalt doped ZnO material. The surface characteristics, morphology, texture, and porosity properties of undoped ZnO and cobalt doped ZnO were investigated from scanning electron microscopy (SEM). The elemental composition was investigated from energy dispersive spectroscopy (EDS). The High-resolution transmission electron microscopy (HRTEM) results revealed the hexagonal phase of prepared material. Furthermore, the undoped ZnO and 5% cobalt doped ZnO gas sensors prepared by screen printing technology were utilized for gas sensing purposes for testing the gases like H<sub>2</sub>S, NO<sub>2</sub>, SO<sub>2</sub>, and methanol. For the gases examined, the cobalt modified ZnO sensor proved to be quite effective, especially for H<sub>2</sub>S and NO<sub>2</sub> gas vapors. The Co<sup>2+</sup> doped ZnO sensor showed 70.12% sensitivity for H<sub>2</sub>S gas at 150 °C and 68.75% gas response for NO<sub>2</sub> gas vapors at 120 °C. In addition, the cobalt modified sensor was also investigated for reusability test to get concrete gas response results with the time interval of 15 days. In conclusion, it can be mentioned that the cobalt doped ZnO thick film sensor is a promising sensor for H<sub>2</sub>S and NO<sub>2</sub> gas vapors.

## 1. Introduction

Material science is presently at the forefront of many scientific and technological sectors. Material science offers a wide range of applications in science and technology due to the inherent qualities of materials. Material science is found to be a promising branch in the field of gas sensing [1,2], photocatalysis [3], organic conversions [4], energy

conversions [5], drug delivery [6], waste and sewage treatment [7], biosensors [8], solar cells [9], photoluminescence [10], biopolymers [11], and chemical detection [12]. Chemical sensors research has grown rapidly in the last decade as a because of their significance in a wide variety of technical applications, including diagnostic and drug exploration [13], food industry [14], environmental control [15,16], and agricultural studies [17]. Metal oxide (MOX) semiconductor gas sensors

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## **Green Synthesis of Ceria Nanoparticles Using Azadirachta Indica Plant Extract: Characterization, Gas Sensing and Antibacterial Studies**

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### **Abstract**

In the present investigation we have fabricated the cerium dioxide ( $\text{CeO}_2$ ) nanoparticles by green route. While preparing the cerium dioxide nanoparticles by co-precipitation method, Neem leaf extract mixed into the precursor of cerium. The synthesized nanoparticles of  $\text{CeO}_2$  were used for the preparation of thick film sensor by using screen printing strategy. The fabricated  $\text{CeO}_2$  sensor was characterized by XRD, SEM, EDS and TEM techniques. The structural characteristics investigated by x-ray diffraction technique (XRD). XRD confirms the formation of cubic lattice of  $\text{CeO}_2$  material. The surface, texture, porosity characteristics were investigated from SEM analysis, while chemical composition of the material was analysed by EDS technique. The transmission electron microscopy (TEM) confirms the formation cubic lattice of the cerium dioxide material. The thickness of the films was calculated from



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Antibacterial Study;  
 $\text{CeO}_2$  Sensor; Lpg;  
Petrol Vapors Sensor;  
Tem.

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# COMPUTATIONAL CHEMISTRY: MOLECULAR STRUCTURE, SPECTROSCOPIC (UV-VISIBLE AND IR), ELECTRONIC, CHEMICAL AND THERMOCHEMICAL ANALYSIS OF 3'-PHENYL-1,2-DIHYDROSPIRO[INDENO[5,4-B]FURAN-7,2'-OXIRAN]-8(6H)-ONE

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## ABSTRACT

Present investigation deals with the synthesis and density functional theory study (DFT) of a new epoxide derivative; 3'-phenyl-1,2-dihydrospiro[indeno[5,4-b]furan-7,2'-oxiran]-8(6H)-one (PHIFO). The synthesis of a PHIFO has been carried out by the reaction of (E)-7-benzylidene-1,2,6,7-tetrahydro-8H-indeno[5,4-b]furan-8-one with alkaline hydrogen peroxide in ethanol at room temperature. The structure of a synthesized epoxide derivative is affirmed on the basis of a proton nuclear magnetic resonance spectroscopy. The geometry of a PHIFO is optimized by using the density functional theory method at the B3LYP/6-31G(d,p) basis set. The optimized geometrical parameters like bond length and bond angles have been computed. The absorption energies, oscillator strength, and electronic transitions have been derived at the TD-DFT method at the B3LYP/6-31G(d,p) level of theory for B3LYP/6-31G(d,p) optimized geometries. The effect of polarity on the absorption energies is discussed by computing UV-visible results in dichloromethane (DCM). The vibrational wavenumbers are assigned to various functional groups and the gas phase vibrational data is compared with vibrational data obtained in the DCM. Quantum chemical parameters have been determined and examined. Molecular electrostatic potential (MEP) surface plot analysis has been carried out at the same level of theory. Some thermodynamic functions have likewise been examined. Mulliken atomic charge study is also discussed in the present study. The thermochemical data consisting total energy, heat capacity at constant volume, total entropy, zero-point vibrational energy, and rotational constants have been evaluated from harmonic vibrational frequencies.

**Keywords:** 3'-Phenyl-1,2-dihydrospiro[indeno[5,4-b]furan-7,2'-oxiran]-8(6H)-one, B3LYP/6-31G(d,p), MEP, TD-DFT.

## 1. INTRODUCTION

The chemistry of heterocyclic compounds has been extended to a colossal degree. Several heterocyclic scaffolds frameworks have been found to apply incredible pharmacological properties. Due to their diverse applications in medicinal chemistry and chemical biology, the research has been explored tremendously [1-4]. Numerous new heterocyclic compounds have

been synthesized in view of their remedial applications [5-7]. Dihydrofuran ring, the 2-arylidene indanone, and the chalcone skeleton have been found to exert good biological applications [8-13]. To understand the biological activity, it is very much necessary to know their physical and chemical properties. DFT is a method that can provide a good deal of information regarding the physical and chemical behavior of the molecules [14-

## Structural, Spectroscopic (UV-Vis and IR), Electronic and Chemical Reactivity Studies of (3,5-Diphenyl-4,5-dihydro-1H-pyrazol-1-yl)(phenyl)methanone

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(3,5-Diphenyl-4,5-dihydro-1H-pyrazol-1-yl)(phenyl)methanone (DPPPM) was synthesized using a rapid and recyclable reaction media of polyethylene glycol-400 (PEG-400) and catalytic amount of acetic acid. This method gives remarkable advantages such as a simple workup and a greener method by avoiding hazardous and toxic solvents. The computational calculations for the title compound were carried out using the density functional theory (DFT) method with B3LYP hybrid functional and 6-311++G(d,p) basis set. The structural parameters like bond lengths, bond angles, and dihedral angles were obtained from the optimized molecular geometry and discussed. This structural analysis shows that the DPPPM molecule has a non-planar structure and possess C<sub>1</sub> point group symmetry. The infrared vibrational spectral bands assignments were made by correlating experimental findings with the computed data that showed a good agreement. The electronic spectral properties were explored using the time-dependent DFT in the gas phase and two different polarity solvents. The theoretical UV-Vis absorption results obtained were in an acceptable agreement with the UV-Vis absorption experimental results. The solvent effect on wavelength of absorption was also reported. The frontier molecular orbital, molecular electrostatic surface potential and global chemical reactivity parameters for the title molecule in the gas phase were reported and discussed. Based on the results, the synthesized molecule possesses a good strength and kinetic stability.

**Keywords:** DFT, FT-IR, UV-Vis, HOMO-LUMO

## INTRODUCTION

Chalcones are mainly used as a precursor for the synthesis of pyrazolines. The N-substituted pyrazolines are an important class of biologically active compounds exhibiting a broad spectrum of biological activities. The notable biological spectrum includes COX-2 inhibitors [1], antibacterial [2], antifungal [3], anti-inflammatory [4], analgesic [4,5], antidepressant [6], anticancer [7], anticonvulsant [8], etc. They are also used as fluorescent probes [9] in some elaborate chemo sensors and as photosensitizers [10]. Various different strategies for the synthesis of (3,5-diphenyl-4,5-dihydro-1H-pyrazol-1-yl)(phenyl)methanone are known. However, many of these

methods are associated with various drawback such as tedious experimental workup procedure, harsh reaction condition, unsatisfactory yield, long reaction time and use of hazardous and toxic solvents. Hence, there is a need to develop a rapid and environmentally benign synthetic procedure for the synthesis of title molecule. In the recent years, use of polyethylene glycol (PEG) solvents has become dominant due to several advantages associated with them. The PEG solvents are known to be inexpensive, easily available, thermally stable, recyclable, biologically compatible, and non-toxic [11-12]. Due to these impeccable advantages of PEG solvents, they are used as solvents and catalysts in numerous organic transformations [13-16]. In view of the emerging importance of PEG as reusable and safe reaction media, here, we report the synthesis of (3,5-diphenyl-4,5-dihydro-1H-pyrazol-1-yl)(phenyl)methanone

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## Original Research Article

# Molecular Structure, FT-IR Spectra, MEP and HOMO-LUMO Investigation of 2-(4-Fluorophenyl)-5-phenyl-1, 3,4-oxadiazole Using DFT Theory Calculations

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## ABSTRACT

In the present work, synthesis and DFT study of 2-(4-fluorophenyl)-5-phenyl-1,3,4-oxadiazole is reported. The 6-311++G (d,p) basis set was used to optimize the molecular structure of the title compound using the DFT/B3LYP method. The structural parameters, bond length, and bond angle were studied. The fundamental vibrational wavenumbers and intensities were computed, and the observed and calculated wavenumbers were found to be in excellent agreement. In order to decide the reactivity and possible site for electrophilic and nucleophilic, Frontier molecular orbital (HOMO-LUMO) energies, global reactivity descriptors, molecular electrostatic potential as well as Mulliken charges were calculated using the same theory. The obtained results indicates that the compound possess good kinetic stability. The molecular electrostatic potential surface analysis shows that the nitrogen atom oxadiazole ring is the binding site for electrophilic attack.

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# New Congruence Method towards Assignment Problem

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## Abstract

In this paper, we have develop the new congruence method for assignment problem in minimum steps which gives the result in minimum stipulated time as compare to other method to solve assignment problem. Also as an application we have compare the result with Hungarian method.

**Subject Classification:**[2010] 90B06, 90B80, 11A07

**Keywords:** Transportation Problem, Assignment Problem, Congruence

## 1 Introduction

Though the theory of Transportation problems generally evolved during the world war II, origin of its roots are right from the 400 B. C. or from 3500 B. C. after wheel was invented in the Middle East of Asia ([4],[8]). On the other hand the origin of an assignment problem were discovered by the great mathematician Carl Gustav Jacobi in 19<sup>th</sup> century. Whenever one think of an assignment problem the first case come into our mind ([4],[7],[8]) is transportation problem in which the objective depends upon available resources which were depending upon machines with different efficiency of performing job. The assignment problem tells us that ([4],[8]) How should the assignment be made so as to optimize the given objective? this is because the assignment problem has varying degree of efficiency for performing different activities. Therefore cost, profit or time of performing different activities is different ([4],[8]).

To overcome this difficulty it is interesting to modify the given transportation problem as number theoretic approach using the congruence relation. We know that, the congruence relation  $a \equiv b \pmod{m}$  is an equivalence relation [3] which tells us that  $m \mid (b - a) \Leftrightarrow a \equiv b \pmod{m}$ .

The paper mainly consists of three parts. In first part some basic definitions were given while in second part the algorithm for proposed new method were given. In the third part, this new method along with numerical example were explained. In the fourth part, we have compared the result with Hungarian method along with conclusion.

## 2 Basic Definition

### 1) Transportation:

Let there be 'm' origins  $O_1, O_2, \dots, O_m$  having  $a_i (a_i > 0, i = 1, 2, \dots, m)$  units of avail-

# APBs method for the IBFS of a Transportation Problem and comparison with North West Corner Method

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## Abstract

In this paper, we have given the new method as APBs method for the Initial Basic Feasible solution of a transportation problem by number theoretic / algebraic approach (congruence relation) relation which generally used in algebraic number theory. So, we used this relation for finding penalties in the initial basic feasible solution towards the transportation problems and compare it with North West Corner method and have shown that the new APBs method gives very much good result as compare to North West Corner method.

**Subject Classification:**[2010] 90B06, 11A07, 90B99

**Keywords:** Transportation Problem, Congruence, North West Corner Method

## 1 Introduction

We know that Most of the practical / physical models are transformed into transportation problems which generally include inventory problem, assignment problem, and traffic problem [2]. The transportation problem [1] generally considered as a problems of multi objective (like minimum cost and shortest path) combinatorial approach on the other hand as we know that the transportation problem were first proposed by Hitchcock in 1941.

The standard transportation problems [4] mainly North West Corner Method (NWC), Least Cost Method (LCM) and Vogels Approximation Method having important application in the area of physical distribution i.e. transportation of goods and services from several supply centers to several demand centers. As we saw towards NWC [2], it is an iterative method / procedure which generally used to find out initial basic feasible solution towards the transportation problems like Least Cost Method it also takes the cost into consideration but in relative sense.

To overcome this difficulty it is interesting to modify the given transportation problem as number theoretic approach using the congruence relation. We know that, the congruence relation  $a \equiv b(mod m)$  is an equivalence relation [3] which tells us that  $m \mid (b - a) \Leftrightarrow a \equiv b(mod m)$ .

The paper mainly consists of three parts. In first part algorithm for proposed method

## On two – dimensional Generalized fractional Elzaki Tarig Transformations Relation and Convergence

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### Abstract

In this paper, we have extend the newly defined Generalized two – dimensional Elzaki – Tarig transformation to two – dimensional Generalized fractional Elzaki – Tarig transformation and find out its relations with some Two – dimensional fractional integral Transformation. Also, we have studied the convergence and Uniform Convergence of it in the form of theorems.

**Keywords:** Fractional Integral Transformations, Convergence, Two dimensional Integral Transformation

**Mathematics – Subject Classification 2010:** 26A33, 40A10

### Introduction

The theory of fractional calculus [5] plays an important role in the field of artificial intelligence, CFD, Quantum Calculus, Financial Mathematics and fractional Graph Theory while the theory of modern integral transform [6, 7, 8, 9] which includes Laplace, Fourier, Mellin, Hilbert, Wavelet, Chirplet, Weirstrass, Laplace – Carson, Laplace – Stieltjes.

In the recent years, fractional linear and Non – linear differential equations becoming more and more applicable to all the modern era [6, 7] which can be solved by various methods including Adomain decomposition method, Analytical method, Numerical method, successive approximation method, and integral transform method [1, 6, 7, 8, 9, 11]. The Elzaki – Tarig transformation [10] which has simple relationship with Laplace transformation is convenient mathematical tool for solving fractional



## Ameliorating effect of L-Ascorbate on protein and ascorbic acid content in different tissues of freshwater bivalve *Lamellidens marginalis* (Lamarck) on exposure to Lambda-cyhalothrin

Goswami, D.B.<sup>1</sup> and Bhalla, R.<sup>2</sup>

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### Abstract

In the present investigation, *Lamellidens marginalis* the freshwater bivalves were treated with Lambda-cyhalothrin (0.75 ppm LC 50/10 value) alone and along with L-ascorbic acid (50 mg/L) chronically for 21 days. The values of protein and ascorbic acid were determined in the mantle, foot, gills, digestive glands, gonads, whole body of the *Lamellidens marginalis* on treating with Lambda-cyhalothrin alone and along with L-Ascorbic acid (50 mg/L). The values of protein and ascorbic acid observed in all soft body tissues of *Lamellidens marginalis* were found to be decreased remarkably as compared to the values observed in animals kept in controlled environment. The amount of protein was observed maximum (45.5268 mg/L) in foot and minimum (27.2648 mg/L) in digestive glands of the freshwater bivalve. The amount of ascorbic acid was observed maximum (0.8851 mg/L) in digestive glands and minimum (mg/L) in foot of the freshwater bivalve. The depletion of amount of protein and ascorbic acid was observed less in animals exposed to Lambda-cyhalothrin along with 50 mg/l ascorbic acid. In the present investigation it was observed that the percent protein and ascorbic acid concentrations recovered fast on 7<sup>th</sup>, 14<sup>th</sup> and 21<sup>st</sup> days in the mantle, foot, gills, digestive glands, gonads, whole body tissues of *Lamellidens marginalis* on exposure to ascorbic acid than only treating the animals in the normal fresh water. This study determines that the L-Ascorbic acid has curative and protective properties against the severe damages may be caused by the Lambda-cyhalothrin.

**Key words:** Ascorbic acid, *Lamellidens marginalis*, Lambda-cyhalothrin, protein

### Introduction

The freshwater bivalves found in natural environment play an important role in being a good source of food to the human population at large and the other aquatic organisms and also aquatic birds throughout the world in all water bodies (Malathi and Thippeswamy, 2013). For the development of the cities and countries there is a tremendous increase in the mechanised activities like siltation, construction of dams, chemical harvest and increasing level of pollution the number of freshwater bivalves is decreasing tremendously. Jaykumar *et al.* (2008) observed that exposure assessment of non-target animal populations like mussels, the excellent indicator organisms is essential to understand the potential effects of environmental contaminants. The pesticide Lambda-cyhalothrin is posing a potential threat to

aquaculture in developing countries. Lambda-cyhalothrin results in systemic intoxication when absorbed through the respiratory mucous membrane of aquatic organisms and proves to be highly toxic. This intoxicant interacts with certain membrane receptors, protein and ascorbic contents in the body of organisms and cause harmful effects by disturbing the physiological and biochemical processes and resulting into damage of different vital organs. Some animals, usually synthesize their own vitamin C and is highly concentrated in their liver part whereas other organisms have to take it as a supplement or through the external source through like Indian gooseberry, citrus fruits, green leafy vegetables as rich source of vitamin C. The requirement of vitamin C, as an antioxidant in the body is very less as it is required in micrograms but it is very essential for synthesis of collagen, maturation of RBC's maturation and detoxification of drugs with aromatic rings. Ascorbic acid is a potent reducing antioxidant agent, helps to fight bacterial infections, detoxification reactions, helps

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## QUANTITATIVE ANALYSIS OF CASIEN BY PRECIPITATION FROM THE VARIOUS MILK POWDER SAMPLES & DETECTION OF METALS IN MILK POWDER SAMPLES

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### **ABSTRACT**

The present research deals with the separation of casein from milk samples from various commercial milk samples of cow, buffalo and goat milk. The milk samples were analysed in laboratory for casein estimation by commercial precipitation method. Further the samples were further processed for inorganic qualitative analysis to investigate the various metals present in the milk samples by routine chemical analysis. After qualitative analysis of these milk samples, these three samples viz. cow, buffalo and goat milk samples were investigated by Energy Dispersion Spectroscopy (EDS) technique, to get the exact composition of metals present among these samples. From EDAX analysis it was observed that the cow, buffalo and goat milk samples contain large of transition metals in various concentration. The transition metals observed in these samples are Cr, Mn, Ni, Fe, Zn, Co, Cu & Cd. Further more the qualitative investigation of milk samples

was investigated to find out the casein present in the various milk samples. From this investigation it was found that the cow milk samples contain 7.8 g of casein, the buffalo milk sample contains 4 g and goat milk sample contains 6.4 g of casein. From overall comparison it can be seen that cow milk sample contains more percentage of casein in contrast to buffalo and goat samples.

**KEYWORDS:** Milk powder, casein, EDS, qualitative and quantitative estimation.



**Enhanced Photocatalytic Activity of Two Dimensional Graphitic carbon nitride:  $C_3N_4@Co_3O_4$  Core shell nanocomposite for Discriminatory Organic transformation of CF dye under Hg-vapor reactor**

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**Abstract**

In the present investigation the material  $Co_3O_4$  nanoparticles were prepared by co-precipitation method, while graphitic carbon nitride ( $g-C_3N_4$ ) was prepared by direct heating of melamine. The nanocomposite  $g-C_3N_4-Co_3O_4$  were prepared by stoichiometric mixing and direct heating in porcelain boat followed by calcination. The prepared nanomaterials were characterized by various techniques. These both materials were characterized by XRD to get structural parameters and to confirm the average particle size of prepared nanomaterial. The scanning electron microscopy (SEM) was carried out to get surface characteristics of prepared materials. The energy dispersive spectroscopy was conducted to get elemental composition prepared material  $Co_3O_4$  and  $g-C_3N_4-Co_3O_4$ . The transmission electron microscopy (TEM) was conducted to get lattice information of prepared



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BET;  
Carbol Fuchsin (CF) dye;  $g-C_3N_4-Co_3O_4$  nanocomposite; photocatalysis; VSM.

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## **Antibacterial Applications of Biosynthesized AgNPs: A Short Review (2015-2020)**

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### **Abstract**

Bacterial resistance to a wide spectrum of antimicrobial medicines has evolved as a major public health concern. Antibiotics are medications that are used to kill microorganisms that could cause serious illness or death. Nanotechnology has exploded as a significant and appealing field of research, with innovative features and functionalities in a variety of fields. Silver is a versatile antibacterial and anticancer medicinal agent in the form of nanoparticles. Silver Nanoparticles (AgNPs) have been implicated in a wide variety of medicinal benefits. This review article addresses antibacterial applications of biosynthesized AgNPs that have been researched over the last decade. AgNPs' antimicrobial potential against a variety of bacterial agents is discussed.



### **Article History**

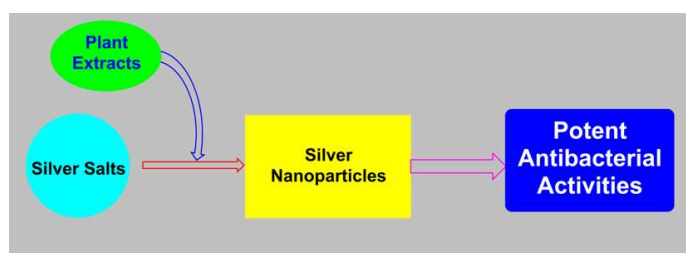
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### **Keywords**

Antibacterial;  
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Medicinal;  
Silver Nanoparticles.

### **Graphical Abstract**



### **Introduction**

Thinking about the commonness of different diseases, infections brought about by any type of

microorganism ought not to be messed with; they can go through fundamental changes and cause serious medical problems. Antimicrobial resistance

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## SONOCHEMISTRY: SULFAMIC ACID CATALYZED GREEN SYNTHESIS AND CHARACTERIZATION OF SOME $\beta$ -AMINO CARBONYL LIGANDS CONTAINING CHLORO SUBSTITUENT

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### ABSTRACT

In this article, a multicomponent reaction of aromatic ketone, aromatic aldehyde, and aromatic amine that results in the formation of  $\beta$ -amino carbonyl ligands using a Sonochemical method is described. Sulfamic acid, a green and environmental friendly catalyst, catalyzed the reaction. There was no side products produced during the reactions. The present study highlights a fast reaction time, the use of a catalyst, a non-toxic process, simple procedure, and quick product separation. On the basis of  $^1\text{H}$  NMR spectral analysis, the structures of the synthesized compounds were verified.

**Keywords:**  $\beta$ -amino carbonyl ligand, Aromatic ketone, Aromatic aldehyde, Mannich reaction.

### 1. INTRODUCTION

Multicomponent reactions (MCRs) are reactions in which three or more components are interacted to produce preferably one product that includes all of the initial reactants' essential components. By reducing the number of synthetic steps, energy use, and waste generation, MCRs help to meet the requirements of an environmentally friendly procedure [1-10]. As a result, discovering new MCRs and building on those that already exist, is of great interest. The Mannich reaction, for example, is used to produce  $\beta$ -amino carbonyl compounds [11]. The development of carbon-carbon bonds is essential for the formation of organic compounds, and there has recently been a lot of research in this field [12-16]. The Mannich reaction is important in the formation of a broad range of organic molecules [17-24]. The Mannich reaction, which yields industrially and biologically essential  $\beta$ -amino carbonyl compounds, is a classic method for preparing  $\beta$ -amino ketones and aldehydes.

The classical reactions encounter a variety of significant shortcomings, including harsh reaction conditions, extreme side reactions, substrate limits, costly reagents or catalysts, as well as a long reaction performance and low yield. Researchers are working to build eco-friendly ways to address the disadvantages of many conventional methods [25-32]. Sulfamic acid has recently emerged as

a potential alternative for a variety of acidic catalysts [33-37]. In the present paper, a facile and efficient method for preparation of  $\beta$ -amino carbonyl compounds by Mannich reaction of acetophenone with aldehyde and aromatic amines in presence of sulfamic acid by Sonochemical approach has been presented.

### 2. MATERIAL AND METHODS

#### 2.1. General Remarks

The AR grade chemicals were purchased and used as received. The reactions were monitored by using thin-layer chromatography on Merck Aluminium TLC plate, silica gel coated with fluorescent indicator F254. Prior to use, all of the glass apparatus were washed and dried in the oven. Solvents were distilled before use.

#### 2.2. Synthesis procedure

To an equimolar mixture (0.01mol) of acetophenones (1), aromatic aldehydes (2), and aromatic amines (3) in conical flask, catalytic amount of sulfamic acid was added. To this mixture, 15 mL methanol solvent was added. The mixture was subjected to ultrasound irradiation until the completion of product. The reaction was monitored by TLC. The crude products were recrystallized from ethyl acetate. The structures of the synthesized compound were affirmed on the basis of  $^1\text{H}$  NMR spectral analysis.



## Screen Printing Strategy for Investigation of Spectrophotometric Properties of Modified Thick Films of Zirconium Oxide (ZrO<sub>2</sub>): Tin Oxide (SnO<sub>2</sub>) Composites

Volume 37, Number 5

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### ABSTRACT:

There are numerous methods has been investigated and developed for the preparation of thin and thick films. Thick film technology is utilized for the production of electronic devices like surface mount devices, in the preparation of hybrid integrated circuit, in the formulation of heating elements, in the construction of integrated passive devices and sensors. Pure tin oxide (SnO<sub>2</sub>) and composite 1%, 3%, 5%, 7% and 9 % zirconium oxide (ZrO<sub>2</sub>) thick films of dimensions 2 cm×1 cm incorporated into pure tin oxide (SnO<sub>2</sub>) were prepared with standard screen printing method. All samples were fabricated on glass support. The thick films were subjected to drying and firing at 5000C at 5 hours in muffle furnace. Thick films of tin oxide (SnO<sub>2</sub>) and composite 1%, 3%, 5%, 7% and 9 % zirconium oxide (ZrO<sub>2</sub>) incorporated into pure tin oxide (SnO<sub>2</sub>) were checked for Scanning Electron Microscopy (S.E.M), Energy Dispersive X-ray Spectroscopy (E.D.A.X), X-ray diffraction (X.R.D), Fourier Transform infra-Red (F.T.I.R) and Ultra-Violet-Visible spectroscopy (U.V) for surface morphology, elemental analysis, crystalline phases of films, vibrational and spectrophotometric study respectively. In this research paper the spectrophotometric parameters such as absorbance and absorption coefficient with pure and compositional thick films were a part of investigation and surveillance.

### KEYWORDS:

Absorption Coefficient; Electronic Devices; Morphology; Thick Films; Tin Oxide

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### Introduction

Thick film technology is more precisely and popularly called printed and fired technology. The principle of thick film technology includes the resistive, conductive, insulating pastes containing glass frit, deposited in patterns defined by screen printing and fused at high temperature on



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## Impact of COVID-19 On Higher Education in Maharashtra

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### Abstract :

*The COVID-19 the deadliest pandemic covered a whole world and every sector of human life. Due to increasing number of COVID-19 infections, we were forced under lockdown situation for nearly 3 months in the year 2020. This year also many states are declaring complete lockdown including Maharashtra due to second wave of COVID-19 in India. The Covid-19 impacted not just the health of the human being but also impacted on many other activities such as employment, agriculture, industries, trade and transport and education. The objectives of the research paper are to know the situation of higher education in Maharashtra before COVID-19 and to assess the impact of COVID-19 on higher education in Maharashtra. Primary and secondary data has been collected for the research work. The responses were collected from various stakeholders such as students, teachers, parents, administrators, common people, etc. The COVID-19 pandemic drastically changed the overall higher education system in Maharashtra. The teachers and students used various social media apps such as WhatsApp, Telegram, etc. for teaching - learning process. Students from rural areas do not have smartphones and they don't afford to purchase the same. The evaluation system also changed in lockdown situation. Teachers developed their skills of information technology, handling of electronic gadgets, use of several apps and softwares for developing the E-content.*  
*Keywords: COVID-19, Lockdown, Higher Education, Maharashtra, Online Classes, Online Examinations, E-content, digital tools*

### Introduction:

The COVID-19 the deadliest pandemic covered a whole world and every sector of human life. It has emerged in the year 2019 in Wuhan, China. Due to increasing number of COVID-19 infections, we were forced under lockdown situation for nearly 3 months in the year 2020. This year also many states are declaring complete lockdown including Maharashtra due to second wave of COVID-19 in India. The health situation is becoming more and worse in India. The Covid-19 impacted not just the health of the human being but also impacted on many other activities such as employment, agriculture, industries, trade and transport and education. The lockdown declared in the year 2020 drastically affected the education sector not just in India but in the whole world.

According to UNESCO, around 1.3 billion learners across the world were not able to attend school or university as of March 23, 2020, and current UNESCO statistics put this figure at over 1.5 billion (McCarthy, 2020). In India, all academic activities were suspended after the announcement of the University Grants Commission (UGC) on 19 March to postpone examinations in all universities until the end of March. All the central universities announced to defer all academic activities and close their hostels, and even private declared the summer vacation for students. (Crawford et al., 2020)

In Maharashtra the state government declared strict rules and complete lockdown as the COVID-19 pandemic situation is more critical than the surrounding states. Hence the schools, colleges, educational institutes get severely affected in the state. Every steps starting from



# A Review on: Renewable Energy Sources and Generation of Photovoltaic Solar Technology

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**Abstract:** With expansion of global energy consumption and environmental pollution, traditional fossil energy sources and greenhouse gases cannot reach the imperishable development of human society. The usage of clean, renewable energy sources has become a mere essential for the development of human society. Solar energy, energy wind, biomass, tidal, and geothermal energy, are eco-friendly and emerging as an alternate source of energy. Among a variety of new energy technologies, solar power is most abundant, inexhaustible and one of the most promising technologies. Solar photovoltaic technology is one of the renewable technologies, which has a potential to shape a clean, reliable, scalable and affordable electricity system for the future. This article provides a comprehensive review of solar photovoltaic technology. Over the past four decades silicon solar cells have advanced tremendously both in terms of photovoltaic material and efficiency. The working principles of photovoltaic materials have also been discussed.

**Index Terms:** Solar Cells, Photovoltaic Devices, Photovoltaic materials, photovoltaic efficiency.

## 1. Introduction:

### 1.1 Overview of solar cell:

A solar cell is a device that converts light energy directly into electrical energy via photovoltaic effects. The French physicist Becquerel discovered the photovoltaic effect in 1839. British scientists John Couch Adams in 1876, found that a selenium semiconductor could produce electricity when it was radiated under sunlight. The first working solar cell was successfully developed by Charles Fritts in 1882. It was made of thin sheets of selenium and coated with gold. The use of solar panels for generating electricity and heat seems relatively like new development, it has actually been widely used to generate power since early 1900 [1]. A practical photovoltaic cell was developed in 1954 Bell laboratory mass produced the first crystal silicon solar cell. The Bell PV converted 4% of the sun's energy into electricity at a rate that was considered the cutting edge in energy technology. Their scientists Daryl M. Chapin constructed a silicon-based solar cell with an efficiency of 6% [2, 3]. Solar energy has encountered an amazing technological move. Initially solar technologies consisted of small-scale photovoltaic cells, now solar technologies are represented by solar concentrated power and large-scale photovoltaic systems with solar photovoltaic panels [4].

Since then the quest for new materials that would offer an improved efficiency continued. Most of the semiconductor materials that researchers targeted had a bandgap of 1.0 eV or more, so that visible range of solar spectrum is absorbed for conversion to electricity. Shockley and Queisser developed a single-junction solar cell which could reach a maximum efficiency of 30% for a semiconductor with a band gap of 1.12 eV; this value matches with the band gap of silicon [5].

### 1.2 Currently implemented renewable energy sources:

About 80% of the world's energy requirement is currently satisfied by exhaustible fissile fuels that have harmful effect on human health and the environment as well, the global energy demand is predicted to double in upcoming decades [6]. Figure 1 shows percentage segregation of all India installed power generation capacity. It is well-defined that increasing energy needs, rapid decrease in energy sources from fossil fuels, and urgent requirement to protect the environment for the future generations, gives rise to the search for eco-friendly and renewable energy sources more than ever. Abundant use of conventional, non-renewable fossil fuels resources has been a major cause behind degradation of the environment such as global warming, acid rains, increase in carbon dioxide content in the environment, smog, etc. Green energy resources such as solar, wind and tidal, and hydropower offer replacement to the fossil fuels so that the usage of conventional source of energy can be constricted.



# Annealing Effect on Structural, Morphological and Electrical Properties by Screen Printed Bunsenite NiO Thick Films.

Ujwala m. Pagar, U. P. Shinde

**Abstract:** Thick films of NiO deposited on glass substrate by screen printing technique. The nano powder of AR grade NiO was used for the preparation of thick films. The X-ray diffraction (XRD), Scanning Electron Microscopy and Electrical Characterization was carried out for unannealed and annealed films. The annealed films were at 250 °C-400 °C in a muffle furnace. Using characterisation techniques, the success of the synthesised nanoparticles was confirmed. The x-ray diffraction was used for structural characterization which confirms the polycrystalline nature of the films with cubic structure. From the SEM analysis the films show uniformity, roughness, large crystals and agglomeration of particles. The SEM-EDS analysed morphology and chemical compositions. The correlations between structural and morphological properties are reported. The D.C. resistance of the films was measured by half bridge method in air atmosphere at 30°C to 350°C. From the electrical parameters the NiO films shows semiconducting nature. The TCR, activation energy and sheet resistivity, specific surface area were calculated at different annealing temperatures. The electrical conductivity at room temperature was calculated as  $4.56 \times 10^{-4} (\Omega \cdot m)^{-1}$ .

**Keywords:** NiO, Thick Films, XRD, SEM-EDS, TCR, Activation energy, Electrical conductivity.

## I. INTRODUCTION

Nickel oxide (NiO) is an attractive material due to its chemical stability. It is forming with nickel metal and oxygen element; it has cubic structure with lattice parameter ( $a = 0.4816$  nm) [1-4]. Nickel oxide (NiO) is low-cost material, it is applicable in several application areas such as a catalyst, TCO, photo detectors, gas sensors, photovoltaic devices, electrochemical super capacitors, heat reflectors, photo-electrochemical cell, solar cells and many opto-electronic devices [5-7]. The specialized applications of Nickel (II) oxide (NiO) include, production of alloys, in ceramic industry for making frits, ferrites and porcelain glazes, as a catalyst for chemical and biological sensors. NiO is a basic component in Nickel-iron battery and in fuel cells. The NiO nanoparticles possess distinctive properties such as large surface to volume ratio, low porosity, high dispersion rates, high photo-absorption and low heat capacities. The NiO nano particles exhibit the NaCl-type cubic crystalline structure.

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Bunsenite is an environmentally friendly material having p-type semiconductor metal oxide with a wide band gap ranging from 3.6 to 4.0 eV [8]. After doping with foreign elements in NiO, it shows optical, structural and electrical properties. The reduction of particle size to nanometre scale compared with their bulk properties shows interesting properties [9]. Non stoichiometric nickel oxide is a good p-type semiconductor owing to its defect structure [10]. The applications of Nickel oxide (NiO) found in semiconductors, capacitor-inductor devices, tuned circuits, transparent heat mirrors, thermistors and batteries, micro-super capacitors, and temperature sensing devices. The nickel oxide thin films have been prepared using various techniques including thermal evaporation, spray pyrolysis, chemical vapor deposition, electrochemical deposition, sol-gel sputtering, Screen printing technique, chemical solution deposition etc. All these methods have different advantages depending on their applications. Among these different methods for film deposition, the relatively simple and inexpensive method is screen-printing technique. The effect of annealing on structural, morphological and electrical properties were investigated [11]. The aim of this work is to evaluate the annealing effect on structural, morphological and electrical properties of NiO thick films deposited by simple screen-printing technique.

## II. MATERIALS METHOD AND MEASUREMENTS

The commercially available AR grade Nickel Oxide nano powder was used for preparation of thick films. The chemicals other than NiO power required for preparation of thick film are acetone, B.C.A., ethyl cellulose etc purchased from Modern Lab. Nashik etc. The X-ray diffraction (XRD) spectra of the NiO were measured to verify the structure.

The X-ray diffraction patterns of all the samples are recorded for analysis purpose. They were plotted using Bruker D8 advance diffractometer, Germany with  $\text{CuK}\alpha$  ( $\lambda = 1.54 \text{ \AA}$ ) radiations operated at 40 KV and 40 mA in the scanning range of ( $2\theta$ ) between  $20^\circ$  and  $80^\circ$ .

Chemical composition and surface morphology observed using a scanning electron microscope, SEM-JEOLJSM-6360A with OXFORD EDAX attachment. For electrical characterization simple half bridge method was used.

### A. Preparation of thick films of Nickel Oxide nanoparticles

The Nickel oxide based thick film sensor was constructed by standard screen-printing technique.



# Reduced Graphene Oxide Screen Printed Thick Film as NO<sub>2</sub> Gas Sensor at Low Temperature

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**Keywords.** Thick films, Sensitivity, rGO, NO<sub>2</sub>, Morphology.

**Abstract.** Most of the recent reduced graphene oxide (rGO) based sensors shows gas sensitivity above 50° to 150 °C. The present investigation deals with the gas sensing at 50 °C temperature. In the present research work, thick film sensors of rGO were developed on glass substrate by using standard screen-printing technique. The silver paste of rGO was used to make electrodes for contact on thick films for the electrical and gas sensing system. The electrical properties of rGO thick films such as resistivity, activation energy and temperature coefficient were studied. The resistivity of rGO thick films was found to be 84.84 Ω/m. The morphological, elemental and structural properties of rGO thick films were analyzed by SEM, EDS and XRD techniques respectively. The crystallite size of rGO thick films was found as 28.42 nm by using Scherer's formula. The rGO thick films were prepared and exposed to Ethanol, NH<sub>3</sub>, NO<sub>2</sub> and LPG gases to determine sensitivity and selectivity. The sensitivity of NO<sub>2</sub> has been found to be maximum among other exposed gases. The maximum sensitivity of NO<sub>2</sub> gas was 92.55 % at 50 °C found with fast response (~ 11 sec) and recovery (~ 19 sec) time.

## 1. Introduction

In the recent decade, both graphene and reduced graphene oxide (rGO), have gained considerable importance in research due to their unique properties. Graphene is a two-dimensional sheet of sp<sup>2</sup> hybridized carbon atoms [1]. The electrical and thermal properties of rGO are inferior to graphene. During the synthesis of graphene and rGO, precursor consists of a two-dimensional (2D) network of sp<sup>2</sup> hybridized carbon [2, 3]. By using chemical reagent, thermal and multistep reduction process, graphene oxide can be reduced to rGO form. The reduction of graphene oxide makes effect on the oxygen of functional groups [1]. Generally, to remove the oxygen from the functional groups, reduction method is used [4]. The electrical properties of the rGO depend on the amount of residual oxygen present in the functional groups [5]. It has been investigated that the graphene oxide and rGO has better optical, mechanical, thermal, catalytic and electrical properties [6, 7]. The advantage of rGO over mono layer defect-free graphene is the presence of dangling oxygen functional groups on the graphene surface and edges.

Both theoretical and experimental results reveal that tuning of the oxygen functional groups on rGO plays a vital role in the detection of several organic compounds. Experimentally, oxygen functional groups can be tuned by adjusting the reduction time, the type of reducing agent and the environment of reduction process. The rGO with a high number of oxygen functional groups produced in a short reduction time shows a faster response to analytes. Due to the excellent properties of rGO, it is used in different applications in the field of nano-electronics like semiconductor devices [8,9], energy storage devices [10], biomedical applications, optical and gas sensor [11, 12].

In recent studies, researchers are focusing on the preparation of thick and thin films of rGO. For the preparation of rGO thin films, sol gel, epitaxial growth [13], spray pyrolysis method [14], chemical and physical vapour deposition methods are used. These methods are very expensive and time

# Potentiometric Taste Sensing Using Reduced Graphene Oxide Screen Printed Electrodes

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This paper reports the development of simple and economical reduced graphene oxide (rGO) based screen-printed electrodes (SPE) for five basic taste sensing applications. Twenty different test solutions for the five tastes of salty, sour, sweet, umami, and bitter at 1 ppm, 10 ppm, 100 ppm, 1000 ppm concentration levels were tested with the fabricated SPEs. From experimental results, electrical signals generated between the electrode and test solution interface were measured using the potentiometric method. Satisfactory potentiometric responses of SPEs to different ppm concentrations for each sample were used to analyze the sample data. Histogram using the statistical tool was used to analyze the changes in the conductivity response. A multivariate Principal Component Analysis (PCA) statistical tool correlated using loading plots between variables and factors of all the five basic tastes. The plot showed the interrelation between variables and test samples. The obtained experimental results from these rGO based SPEs make them suitable for their use in taste sensing applications such as for any taste disorder disability, food-producing industry, pharmaceutical industries, etc.

**Keywords:** Basic Taste, RGO, SPEs, Conductivity, PCA.

## 1. INTRODUCTION

Human being has natural ability to differentiate five basic tastes viz: sour, salty, sweet, umami and bitter and communicate very important data regarding the taste disorder disability, if any. The human tongue consists of thousands of taste buds in his tongue. The taste is a particular nerve signal that is produced by the various taste cells on the taste cells later specific molecular simulation [1–3]. In recent years, taste disorder is the main issue occur with the individual. Even though a typical individual beginning losing taste buds due to aging, there are different reasons like radiation treatment, respiratory infections, and medical actions close to the head or neck [4–6].

In the present era, an electronic tongue (e-tongue) has become a famous advancement for taste detection [7, 8]. A complex framework had been creating which reproduces the elements of a tongue. Even though the e-tongue offers critical working as a customary tongue, there are

sure weaknesses that are convincing analysts to five elective alternatives. Beginning from the significant expense to build up the construction [9], the general design is unpredictable [10] making it hard to bear for monetarily obliged patients [11, 12]. Additionally, the re-convenience of the sensor restricts the adsorption of the test solutions on the particular detecting surface [13].

In this manner, it is attractive to create elective choices that could be utilized as taste sensors [14–20]. Taste is a form of chemoreception therefore chemo resistive sensors can be good taste sensors.

Chemo resistors have high detection accuracy; detection conditions are relatively simple and are low-cost devices [21]. Reduced graphene oxide (rGO) was considered a good electrode material for biosensing applications due to its exceptional electric conductivity, strong mechanical strength, and higher surface area. So, we have used thermally produced rGO. Due to thermal treatment, most of the oxide groups of rGO were removed and conjugated sp<sup>2</sup> carbon linkage was re-established. As a result, the rGO has increased electrical conductivity. Thus, the prepared

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# STRUCTURAL CHARACTERIZATION AND GAS SENSING PERFORMANCE OF TiO<sub>2</sub> METAL OXIDE SEMICONDUCTOR FOR NO<sub>2</sub> DETECTION

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## Abstract

In this study, a highly sensitive nitrogen dioxide (NO<sub>2</sub>) gas sensor based on titanium dioxide nanocrystals (TiO<sub>2</sub>-NCs) was successfully fabricated using a Screen Printing method. The structure of the sensor film was investigated using scanning electron microscopy, X-ray diffraction, energy-dispersive X-ray spectroscopy, and transmission electron microscopy. The sensor properties were also investigated. We found that the TiO<sub>2</sub>-NCs sensor showed excellent selectivity and high sensitivity down to 100 ppm of NO<sub>2</sub> at with rapid response and recovery times of 35s to 40s, respectively. Additionally, the TiO<sub>2</sub>-NCs displayed good repeatability and selectivity against various interfering gases such as NH<sub>3</sub>, H<sub>2</sub>S, and Ethanol. We propose a possible mechanism for NO<sub>2</sub> sensing by the TiO<sub>2</sub> sensor.

Gas response measurements to various gas ppm (100 to 1000 ppm) were carried out by varying operation temperatures ranging from 30 - 400°C. The sensor showed a prominent response towards NO<sub>2</sub> at 200 °C.

**Key Words:** : Nitrogen Dioxide, Gas Sensor, Titanium Dioxide, Sensitivity, Selectivity, XRD

## 1.INTRODUCTION

Titanium dioxide or titania (TiO<sub>2</sub>) was first produced commercially in 1923. The bulk material of TiO<sub>2</sub> is widely nominated for three main phases of rutile, anatase and brookite (Kim *et al.*, 2005). Among them, the TiO<sub>2</sub> exists mostly as rutile and anatase phases which both of them have the tetragonal structures. However, rutile is a high-temperature stable phase and has an optical energy band gap of 3.0 eV (415 nm), anatase is formed at a lower temperature with an optical energy band gap of 3.2 eV (380 nm) and refractive index of 2.3 (Brady, 1971).

TiO<sub>2</sub> nanostructures such as nanoparticles, nanowires, nanosheets, and nanotubes have attracted much attention for a range of electrochemical applications such as photocatalysts, battery, and solar cells because of their good photo- and electrochemical-activities, low costs, and good physicochemical stability. For gas sensor applications, it has been reported that TiO<sub>2</sub> with a large surface area shows good sensing properties to CO, H<sub>2</sub> and NO<sub>x</sub>. The important feature of TiO<sub>2</sub>-based gas sensors is that they can be operated at high temperature because of the good chemical stability of TiO<sub>2</sub>. For semiconductor gas sensors, the porosity of sensing films is an important parameter; porous sensing films can facilitate gas diffusion deep inside of the films and give high gas sensitivity. In particular, the microstructure control is important to detect large organic molecules like toluene gas. Also, there has recently been a strong demand for a compact gas sensor capable of detecting various organic gases due to the increasing need for air quality monitoring in the environment and the workplace.

Nitrogen dioxide (NO<sub>2</sub>) is a dangerous air pollutant for plants and for the human and animal respiratory systems [1]. In addition, NO<sub>2</sub> emission has caused serious pollution problems including acid rain and photochemical smog [2]. To detect NO<sub>2</sub> emission from automotive vehicles and industrial processes, the development of inexpensive, compact, sensitive, and reliable gas sensors to monitor and control NO<sub>2</sub> gas concentrations is crucial to protect human lives [3-4].

In recent years, different sensing techniques have been used for the detection of NO<sub>2</sub> gas including absorption spectroscopy, electrochemical, optical, acoustic, chromatographic methods and



# Sensitivity of screen printed WO<sub>3</sub> thick film chemiresistance gas sensor with alteration in firing temperature

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**Abstract:** The main aim of the study was to find the effect of firing temperature on the nature of tungsten trioxide thick film prepared by screen printing process for gas sensing application. X-Ray diffraction is used to examine the phases formed after firing. XRD result shows a mixture of monoclinic, orthorhombic phases of WO<sub>3</sub> in the range 600°C-800°C. The morphology was analyzed by SEM-EDS. The D.C. resistance of the films was measured by half bridge method in air atmosphere in 30°C to 450°C temperature range. The WO<sub>3</sub> films showed semiconducting nature. The temperature coefficients of resistance, activation energy, sheet resistivity and surface area to volume ratio of films were assessed at different firing temperatures. Surface area to volume ratio decides the gas sensing property of the film. The cause of the enhancement of gas sensitivity of the sample for target gas with high surface area to volume ratio was also discussed. Gas sensing property ameliorates for greater ratio. Film fired at 600°C has maximum ratio hence found to be suitable for gas sensing.

**Keywords:** WO<sub>3</sub>, screen printing, SEM, XRD, resistivity.

## 1. INTRODUCTION

Air, a nature's gift and a valuable asset is one of the most important elements of environment which is freely available for our survival. Unfortunately, due to industrialization it is far from pure at the moment. Ironically, although industrialization has improved human lives on one hand; on the other hand it is adversely affecting the human health due to pollutants from industrial emissions, exhaust gases from the vehicles and aircrafts etc. Land vehicles use oil and fuel which create smoke which gets mixed with air and thus pollutes air. A number of physical activities (volcanoes, fire, etc.) may liberate different pollutants in the nearby area; anthropogenic activities are the major cause of environmental air pollution.

Thus, there is a need of gas sensors to measure the pollution level in the atmosphere so that the appropriate steps can be followed to control the pollution. In addition, to protect against the unwanted incidence of fire or explosion, the flammable gases need to be regulate for useful purpose. Thus development of reliable, low cost, low power gas sensors with better sensitivity and selectivity towards specific gases is growing demand of research.

The development of MOS gas sensors started from the work of Brattain and Bardeen in the late 1940s [1-3] who clarified that the resistance of semiconductors was very sensitive to adsorption of gas molecules present nearby the sensing element. They described the effect of the ambient atmosphere upon the electrical conductance. Just after the discovery of sensing process Seiyama et al. in 1962 practically proved the effect of ambient gases on conductivity of ZnO films. The sensitivity was found to be maximum at 300°C [4]. In 1970 Taguchi demonstrated that SnO<sub>2</sub> was sensitive to the reactive gases in the atmosphere [5-7]. Since then, for gas-leak indicator, process control, pollution control, etc. semiconductor gas sensors have been extensively used as domestic and industrial gas detectors. Compared to the organic (such as phenanthrene, polybenzimidazole) and elemental (such as Si, Ge, GaAs, GaP) semiconductors, semiconductor oxides have been more successfully employed as sensing materials for the detection of different gases, such as CO, CO<sub>2</sub>, H<sub>2</sub>, alcohol, NH<sub>3</sub>, O<sub>2</sub>, NO<sub>x</sub>, etc. Both p-type and n-type semiconductor oxides can be used as gas sensor materials. For the development and study of solid state gas sensor, vast amount of literature was developed.

Various semi conducting metal oxides SnO<sub>2</sub> [8-9], ZnO [10-11], WO<sub>3</sub> [12, 13], In<sub>2</sub>O<sub>3</sub> [14]; catalytic oxides V<sub>2</sub>O<sub>5</sub> [15], MoO<sub>3</sub> [16], CuO [17], NiO [18] and mixed oxides lanthanum ferrite: LaFeO<sub>3</sub> [19], zinc ferrite: ZnFe<sub>2</sub>O<sub>4</sub> [20], Barium titanate: BaTiO<sub>3</sub> [21] and CdSb<sub>2</sub>O<sub>6.5</sub> [22] have been studied for gas detection and many more new oxides are currently being explored.

For the detection of toxic, pollutant gases, combustible gases and organic vapours metal oxide semiconductors have been used enormously. It is reported that tungsten oxide (WO<sub>3</sub>) films have promising optical & electrical properties. WO<sub>3</sub> is an n-type semiconductor. The band gap of WO<sub>3</sub> is about 2.6 -2.8 eV [23]. WO<sub>3</sub> has perovskite-type ABO<sub>3</sub> lattice in which 'A' site remains unoccupied. The WO<sub>3</sub> is considered as oxygen-deficient or nonstoichiometric oxide has many oxidation states i. e. 2, 3, 4, 5 and 6. C. V. Raman proved the phase transformations in the WO<sub>3</sub> films by annealing in the TEM column at 30°C to 500°C [24]. The crystal structure of tungsten trioxide is temperature dependent, shows five phase transitions in accordance to the following sequence: triclinic from -50°C to 17°C, monoclinic from 17°C to 330°C, orthorhombic from 330 to 740°C and It is tetragonal above 740°C. An intermediate meta-stable form of WO<sub>3</sub> is hexagonal tungsten trioxide. Such electronic properties make the tungsten oxides suitable for gas sensors [25].

The working principle involves the receptor function controlled by the surface of each oxide grain and the transducer function controlled by each grain boundary. The third factor, utility, determines the effective utilization of surface and bulk grains for the ambient gas response [26].



# ELECTRICAL AND GAS SENSING PROPERTIES OF Cd-DOPED $\text{SnO}_2$ THIN FILMS USING PVD TECHNIQUE

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**Abstract:** Tin oxide has been a very promising material due to its properties like mechanical hardness, stability to heat treatment etc. Addition of impurities (dopants) improves the film quality as well as their chemical properties. In this paper, the preparation of cadmium doped tin oxide, their properties like electrical and gas sensing are explained. The cadmium doped tin oxide thin film samples have been prepared by the Physical Vapour Deposition technique and annealed at 300°C, 400°C and 500°C. Those annealed at 400°C were considered for all further characterizations, since they showed better results compared to those annealed at other temperatures. The so prepared film samples were then characterized for structural, morphological and electrical characterization for gas sensing. Locally fabricated Static Gas Sensing system was employed to study the electrical as well as gas sensing properties of the film samples. The film samples showed better responses for ethanol vapours over target gases like carbon dioxide, ammonia, chlorine, acetone vapours etc.

**Key words:** Cd-doped tin oxide, doping, PVD technique, gas sensing, Tin oxide.

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## 1. Introduction

Tin oxide is one of the versatile materials for toxic gas sensors [1, 2]. The sensitivity and selectivity of these sensors have been improved by the usage of dopants that spontaneously segregate onto the surface of  $\text{SnO}_2$  nano particles and nano films during the synthesis process [3–5]. One of the advantages of these dopants is that one may activate and control the sensing properties without needing an additional preparation step for a surface coverage, to do so, reducing time and cost of a large-scale sensor production [6]. Doping also improves the quality of film as well as the physical and chemical properties of thin films, in addition to change the charge carrier's concentration of the metal oxide matrix, catalytic activity, the surface potential, the phase composition, the size of crystallites, and so on [7]. Moreover, some studies have already been carried out on the potential sensing activities of Cd-doped  $\text{SnO}_2$  [8–10]. It is established fact that reduction in grain size of a material increases sensitivity [11, 12]. Yamazoe et al. [13] studied effects of additives in semiconductor gas sensors. Tianshu et. al. [14] investigated Cd-doped  $\text{SnO}_2$ -based sensor for the detection of ethanol and hydrogen.

## 2. Deposition of Thin Film Samples:

The film samples were prepared by evaporating tin wire and a lump of cadmium in vacuum chamber at pressure of about  $10^{-5}$  Torr on thoroughly clean glass substrates at room temperature. Vacuum system VS150D was used for the purpose. Pure tin wire and a lump of cadmium were vaporized in tungsten spiral filament by passing an appropriate amount of current through it with the help of a dimmerstat. The so prepared film samples were then annealed at 300°C, 400°C and 500°C. The annealing is usually performed to reduce the intrinsic strain, to improve the lattice mismatch and create longer mean paths for the free electrons in getting better electrical conductivity [15, 16]. Those samples annealed at 400°C are considered for all investigations since they showed better results over those annealed at other temperatures.

## 3. Results and Discussion

Locally fabricated Static Gas Sensing system (Fig. 4) was employed to study the electrical as well as gas sensing properties of the film samples. Although the film samples were rigorously analyzed, only gas sensing with electrical characterizations are considered.

### 3.1 Electrical Properties

Electrical characterizations were carried out in two parts- first by I-V characteristics (Fig.1) and second by variation in sample resistance as a function of temperature (Fig.2 and 3).

Qth



## **Internet use and Addiction Among College Students and its Relation with Personality traits, Loneliness and Psychological Wellbeing**

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### **Abstract**

**Aim:** The aim of the study was to examine the internet addiction and their association with personality traits, loneliness and psychological well-being among college students.

**Settings and Design:** A comparative and correlational study on conventional degree college students in Nashik district, Maharashtra, India. **Methods:** The total sample of 60 college students (30 boys and 30 girls) from various colleges in Nasik city. The age group of the sample was 18 to 22 years.

**Statistical Analysis:** Descriptive and inferential statistical analyses were used. Student's t-test and Pearson product moment correlation has been used for finding gender difference and association between variables. **Results and Conclusions:** The Internet Addiction mean of male ( $M = 58.27$ ) and the mean of female ( $M = 57.90$ ) and the t value is 0.105 was not significant. This indicated that there is no gender difference in internet addiction. The correlation coefficient value between internet addiction and neuroticism is ( $r = 0.642, p < 0.01$ ), internet addiction and extroversion is ( $r = -0.281, p < 0.05$ ) internet addiction and openness to experience is ( $r = 0.259, p < 0.05$ ), internet addiction and agreeableness is ( $r = -0.268, p < 0.05$ ), internet addiction and conscientiousness is ( $r = 0.243, p < 0.05$ ). The Correlation between internet addiction and psychological well-being is ( $r = -0.278, p < 0.05$ ). The correlation coefficient value between internet addiction and loneliness is ( $r = 0.612, p < 0.01$ ) It means there is positive correlation between loneliness & internet addiction.

**Keyword:** *Internet Addiction, Personality Traits, loneliness, Psychological Well-Being and College Students*

### **Introduction**

#### **Internet use and Addiction:**

Internet users may enjoy aspects of the Internet that allow them to meet, socialize, and exchange ideas through the use of chat rooms, social networking websites, or "virtual communities."

IAD leads to anxiety, depression or other mental health or mood disorders, feeling of loneliness, problems in social interaction or support, change that limits social activity or mobility such as moving, job loss, disability or having a baby, High levels of stress.

#### **2) Personality**

Personality can be described as distinctive patterns and specific characteristics of thinking, emotion and behavior which determine the style of interaction with the physical and social environment. Personality traits indicate a relatively stable profile in people's morale.

#### **Allport (1937):**

"Personality is the dynamic organization within the individual of those psychophysical systems that determine his unique adjustment to his environment".

As described in the definitions above it is clear that traits and patterns of thought and emotion make up an important part of personality.

#### **3) Loneliness**

According to APA Dictionary of Psychology, Loneliness means cognitively or emotionally discomfort of perceiving oneself to feel alone or solitary. Loneliness is rather a subjective feeling. Different persons can experience level and duration of loneliness differently.

**Perlman & Peplau (1981):** "Loneliness is a negative emotion that comes about through a discrepancy between desired and achieved levels of social contact"

**In general:** "Loneliness as the distress that results from discrepancies between ideal and perceived social relationships"

#### **4) Psychological Well-being**

Psychological well-being refers to how people evaluate their lives. Carol Ryff was doing pioneering work on the study of psychological well-being. Psychological well-being is a very subjective term but from all the research that has been carried out, the term is used throughout the health industry as kind of a 'catch-all phrase' meaning contentment, satisfaction with all elements of life, self-actualisation (a feeling of having achieved something with one's life)

## **Effectiveness of a Gratitude Intervention in Increasing Gratitude**

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### **Abstract**

The main objective of this empirical research is to test the effectiveness of gratitude increasing intervention on college students. The field experiment carried on one hundred junior and senior college students (fifty percent females) showed that the intervention was efficacious in improving the level of gratitude of the subjects.

**Key words:** Gratitude, gratitude increasing intervention

### **Effectiveness of a Gratitude Intervention in Increasing Gratitude**

#### **Introduction**

"Gratitude is a vaccine, an antitoxin, and an antiseptic." John Henry Jowett, the great British preacher has described the unquestionable value of gratitude in this famous quote. In most of the religions all over the world like Hindu, Buddhist, Muslim, Christian, and Jewish traditions, it is considered as an esteemed human tendency (Emmons et al., 2003). Psychologists also consider gratitude as one of the important virtues and strengths of human being. The positive psychology movement has brought in light many of the human virtues and gratitude is one of them. Eminent positive psychologists Peterson and Seligman have included gratitude in their VIA Classification of Strengths (Peterson & Seligman, 2004) which serves as the antithesis of DSM.

The term originated from the Latin impression of *gratia*, involves the feelings of grace, appreciation and graciousness (Emmons et al., 2003). The definition of gratitude is an emotional state that requires person to acknowledge that he has received some positive outcome from an external source (Emmons and McCullough, 2003). The focus of gratitude is directed toward another person (Emmons and Mishra, 2011). The person may feel grateful for other human beings as well as non-human things. It also involves appreciating the benefits received from others and a feeling of reciprocation for the giver or extend the feeling to others (Froh et al., 2010).

The strong correlations between gratitude and healthy psychological and social functioning (McCullough et al., 2002) makes it even more desirable virtue. As compared to lesser grateful individual, individuals with high gratitude describe themselves as optimistic, vital, higher on life satisfaction and less depressed and not jealous of others. Such people are more helpful, sympathetic, are forgiving in nature. Gratefulness leads to the enhancement in feelings connectedness and of perceived social support (Wood et al., 2008). While describing the blessings of gratitude, Roberts R. C. (2004), states that it eliminates the painful emotions of resentment, regret and envy and protects happiness. Like other positive emotions gratitude also broaden and builds (Fredrickson, B. L. 2004). Armenta et al., (2016) came up with the idea that expressing gratitude leads to the efforts for self-improvement via augmentations in connectedness, elevation, humility and indebtedness. The supportive evidences offered by the researchers make the idea very convincing.

#### **Rationale of the Study**

The rationale behind the present experiment is the malleability of gratitude to the interventions. Considering the psychological and social benefits of gratitude, positive psychologists tried to cultivate gratitude through positive activity interventions. And thankfully previous research has proved that gratitude is malleable to such interventions. Three types of gratitude interventions are used to bring more gratitude in subjects i.e., listing events of gratitude, expressing gratitude in behaviour and thirdly contemplating on gratitude (Rash et al., 2011). Also, there are many psychological benefits of cultivating gratitude. Emmons & McCullough (2003) have found that people keeping gratitude journals were more superior in amount of exercise they are doing, in the level of optimism about the upcoming week and feelings about their lives as compared to the people who kept the journal of stressful life events or neutral events. The subjects maintaining gratitude journal also reported being more enthusiastic, alert and determined. Gratefulness reflection also enhances positive affect (Watkins et al., 2003). In an intervention of eight weeks, Toepfer & Walker (2009) found that subjects from experimental group who wrote three gratitude letters per week showed increase in their level of happiness as well as gratitude.

## Role of REBT in HR Training with reference to COVID-19 Impact

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### Abstract

The COVID-19 Pandemic has massively affected every each sector of human life. Not only routine life has been affected but work culture is currently facing a long lasting effect of the pandemic situation. The salary, safety while travelling, safety measures at workplace i.e. handling the machinery, interacting with colleagues and customers everything has become a fearful and stressful as well. However, Government policies and rules are there to maintain the distancing and staff support is there to manage the cleanliness, supervisors are there to look at the technical experts but the question remains that what about the psychological atmosphere during the office hours and who is concerned regarding overall psychological well-being of the workers. The current paper will throw some light on the psychological hygiene and psychological training of the staff, which may further enhance the productivity despite the adversity.

**Keywords-** REBT, psychological training, psychological well-being, COVID 19.

### Introduction

One of the very effective and promising methods in psychology is known as Rational Emotive Behavior Therapy(REBT), coined by Dr Albert Ellis in 1955 in U.S. REBT has been influenced by the stoic philosopher Epictetus. Epictetus has said that 'outside events or people do not cause our feelings but rather our beliefs about events or people cause our feelings. He further said that if we change our beliefs we can change our feelings and therefore we can change our behavior also.

Dr. Ellis framed this philosophy more

systematically [2]. The event, whether it was related to past or in present or may occur in future, is called a activating event. Therefore, activating event stands for A. As a layperson most of us assume that it is the event which leads us to feel something either at the physical level, psychological level or both. In simple term activating leads to some consequences. However, Dr. Ellis demonstrated that it is not the activating event which leads to experience some consequences, but it is the B, stands for Beliefs, which leads to C, i.e. consequences. For example, one employee is having some beliefs about the COVID-19 situation as, "Oh my God, it is so awful. I can't stand and I can't even be imaging to have such kind of situation. Now it is just impossible to go to the workplace or it so pathetic that I have to deal and interact with people, therefore it's better not to work with people around there and so on". Of course, the employee's reactions or attitude is not healthy and useful.

However, keeping the same situation, another employee is having a bit different beliefs patterns like, "it is much unexpected to have such kind of stressful situation. Though I have never imagined it, now as the situation is there, it is better to accept and let's find some constructive way to face it. As part of the job I have to interact with many people, but still, I take care of myself by following the rules strictly. It may affect my routine or my work speed but it will not be appropriate to give the job". Certainly, such kind of attitude will not only support to achieve the company's goal of profit but even it will enrich the relationship between colleagues as well.



## Clinical Profile of Specific Learning Disability in Vernacular schools

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### Abstract

**Background:** Learning disorder is very prevalent but significantly underestimated disorder in the children. It impacts the basic psychological processes which are required for the language development which is responsible for the overall development and the performance of the individual. The assessment is done in India in English language mostly which is second or third language of children which make the validity of assessment doubtful. At the same time, assessments done for the population of vernacular schools, middle or lower socioeconomic strata and non metro cities or rural area are least. So it is important to address this situation. **Objectives:** Our aim was to study the SLD in the vernacular schools in Nashik. **Materials and Methods:** Sampling was done in a stepwise manner addressing the poor academic performance students. After constructing the sample group of SLD, it is studied for demographic variables, Extent of SLD, Co-morbidities. The research tool used to assess the children was Dyslexia Assessment of Languages of India (DALI). Psychological co-morbidities were studied using the behavioral checklist and clinical examination. Evaluation of the data is done with the help of central tendencies, variance and the comparison of the means. **Results:** We found that prevalence of the SLD is high in boys than girls. The percentage of referral and assessment of children to Psychologist or government institutions is negligible in case of vernacular school. Incidence is not impacted by the socioeconomic condition of the children but Extent of the SLD is found more in socioeconomically weaker cases where the academic instructions might be poorly administered at home. ADHD is the most common co morbidity found in cases of SLD. Symptom profile of the SLD was noted which shows that the difficulty while reading blends, difficulty reading non words and slow reading were commonest presentation. **Conclusion:** The study gives the clinical and symptomatic profile of the symptoms which will help to recognize the presence of SLD at earliest. Research study also gives the demographic variables in SLD. Study recommends the government and other stakeholders to construct diagnostic assessment and management centers at community health care level.

**Key Words:** Specific Learning Disability, Dyslexia, School Health.

### Introduction:

Learning disability or Specific Learning Disability (SLD) is psycho-neurological disability which impacts certain basic psychological processes such as reading, writing and the mathematical ability of an individual. According to studies the prevalence of the dyslexia is about 2-18% in Indian school children (Karanth, 2002, Srinath S, et al., 2005, LTMG, 2006). Learning disorder is umbrella term and it has varied presentations. Causes of this neurological entity are still not clear, but high incidence is found in the families. SLD is usually have concurrent other clinical states termed as co-morbidities, such as Attention deficit hyperactivity disorder (ADHD), Oppositional Defiant Disorder (ODD), Depression, conduct disorder, conversion disorder. Association of SLD along with co-morbidities further deteriorates the performance of children.

Early detection and individualistic remedial education as per the need of child is proven beneficial in past studies. But as India is a multilingual country, assessments of those different languages for identification of possible deviation is a cumbersome task. Using the translated versions or the English tests of western world further add to the confusion as English is the second or third language of the Indian children, so validity of testing them in English is questionable. Due to paucity of the diagnostic tools, assessment of the SLD has limited to metro cities or larger cities only, and studies of SLD in vernacular medium schools are less available. (Srinath S, et al., 2005). In the assessment of children the background of the children at Cultural and Linguistic level is very important (National Information Centre for Children and Youth with Disabilities, 2000).

SLD since decades has remained the problem of large population because of under recognition and inadequate management. It is urgent necessity to understand the SLD and its impact along with the co-morbidities in Indian population, so that the management policies can be constructed to benefit the needful. At the same time the literature regarding the SLD should be enriched to guide the coming generations. So we took up this study to understand the clinical profile of the SLD in vernacular schools. Our study aims at studying the detailed clinical profile of SLD children in respect to gender differentiation, causative ailments, clinical features, Psychological co-morbidities, impact of Socio economic condition as cause or the modulating factor and other factors related to SLD. It will help in early diagnosis and the increased possibility of the early intervention.

### Materials and Methods:

This study was a cross-sectional descriptive study; sample construction was done by addressing the children with poor academic performance and children having significant scholastic difficulty. Among the group poor academic performance students, children with intellectual disability, poor academic instructions and other physical illnesses were excluded from the study. Sample comprised of 64 children. All the children within 8 to 12 years range were selected. All the children assessed with the DALI Test. The Test is standardized test constructed by the National Brain Research Centre, India, and has sufficient reliability and validity. Parents of children were informed about the study and interviewed to collect necessary information.

Research Paper

## Anxiety and Perceived Stress among Primary School Teachers in Rural Area Engaged in Online Teaching During COVID-19 Pandemic

Jaimala Ashok Sode<sup>1\*</sup>, Prof. Dr. M.A. Bhardwaj<sup>2</sup>

### ABSTRACT

**Aim:** The aim of the study was to examine the level of anxiety and perceived stress among primary school teachers in rural area engaged in online teaching during Covid-19 Pandemic. **Settings and Design:** A comparative study with simple two group design on primary school teachers in rural areas in Nashik district, Maharashtra, India. **Material and Methods:** The total sample of 30 primary school teachers in rural area (15 male Teachers and 15 female teachers) from the rural areas of Nashik District. The age group of the sample was 40 to 50 years. The data was collected by online mode (Google Form) for avoiding physical contacts as per the government guidelines of physical distancing during the COVID-19 pandemic. Hamilton Anxiety Rating Scale (HAM-A) by Hamilton (1959), Perceived Stress Scale by Sheldon Cohen (1988) were used for data collection. **Statistical Analysis:** Descriptive and inferential statistical analyses were used for observing the level of anxiety and stress and Student's t-test was used for finding gender difference. **Results:** The Mean and SD of anxiety the mean and SD of males (M = 42.27, SD = 6.14) and female (M = 42.80, SD = 3.97) and the t value 0.260 was found to be statistically not significant. The Mean and SD of mean of males (M = 34, SD = 2.80) and female (M = 33.73, SD = 2.76) and t value 0.261 was found to be statistically not significant. **Conclusions:** Primary schools teachers in rural are experience the high level of anxiety and perceived stress while engaged in online teaching during Covid-19 Pandemic. There were no gender difference in terms of anxiety and perceived stress among primary school teachers in rural area engaged in online teaching during Covid-19 Pandemic.

**Keywords:** Anxiety, Perceived Stress, Male & Female Primary School Teachers, Rural Area, COVID-19

The total educational system from primary to higher education has been collapsed during this covid-19 pandemic not only in India but across the world. The corona disease is a highly infectious disease caused by SARS-CoV-2, which is originated in Wuhan city of China. The covid-19 spread rapidly across the world. The Covid-19 pandemic

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**“COVID-19 IMPACT ON TOURISM SECTOR OF INDIA”**

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**Abstract:**

Tourism sector is an important contributor to the world economy. The tourism industry not only generates revenues for a country, but it is also one of the most important engines for economic growth and development. This sector simultaneously offers the opportunity for economies to grow and people to earn income, while tourism spending is associated with improvements in well-being for consumers of tourism services. As a labour-intensive sector, tourism generates employment, while fostering skills development and local entrepreneurship. Its connectivity and mobility features play a key role in regional balance and economic inclusion.

The growing impact of the tourism sector as an economic powerhouse and its potential as a tool for development are inarguable. Not only does the tourism sector spearhead growth, it also improves the quality of people's lives with its capacity to create large scale employment of diverse kind. It supports environmental protection, champions the diverse cultural heritage and strengthens peace in the world. As the ultimate cross-cutting sector, tourism contributes directly or indirectly to all of the Sustainable Development Goals (SDGs).

**Key words:** Tourism - Global perspective, Indian perspective, Impact of COVID-19, Government efforts.

**Introduction:**

Impact of the Covid 19 Pandemic The World Health Organization (WHO) on March 11, 2020, declared the novel coronavirus (COVID-19) outbreak a global pandemic. Tourism was one of the first sectors to be deeply impacted by the pandemic, as measures introduced to contain the virus led to a near-complete cessation of tourism activities around the world. The COVID-19 pandemic has hit the tourism economy hard with unprecedented effects on jobs and businesses. Destinations that rely heavily on international, business and events tourism are struggling. This sector also risks being among one of the last to recover with the ongoing travel restrictions and the global recession. This has consequences beyond the tourism economy, with many other sectors that support and are supported by tourism also significantly impacted. The impacts of COVID-19 on tourism threaten to increase poverty (SDG 1) and inequality (SDG 10) and reverse nature and cultural conservation efforts. The pandemic also risks slowing down progress towards the Sustainable Development Goals (SDGs). Tourism is directly referenced in three goals: SDG 8 on —decent work and economic growth, SDG 12 —responsible consumption and production and SDG 14 —life below water.

**Objective:**

The present research paper tries to study the COVID-19 impact on tourism, what effort taken by government of India to boost of tourism sector and suggest to the priorities to restart tourism activity.

**Global perspective:**

- The tourism and hospitality sector accounts for around **7% of the global GDP**.
- The sector has a tremendous potential to generate **employment opportunities in large numbers**, given the higher **forward and backward linkages of the sector**. The sector acts as a **multiplication of jobs**, as every direct job in this sector creates 6-8 times indirect jobs.



## **A Resource Assessment for Sustainable Tourism Development and Tourist Satisfaction in North East Part of Nashik District, Maharashtra**

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### **Abstract:**

*Tourism ranks first in the recreational and leisure activities in the world. It is of the largest industries in the World. The tourist places get good amount of foreign exchange earnings through this industry. Today tourism is viewed as an economic and social force of major proportions in the world. Its importance was exemplified in the sponsorship by the United Nations of a Conference of International Travel and Tourism held in Rome during August and September, 1963. (D'Souza, 1998).*

*The objectives of the research are to assess the resources contributing for sustainable tourism in the study area. The second objective is to analyze the trends of tourism development and the third objective is to find the tourist satisfaction index.*

*The present study is an attempt to analyze the ecological and economical contribution of tourism. Visitors which belongs to the productive age are more interested in tourism. Majority of tourists (>68%) visit to see nature. Number of female visitors is good. Scope for development of MSRTC buses. 60.41% of the tourists travelled for pleasure and wildlife which is good sign. Tourists are not satisfied with the accommodation facilities. The study area is having potential to develop as tourism destination as because of presence of good number of natural resources. The second finding is large number of tourists shown their interest in the local food, craft and culture. 76.67% of the respondents approved welcoming behavior of local people. In recommendations we can state that local community will be benefited by the tourism in future. The sustainable development could takes place in the study area.*

**Keywords:** Natural Resources, Sustainable tourism, Satisfaction Index, Sustainable Development

### **Introduction:**

Tourism ranks first in the recreational and leisure activities in the world. It is of the largest industries in the World. The tourist places get good amount of foreign exchange earnings through this industry. Tourism industry is different than the other industries as in tourism there is no exchange of commodities involved, instead of that there is exchange of money, art, culture, thoughts and hospitality among the people.

Tourism, has come a long way since the time of the Sumerians and other ancient people who first began to travel for trade purposes. Today tourism is viewed as an economic and social force of major proportions in the world. Its importance was exemplified in the sponsorship by the United Nations of a Conference of International Travel and Tourism held in Rome during August and September, 1963. (D'Souza, 1998).

In the year 2010 it was reported that globally there were 940 Million international tourists arrivals recorded worldwide. The World Travel and Tourism Council have rated India as one of the five fastest growing tourism economies in the world. The domestic tourists increased in Maharashtra from 41.29 lakhs in 1991 to 84.8 lakhs in 2001 and international tourists increased from 7 million in 1991 to 8 million in 2001.

The resources contributing for sustainable tourism are encouraging in the study area.

### **Objectives:**

1. To assess the resources contributing for sustainable tourism in the study area.

# Dark Tourism Sites in India: A Review

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## Abstract

*The study of this paper aims to study the various sites of dark tourism in India. Tourism in India is important for the country's economy and its sectors growing rapidly. Tourism means the act and process of spending time away from home in pursuit of recreation, relaxation, and pleasure while making use of the commercial provision. There are many forms of tourism based on the purpose of visit in that paper; we discussed dark tourism development and sites in India. Dark tourism (black tourism, morbid tourism) has been defined as tourism involving travel to places historically associated with death and tragedy, planning a project on dark tourism documenting the increasing popularity of morbid landmarks around the world. The main attraction to dark locations is their historical value rather than associations with death and suffering. Holocaust tourism contains aspects of both dark and heritage tourism. Dark tourism is a sheer curiosity that pushes people to tread the road less traveled to search their answers, so travel by far has always been related to journey and to explore beautiful places. There are a lot of places in India. This research paper includes references to the promotion of dark tourism in India. The work includes references in the promotion of dark tourism in India, a destination that has largely failed to improve itself on Indian tourism market because this form of tourism promotions a destination. Dark tourism attractions demonstrate demand but also consist of commemoration, historical references, narrative legacies, and populist heritage this tourism sites in some cases become one of few remaining elements of victims and tier testimonies. There is a lot of scope for developing dark tourism in India but taking some efforts and specific solutions to developed dark tourism in India. For this paper used secondary research methodology has been used for research for data collection, secondary data collected from the literature review also government agency data; online tourism news has been collected.*

**Keywords:** Dark Tourism, Morbid, Populist Heritage, Historical Sites, Special Interest Tourism, Death and Tragedy

## Introduction

The Indian tourism industry is one of the important contributors to the economy of the country. Tourism in India is growing rapidly. The world travel and tourism agency calculated that tourism generated 16.91 lakh crore 2018 and supported 42.67 million jobs, i.e., 8% of its total employment. The travel and tourism competitiveness report 2019 ranked India 34 out of 140 countries overall. Tourism is temporary short term movement of people to destinations outside the place of their residence. Tourism is undertaken for recreation, sight seen, pilgrims there are a lot of forms of tourism like sports tourism, adventure tourism, agro-tourism but in that paper, we discussed dark tourism in India. Dark tourism, also known as grief tourism, involves people taking keen curiosity in visiting places that are historically linked to death and tragedy. Also, reminders of human suffering and bloodshed are subset through this concept sounds a bit weird. It is fast catching up with the trends, and in India, with such a long history, dark tourism automatically finds its spot. It is a sheer curiosity that pushes people to tread the road less traveled to seek answers travel by far always been related to journey and exploring beautiful places. With this type of tourism finding its ground, it only explains how the human mind cannot be tamed.

## **4. Analysis of National Webinar on, “Impact of COVID-19 on Indian Agriculture and Economy”**

**Dr. Pralhad Y. Vyalij**

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L. V. H. College Panchavati, Nashik (MS).

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### **Introduction**

India is home to about 120 million small landholder farmers who contribute 40% of the country's grain production and over half of its fruits, vegetables, oilseeds and other crops. Much of the global share of food staples such as rice and wheat come from India, and almost half of the population in India depends on agriculture for their livelihood. Agriculture is the backbone of any economy. It is the primary sector which generates employment so that the entire circle of economic circulation goes on. When we talk about the Indian economy, the majority of the population is restricted to this sector.

Every year, Indian farmers face risks, such as low rainfall, price volatility and rising debts. But risks from COVID-19 pandemic are putting new challenges in front of a sector that is already under threat.

The National Webinar on “**Impact of COVID-19 on Indian Agriculture and Economy**” was organized by the Department of Geography, Loknete Vyankatrao Hiray Arts, Science & Commerce College, Panchavati, Nashik-3, on 6<sup>th</sup> August 2020. The National webinar brought together faculties, teachers, researchers, scholars and students and provided an online forum to discuss innovative ideas and diverse topics on Impact of COVID-19 on Indian agriculture and Economy.

To curb the spread of novel corona virus the country went under the strictest lockdown, which impacted and affected every section of the society, but Agriculture which is the backbone of the Indian economy became the worst victim of lockdown likewise the Indian Economy got hit by the lockdown. During the lockdown Agricultural Economy got deteriorated and many farmers also did not get the expected returns of their crops. 398 participants (professors, research scholars and students) participated from almost 18 states all over the country in the



# Maharashtra: Population Growth, Distribution and Density (Spatio-Temporal Analysis)

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**Abstract:** Maharashtra is the third largest state in India having a geographical area of 307,713 square km. In this paper an attempt has been made to highlight the population growth, distribution and density. Growing population is one of the main factors for changing land use pattern and is the main threat to the land. The dynamics of land use and land cover changes differ in different part of the world. The use of land changes according to the changing needs of man.

Population distribution is a dynamic process, which is ever changing. Its cause and effect vary in the spatio-temporal frame. The economic characteristics of an area directly influence the population pattern through the resource and economic interchange. Study of relationship between man and environment helps to analyze the distribution of population. With intensive utilization of the natural resources, a region tends to increase in population. Natural resource and its relationship with man determine the degree of population density. It is apparent that the study region occupying 9.36 percent area of Maharashtra state in India.

**Key Words:** Population, Growth, Distribution, Density, Spatio- Temporal.

## 1. INTRODUCTION:

Population plays an important role in the economic development of a country. Population must be considered both from the angle of assets and liabilities connected with the attainment of economic development. For the attainment of overall development, proper utilization of both natural as well as human (population) resource is very much essential. Hence the study of the size and quality of population is important. The present research paper highlights Spatio temporal analysis of population growth, Population distribution and Population density.

### 1.1 STUDY AREA:

Maharashtra occupies the western and central part of the country and has a long coastline stretching 720 kilometres along the Arabian Sea. One of the more prominent physical features of Maharashtra is the Deccan plateau, which is separated from the Konkan coastline by 'Ghats'. The Ghats are a succession of steep hills, periodically bisected by narrow roads. The Western Ghats (or the Sahyadri Mountain range) provide a physical backbone to the state on the west, while the Satpura Hills along the north and Bhamragad-Chirol-Gaikhuri ranges on the east serve as its natural borders. The state is surrounded by Gujarat to the North West, Madhya Pradesh to the north, Chhattisgarh to the east, Telangana to the south east, Karnataka to the south and Goa to the south west.

Maharashtra is the third largest state by area in India. Maharashtra has 36 districts, 355 talukas, and 6 administrative divisions. The Western Ghats better known as Sahyadri, are a hilly range running parallel to the coast, at an average elevation of 1,200 metres. Kalsubai, a peak in the Sahyadri, near Nashik city is the highest elevated point in Maharashtra. To the west of these hills lie the Konkan coastal plains, 30–80 kilometres in width. To the east of the Ghats lies the flat Deccan Plateau. Forests comprise 17% of the total area of the state. A majority of the forests are in the eastern and Sahyadri regions of the state. The main rivers of the state are Krishna, Bhima, Godavari, Tapi-Purna and Wardha-Wainganga. Since the central parts of the state receives low rainfall, most of the rivers in the region have multiple dams. Maharashtra has around 1821 notable large dams.

Maharashtra is divided into five geographic regions. Konkan is the western coastal region, between the Western Ghats and the sea. Kandesh is the north-western region lying in the valley of the Tapi River. Desh is in the centre of the state. Marathwada, is located in the south eastern part of the state. Vidarbha is the easternmost region of the state. Sahyadri range, is known for its crowning plateaus. Lying between the Arabian Sea and the Sahyadri Range, Konkan is narrow coastal lowland, just with an elevation below 200 meters. The third important region is the Satpura hills along the northern border, and the Bhamragad-Chirol-Gaikhuri ranges on the eastern border, which form physical barriers preventing easy movement. These ranges also serve as natural limits to the state.

Maharashtra has a tropical climate, with three distinct seasons: Summer, Monsoon, and winter. However, dew and hail also occur sometimes, depending upon the seasonal weather. The winter between October to February is followed by summer between March and May and the monsoon season between June and September. Summers

# A Study of Nutritional Density and Pressure of Population on Agricultural Land in Nashik District, Maharashtra

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**Abstract:** The present paper, based on the secondary data, intends to measure the population growth, nutritional density, cultivated land per head and population pressure on land in Nashik district. The growth of population in 1991-2001 was higher (+29.52%) than what it was in 2001-11 (22.44%). Nashik tahsil being headquarters as well as a very fascinating tourist place, have shown very high population growth (55.59%) in 1991-2001 but in 2001-2011 it has down up to 33.29% in Nashik tahsil. The nutritional density per hectare right from 1991 to 2011 in the district has increased more (1991 it is 5 and 2011 it is 9). It is also found that cultivated land per head has been noticed in the declining trend, which indicated that population pressure on land has been continuously augmenting. It is suggested here that agricultural productivity needs to be enhanced with the application of advanced technology, using organic manure so that the food grains produced will not cause any harm to people. The expansion of urban centers has also been eating out the fertile agricultural land for non-agricultural purposes in their surrounding areas, which needs to be checked systematically.

**Key Words:** Nutritional Density, Population Pressure, Cultivated Land, Population Growth.

## 1. INTRODUCTION:

Population is one of the most important problems before the scientists and demographers being an unstable factor. The land resource is fixed and resources produced out of it on the earth have not been ever-increasing in consonant with population growth. They are stable one and continuously exploited by human beings to meet their needs. Thomas Robert Malthus (1798), the famous economist proposed a systematic theory of population in his renowned book, Essay on the Principles of Population, believed strongly that manpower is much stronger than the capacity of the land to sustain such population. When unchecked, population grows geometrically, while the means of sustenance increase in an arithmetical ratio only. In the name of technology, we criticize Malthus theory, but still it has its own importance and implication. You can enhance the agricultural productivity by augmenting land irrigation that may be drip or sprinkle one, using high yield seeds, organic or inorganic manures, tractorization, rainfall harvesting, even artificial rain sometimes somewhere depending upon the situation, all these technological advancements have some limits to growth and crop productivity to feed the ever increasing population. Hence, along with the development of agri-technology, we have to focus on the very basic fact of controlling the population growth especially in the developing countries like India so that from the given land resources we have to feed the population and maintain the minimum standard of living. In the advanced world, various demands for food, house, industries, roads, play grounds, schools, cinema halls, etc. have increased and all these are dependent on land, which has been divided into very small pieces. So a large population has to be dependent on small parts of land, it means every person has very small portion of land. This is resulting serious problem of rapidly increasing population on resources.

Therefore, the main intent of the discourse in the present study is to measure the population growth and its impact on land considering nutritional density and cultivated land per head in Nashik district of Maharashtra state.

## 2. Study Area :

Nashik is the third largest district of Maharashtra having a total geographical area of 15530 sq. km. This district consists of 15 tahsils, 1919 villages and 25 towns as per the census of 2011. It lies between 19° 35' 18" to 20° 53' 07" North latitude and 73° 16' 07" to 74° 56' 22" East latitudes. Physiographically, Nashik district comprises of a part of a Deccan Plateau, one of the oldest originated blocks of the earth surface. The district may be broadly divided into three geographical regions, viz, a) the downghat konkan tract; b) the Girna basin and c) the Godavari basin.

## ९. भारतरत्न डॉ. बाबासाहेब आंबेडकर यांचे दलिततरांसाठी योगदान

प्रा. डॉ. नारायण नामदेव गाढे

सहयोगी प्राध्यापक (अर्थशास्त्र), लोकनेते व्यंकटराव हिरे कला, विज्ञान आणि वाणिज्य महाविद्यालय, पंचवटी, नाशिक.

### प्रास्ताविक

जगाच्या पाठीवर एकमेव भारत देश असा आहे की, येथे महापुरुषांना जातीजातीमध्ये वाटले जाते. या महामानवांनी देशासाठी व समाजिक कल्याणासाठी केलेले उत्तुंग कार्य व योगदान प्रस्थापितांकडून मात्र सोईस्कररित्या दुर्लक्षिले जाते. म्हणजे त्यांच्या कार्याचे फायदे सर्व स्तरातील, जाती-धर्मातील लोक घेतात परंतु याचे श्रेय मात्र त्या महापुरुषांना दिले जात नाही. ही या देशातील शोकांतिका आहे. हीच गोष्ट महात्मा जोतिबा फुले, छत्रपती राजर्षि शाहू महाराज, डॉ. बाबासाहेब आंबेडकर यांच्या बाबत तंतोतंत लागू पडते भारतरत्न डॉ. बाबासाहेब आंबेडकरांचा उल्लेख वारंवार 'दलितांचे कैवारी', 'दलितोद्धारक' 'दलितांचे मसिहा', 'दलितांचे नेता' असा केला जातो. परंतु हा प्रस्थापितांकडून मुद्दामहून केला जाणारा खोडसाळपणा आहे. या असं करण्यामुळे खरं तर बाबासाहेबांचे नेतृत्व खुजं होत नाही, बोन्साय होत नाही, तर जे कोणी असं करतात त्यांच्याच विचारांचा खुजेपणा स्पष्टपणे जाणविल्याशिवाय रहात नाही, त्यांचं वैचारिक दारिद्र्यचं यावरून प्रकट होतं.

डॉ. बाबासाहेब आंबेडकर यांनी काय केवळ दलितोद्धाराचं कार्य केलं आहे काय? त्यांनी इतर समाजासाठी, इतर जाती-धर्माच्या लोकांसाठी काहीच केलं नाही काय? दलिततरांसाठी त्यांचं काहीच योगदान नाही काय? याच प्रश्नांचा ऊहापोह करण्यासाठी प्रस्तुत शोध निबंधात डॉ. बाबासाहेब आंबेडकरांचे दलिततरांसाठीचे योगदान या संबंधीचा आढावा घेण्यात आलेला आहे.

डॉ. बाबासाहेब आंबेडकर हे भारतीय राज्यघटनेचे शिल्पकार, समाज सुधारक, कायदेपंडित, अर्थतज्ज्ञ, लेखक, पत्रकार, शिक्षणतज्ज्ञ, जलतज्ज्ञ, शेतीतज्ज्ञ, स्त्रीउद्धारक, प्रज्ञासूर्य, सिम्बॉल ऑफ दी नॉलेज, फादर ऑफ मॉडर्न इंडिया म्हणून सर्वांना परिचित आहेत. तरीदेखील त्यांचा उल्लेख 'दलितांचे कैवारी' असा करणं ही वैचारिक दिवाळखोरी आहे. दलितांचे नेते म्हणून त्यांना मर्यादित करणं, म्हणजे त्यांच्यासारख्या सच्चा देशभक्ताच्या महान कार्याकडं जाणीवपूर्वक केलंलं दुर्लक्ष होय. त्यांनी या देशावर अनंत उपकार केलेले आहेत. त्यांच्यावर केवळ दलितांचा नेता, असा जो ठपका ठेवला जात आहे तो पूर्णपणे चुकीचा आहे. त्यांच्या कार्यकर्तृत्वाचा आवाका एवढा प्रचंड मोठा आहे की, त्यांना अशा प्रकारे दलितांचे कैवारी म्हणणं हया प्रस्थापितांच्या बुद्धीच्या आणि विचारांच्या मर्यादा आहेत. 'मी प्रथम भारतीय आहे आणि शेवटपर्यंत भारतीयच राहणार' ही त्यांची गर्जना त्यांनी महापरिनिर्वाणापर्यंत पाळली. यावरून ते केवळ एका समुदायाचे नेते कसे ठरतात?

### शोधनिबंधाची उद्दिष्टे

डॉ. बाबासाहेब आंबेडकर यांनी दलिततरांसाठी व भारत देशासाठी दिलेल्या योगदानाचा चिकित्सक अभ्यास करणं हे प्रस्तुत शोध निबंधाचं प्रमुख उद्दिष्ट आहे.





## नाशिक जिल्ह्यातील मका विपणनविषयक समस्या

डॉ. एन. एन. गाढे

अर्थशास्त्र विभाग प्रमुख व सहयोगी प्राध्यापक  
लोकनेते व्यंकटराव हिरे कला, विज्ञान आणि  
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### प्रस्तावना

प्राचीन काळापासून भारतीय लोकांचा शेती हा प्रमुख व्यवसाय आहे. भारताच्या एकूण लोकसंख्येपैकी 68 टक्के लोकसंख्या खेड्यात रहात असून शेती हे त्यांच्या उपजीविकेचे प्रमुख साधन आहे. शेती व्यवसायाला भारतीय अर्थव्यवस्थेचा 'कणा' मानले जाते. महात्मा गांधी यांनी "भारतीय शेती ही भारतीय लोकांच्या उपजीविकेचे प्रमुख साधन असल्यामुळे शेती हा भारताचा आत्मा आहे" प्रस्तुत संशोधन कृषी अर्थशास्त्राशी निगडित आहे. प्रा. टेलर यांनी कृषी अर्थशास्त्राची व्याख्या पुढीलप्रमाणे केलेली आहे "कृषी अर्थशास्त्रात जमीन, श्रम, औजार इत्यादी साहित्याची निवड करणे, कोणत्या पिकाची लागवड करावयाची, पशुसंवर्धनाचा क्रम कसा ठरवावयाचा, त्या सोबत शेतमालाच्या किमती, उत्पादन खर्च या बाबत विचार करण्यासाठी त्या सर्व साधनांच्या प्रमाणाचा प्रश्न सोडविणे इत्यादी बाबींचा अंतर्भाव होतो."<sup>2</sup>

प्रस्तुत शोध निबंधात 'नाशिक जिल्ह्यातील मका विपणन पद्धतीचे अध्ययन करण्यात आलेले आहे. गेल्या तीस वर्षांपासून नाशिक जिल्ह्यात मका पिकाचे उत्पादन घेतले जाते. गेल्या दशकापासून जिल्ह्यात मका पिकाच्या लागवड क्षेत्रात लक्षणीय वाढ झाली आहे. नाशिक जिल्ह्यातील जमीन, पर्जन्यमान, वातावरण मका पिकासाठी उत्तम आहे. तसेच मका पीक शेतकऱ्यांना वरदान ठरले आहे. मक्याचे उत्पादन व विपणन या अनुषंगाने नाशिक जिल्ह्यात मोठी आर्थिक उलाढाल होत असते. म्हणून नाशिक जिल्ह्याच्या कृषी अर्थव्यवस्थेत मका पिकास मोठे महत्त्व प्राप्त झाले आहे. मका पिकाच्या उत्पादन व विपणन प्रक्रियेत रोजगार निर्मिती, उत्पन्न निर्मिती, होण्यास मदत होत आहे. नाशिक जिल्ह्यात मका पिकाचे विपणन कसे चालते या अनुषंगाने अध्ययन करण्यात आलेले आहे. मका विपणनात शेतकऱ्यांना कोणत्या अडचणी येतात. याबाबत प्रस्तुत शोध निबंधात मांडणी करण्यात आलेली आहे.

नाशिक जिल्ह्यात बागलाण तालुक्यात मका पिकाखालील क्षेत्र सर्वाधिक असून कळवण, मालेगाव व देवळा (कसमादे) या तालुक्यातील मका पिकाखालील एकूण क्षेत्र 81098 हेक्टर असून ते जिल्ह्यातील एकूण मका पिकाखालील क्षेत्राच्या 50% पेक्षा अधिक आहे.<sup>3</sup>

### संशोधनाची उद्दिष्टे

प्रस्तुत शोध निबंधासाठी निश्चित करण्यात आलेली उद्दिष्टे पुढीलप्रमाणे आहेत.

- 1) नाशिक जिल्ह्यातील मका विपणन पद्धतीचे अध्ययन करणे.
- 2) नाशिक जिल्ह्यातील मका उत्पादक शेतकऱ्यांना भेळसावणाऱ्या समस्यांचा अभ्यास करणे.

### संशोधन पद्धती

प्रस्तुत शोध निबंधासाठी वर्णनात्मक आणि विश्लेषणात्मक पद्धतीचा अवलंब केलेला असून सर्वेक्षण पद्धतीवर भर देण्यात आलेला आहे. प्रस्तुत संशोधनासाठी 'यादृच्छिक नमुना निवड' पद्धतीचा अवलंब करण्यात



## नाशिक जिल्ह्यातील मका उत्पादन पध्दतीचा अभ्यास

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### प्रस्तावना

भारत हा कृषिप्रधान देश असून राष्ट्राच्या अर्थव्यवस्थेत कृषि चे स्थान अतिशय महत्वपूर्ण आहे. कृषि व्यवसाय हा येथील 70 टक्के लोकांचा जगण्याचा मार्ग आहे. कृषि ला भारतीय अर्थव्यवस्थेचा 'कणा' मानले जाते. "भारतीय शेती ही भारतीय लोकांच्या उपजीविकेचे प्रमुख साधन असल्यामुळे शेती हा भारताचा आत्मा आहे." कृषि बदल असे उद्गार महात्मा गांधी यांनी काढलेले आहेत. प्रस्तुत संशोधन कृषि अर्थशास्त्राशी निगडीत आहे. स्नॉडग्रास आणि वॉलॅस यांच्या मते, "कृषि अर्थशास्त्र म्हणजे शेतीच्या विविध प्रश्नांच्या सर्व पैलूंचा विचार करणारी अर्थशास्त्राची उपयोजित शाखा होय."²

प्रस्तुत शोध निबंधात नाशिक जिल्ह्यातील मका उत्पादन पध्दतीचा अभ्यास करण्यात आलेला आहे. गेल्या दोन दशकांपासून नाशिक जिल्ह्यात मका पिकाखालील क्षेत्रात झपाट्याने वाढ झाली आहे. नाशिक जिल्ह्यात मका शेती शेतकऱ्यांना किफायतशीर ठरली आहे. मका उत्पादन प्रक्रियेत जिल्ह्यात मोठी आर्थिक उलाढाल होत असून त्यातून ग्रामीण भागात रोजगार संधी निर्माण झालेल्या आहेत. एकूणच नाशिक जिल्ह्याच्या कृषि अर्थव्यवस्थेत मका उत्पादनाचे महत्त्व वाढलेले आहे. प्रस्तुत शोध निबंधात मका उत्पादन पध्दती तसेच मक्याचा प्रतिहेक्टरी उत्पादन खर्च या अनुषंगाने संशोधन करण्यात आलेले आहे.

### संशोधनाची उद्दिष्टे

प्रस्तुत संशोधनासाठी पुढील उद्दिष्टे निश्चित करण्यात आलेली आहेत.

- 1) नाशिक जिल्ह्यातील मका उत्पादन पध्दतीचा अभ्यास करणे.
- 2) नाशिक जिल्ह्यातील मक्याचा प्रतिहेक्टरी खर्च माहित करून घेणे.

### संशोधन पध्दती

प्रस्तुत शोध निबंधासाठी विश्लेषणात्मक पध्दत वापरण्यात आलेली आहे. नाशिक जिल्ह्यातील विविध गावांतील शेतकऱ्यांचे सर्वेक्षण करण्यात आलेले आहे. सदर शोध निबंधासाठी 'यादृच्छिक नमुना निवड' पध्दत अवलंबण्यात आलेली आहे. सन 2013-14 ते 2017-18 या पाच वर्षांचा कालावधी विचारात घेण्यात आला आहे. शेतकऱ्यांना भेटी देवून त्यांच्या मुलाखती घेवून व प्रश्नावली भरून घेवून माहिती व आकडेवारी गोळा करण्यात आलेली आहे.

### नमुना निवड

नाशिक जिल्ह्यातील नाशिक, नांदगांव, निफाड, मालेगांव, सटाणा या तालुक्यांतील विविध गावांमधून 100 शेतकऱ्यांकडून प्रश्नावली भरून घेण्यात आल्या असून काही शेतकऱ्यांच्या मुलाखतीही घेण्यात आले. त्यातून प्राप्त झालेल्या माहिती व आकडेवारीचे विश्लेषण करून निष्कर्ष काढण्यात आलेले आहेत.





## **मानवी कल्याण साधण्यासाठी तथागत बुद्धाच्या तत्त्वज्ञानाची आवश्यकता**

**प्रा. डॉ. नारायण नामदेव गाढे**

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### **प्रास्ताविक:**

जागतिकीकरण करणाऱ्या अवलंब आणि भांडवलशाहीधार्जिणे शासकीय धोरणं याचा परिपाक म्हणून जगाला आज अनेक समस्यांनी ग्रासले असल्याचे चित्र बघायला मिळते. कधी नव्हे एवढी वाढलेली आर्थिक विषमता, बेरोजगारीच्या दराने गाठलेला डबल डिजीट चा उच्चांक', दारिद्र्य, उपासमार, चंगळवाद, शेतकऱ्यांच्या आत्महत्या, पर्यावरणाचा झालेला न्हास, वाढलेली जीवघेणी स्पर्धा, पैसाधिष्ठीत झालेल्या अर्थव्यवस्था, स्थूल देशांतर्गत उत्पादन वाढीसाठी प्रत्येक देशाचा चाललेला आटापिटा, वारंवार उद्भवणारी आर्थिक मंदी, महागाई, साठेबाजी, भ्रष्टाचार इत्यादी समस्या केवळ भारतापुरत्या मर्यादित राहिलेल्या नसून त्या जागतिक समस्या बनल्या आहेत. अर्थशास्त्राने सातत्याने मानवी कल्याणाचा ध्यास घेणे अभिप्रेत आहे. परंतु सद्यस्थिती बघता अर्थशास्त्रीय सिद्धांताच्या मर्यादा स्पष्टपणे दिसू लागलेल्या आहेत. यामुळे एकूणच वर्तमान मानवी जीवन असुरक्षित, अशांत व अनिश्चित बनले असल्याचे सर्वत्र जाणवत आहे. वर्ल्ड हॅपीनेस रिपोर्ट २०२१ नुसार १४६ देशांमध्ये भारताची रँकिंग १३६ आहे.<sup>१</sup> या पार्श्वभूमीवर पर्यायी अर्थशास्त्राची गरज निर्माण झाली असल्याचे संशोधकाचे मत आहे. बुद्धाचे आर्थिक तत्त्वज्ञान वरील परिस्थिती बदलण्याच्या दृष्टीने, व हॅपीनेस इंडेक्स वाढविण्याच्या दृष्टीने नक्कीच उपयुक्त ठरेल असा संशोधकाला विश्वास वाटतो. प्रस्तुत शोध निबंधात बुद्धाचे आर्थिक तत्त्वज्ञान हे आजच्या अर्थशास्त्रीय सिद्धांताला पर्यायी ठरणार आहे या दृष्टीने मांडणी करण्यात आलेली आहे.

### **शोधनिबंधाची उद्दिष्ट्ये:**

प्रस्तुत शोधनिबंधासाठी पुढील उद्दिष्ट्ये निर्धारित करण्यात आलेली आहेत.

१. बुद्ध तत्त्वज्ञान जाणून घेणे.
२. मानवी कल्याणात बुद्धाच्या तत्त्वज्ञानाची उपयुक्तता जाणून घेणे.
३. ग्राँस नॅशनल हॅपीनेस ही संकल्पना समजावून घेणे व तिचा बुद्ध तत्त्वज्ञानाशी सांगड घालणे.
४. बुद्ध तत्त्वज्ञान वर्तमान अर्थशास्त्रीय सिद्धांताला कसा पर्याय ठरू शकते यादृष्टीने मांडणी करणे.

### **शोधनिबंधाची गृहितके:**

प्रस्तुत शोध निबंधासाठी बुद्ध तत्त्वज्ञान वर्तमान अर्थशास्त्रीय सिद्धांतास पर्याय आहे. हे एकमेव गृहितक गृहीत मानल्यात आलेलं आहे.

### **संशोधन पद्धती:**

प्रस्तुत शोधनिबंध दुय्यम स्त्रोतांवर आधारलेला असून माहितीचे संकलन विविध ग्रंथ, मासिके, साप्ताहिके तसेच इंटरनेट इत्यादी द्वारे करण्यात आलेले आहे. तथ्यांचे निर्वचन व स्पष्टीकरण करण्यासाठी विश्लेषणात्मक तथा वर्णनात्मक संशोधन पद्धतीचा अवलंब करण्यात आलेला आहे.

### **बुद्ध तत्त्वज्ञान:**

बुद्धाचा धम्म हा स्वातंत्र्य, समता, न्याय, बंधुभाव यावर आधारलेला असून त्यामध्ये 'बहुजन हिताय बहुजन सुखाय' या तत्वाला प्राधान्य दिलेले दिसून येते. त्यामुळे बुद्धाच्या तत्त्वज्ञानात साकल्याने मानवी सुख, शांती, प्रेम,

## Growth and Composition of Indian Agricultural Exports

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### Abstract

The developing global demand for Indian agricultural commodities offers great opportunities. Indian agricultural exports have multiplied. However, the contribution of agricultural exports to the country's total exports has declined. Present study explores the growth performance of India's agricultural exports from 1991-92 to 2017-18, using compound annual growth rate and percentage share in total export of India as well as Gross Domestic Product. In-depth structure and structural analysis of agricultural exports has been undertaken. The study also examines the changing dynamics of the contribution of individual groups of goods to the basket of agricultural exports.

**Keywords:** Agriculture, Export of Agricultural product, Growth, Composition, Stability.

### Introduction:

Even in its traditional form, Indian agriculture is a major contributor to foreign trade. Indian agricultural products have long faced stiff competition from Asian countries. Due to globalisation and liberalised regime, this competition is likely to increase further and new initiatives in agriculture development shall have to meet the emerging challenges. Agricultural performance has been linked to export success after global market integration. In an effort to increase overall exports, the Government of India has decided to achieve this objective by emphasizing the production and export of agricultural commodities. In the past, agriculture was a foreign currency for India. Most of the agricultural exports came from traditional commodities such as tea, cashews and spices.

India's share in world agricultural exports is very low in many commodities. In the early seventies, India was an importer of many agricultural commodities. With the exception of a few commodities like rice, cotton, tea, coffee, oilseeds, oil cakes, tobacco and spices, the share of agricultural export of India in total world trade was very insignificant. The share is particularly low in the world trade of fish, meat, chicken, vegetables and fruits. India has made substantial strides in the total world production of many commodities. However, its

## Expenditure on Education in India: Recent Trends and Outcomes

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### Abstract

*It is widely accepted that there is a severe shortage of resources in the education sector in India. Economic reforms and associated requirements of fiscal discipline have aggravated the situation. By contrast, however, official sources claim that significant progress has been made in financing education. This paper examines whether, and in what ways, this is so. It analyses major trends in public financing of education in India, including expenditures by the central government, state governments, other local bodies and the NGO sector. Foreign aid, which is transferred primarily through central government budgets, is also included. The paper examines the level and composition of public expenditure on education and the mechanisms of resource sharing, allocation and utilization, in aggregate as well as separately for the center and the states. As a proportion of GDP the share of public expenditure on education has been less than 4 per cent. But there have been major changes in the composition and modalities of expenditure. Initially, education was the responsibility of individual states, but in 1976 it became the joint responsibility of both central and state governments. The analysis finds that the centre has been playing an increasingly important role in state education finance. Centrally sponsored schemes, which are partly funded by external aid, have been a critical part of centre-to-state transfers. Expenditure trends in seven states are studied to explore the possible impact of expenditure on education outcomes. It indicates that for the less developed states recent changes in education expenditure have improved access, but retention and learning achievements remain very low.*

**Keywords:** education, financing education, India, education outcomes

### Financing Education: Policy in India

In India over the last fifty years there have been major changes in the level of financing of education and in priorities attached to different sectors within it. Education at the primary level had been rather neglected by the early planners, who focused more on higher and technical



## Financial Inclusion in India – Recent Trends in Indian Economy

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### Abstract:

"Poverty is the deprivation of opportunity", said economist Dr. Amartya Sen. Financial inclusion gives the financially weak the chance to change their economic circumstances and lead better lives.

Today, 90% of India's 1.3 billion populations have a unique Aadhar identity, which is vital for meeting anti-money laundering "know your customer" (KYC) requirements. In the last four years, 330 million new Jan Dhan bank accounts have been opened. Mobile penetration is expected to reach 90% by 2020. Internet penetration has soared, and the use of digital payments is also rising significantly.

These are creditable achievements for the country. However, getting a unique identity, having a bank account and using digital payments are just the foundations of financial inclusion. Now these basics have been addressed, the government and private sector must take the next steps to build a superstructure of economic prosperity.

In this paper, the researcher attempts to understand financial inclusion and its significance for overall development of society and Nation's economy. This study focuses on approaches adopted by government towards achieving the ultimate goal of financial inclusion inclusive growth in India.

**Keywords:** Financial inclusion, Importance & scope of Financial Inclusion, Government Initiatives for Financial Inclusion, Challenges of Financial Inclusion, key elements for true financial inclusion in India.

### Objectives-

- To understand financial Inclusion in India
- To know Importance & Scope of financial Inclusion in India
- To look at Government Initiatives for Financial Inclusion
- To come across the Challenges of Financial Inclusion in India
- To understand key elements for true financial inclusion in India.

### Methodology:

The data collected is descriptive. Secondary research was conducted to review the present of financial inclusion in India. The information and data for the research is collected through primary as well as secondary sources i.e. published articles, journals, newspapers, books and websites.

## An Overview of Hunger and Under-Nutrition in India

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### Abstract

India is the most malnourished in such countries of the world. Malnutrition is one of the areas most needed for the country to fulfill its economic and social development goals. This paper provides an overview of India's malnutrition status and documents the efforts to overcome the problem. It examines India's performance in key malnutrition indicators as well as its various policy measures and its successes or weaknesses. The program started in the last few decades. In short, it is argued that India's malnutrition this challenge can only be overcome when the state governments adopt a unified and coordinated approach and show good governance; Civil society must respond as well. This paper examines the hunger and nutrition situation prevailing in the country and reviews the obligations and initiatives taken by the Government of India to ensure food security through various policies and schemes. It examines the performance of India Malnutrition indicators, as well as the success and weaknesses of various policy measures the program started in the last few decades. In short, it is argued that India's malnutrition When the state government unanimously and A coordinated approach and good stewardship performance; Civil society must respond as well.

**Keywords:** Hunger & under-nutrition, Causes, Preventing Hunger & Malnutrition

### Introduction

Good health benefits not only the individual, but the individual Country as well. In many countries around the world, the path to greater health of a large proportion of their population is fraught with problems. In poor economies people suffer from a variety of health-related illnesses, regardless of their income level. Despite the effort is being done by



## Zero cost natural farming (Zero Budget) Needs and Reality

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### Abstract

Using conventional techniques in agriculture is like a cancer for our soil and also health. Not only does this make the soil impervious, but eventually the peasantry goes in fear of debt. Therefore, In the Previous budget, the central government announced Zero Budget Farming for doubling the income of farmers to 2022. To change the picture of Indian agricultural development, we need to adopt the basic techniques of natural agriculture. Zero Budget Natural Farming (ZBNF) is the only way to deal with this growing problem. The term 'Budget' refers to credit and expenditure. Thus the word 'Zero Budget' means that without using any credit and without spending any money on the money purchased. Rajiv Kumar, Vice-Chairman of the NITI Commission, said that the Indian Council of Agricultural Research and the Agricultural Universities of India had said that the practice of zero cost natural farming was practiced on different lands in India and this technique needs to get scientific approval. Therefore, zero-cost natural farming has begun to be discussed throughout the country. But considering this discussion, two sides appear. On the one hand, the necessities of natural agriculture seem to be important, while on the other side, there is only discussion and some unanswered points for this fundamental change in agriculture. Both sides are discussed in this article by the researcher.

**Keywords:** Zero Budget Farming, The Need and Importance of Zero Budget Farming, Natural Farming.

### Zero Budget Farming

Expensive production of seeds, chemical fertilizers and pesticides by private companies is increasing the cost of agricultural production. Often, Prices of agriculture production are less than the cost of production, and it falls into debt trap. Loans and Expenses the budget is referred to here

## Impact of Disinvestment on Indian Economy

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### Abstract

*In 1991 we adopted a new economic policy called the new economic policy and the main change in the Indian economy was the licensing policy to the free trade policy. Indian Economy has three sectors public, private and Public-Private. Disinvestment is an Instrument to Increase Efficiency of, our Industry and service Sector so when Government have no Money to Development for Indian Economy they sell the Share of Public Sector and that is the Definition of Disinvestment. I want to study of Disinvestment and effect, Impact and Achievement in Indian Economy. After Many years we present our central deficit Budget that means our income is less than our Expenditure and to solve the deficit problem we take decision to Disinvestment in our Public Sector.*

**Keywords:** Disinvestment, Phases, Impact of Disinvestment

### Introduction:

Most of the efficiency of the Indian economy is not being used properly. Because new technology and skills development programs are not available in our country and finance is the most important to develop these things. To raise finance we took decision that in our public sector share sell and develop the public Sector. And gain foreign Currency from export policy. Other thing that to develop our Basic sector that is Education, Public Health and family Health. We take debt from many years from other country or International organizations. But use of this debt reducing the public sector investment and increased position of Disinvestment.



## **Importance and Challenges of Dairy Sector in India : A Critical Study**

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### **Abstract**

The present research paper analysis the importance of dairy sector and its contribution in Indian economy. In this research paper, researcher also tries to carry out various challenges of dairy sector in India. The study is descriptive in nature and based on secondary data which obtained from various secondary sources. In the country of India especially across the rural area of India, production of milk is the prime source of earning money and it is the most preferred livelihood among the rural people. India has vast resources of livestock, which play an important role in the national economy and also in the socioeconomic development of millions of rural households. India has one of the largest stocks of cattle and buffaloes: more than 20 percent of the world's buffaloes and 20 percent of its cattle.

**Keywords:** Dairy Sector, Rural Economy, Prime source of income.

### **Introduction:**

Milk and milk products have always been a part of our diet across the country. In the vast field of Animal Husbandry, the contribution of dairying has been the most vital source to generate employment as well as the source of income. In post-independence India cooperative dairying has been one of our major successful stories having a profound impact on socioeconomic development of rural area. Agriculture and animal husbandry are the two main occupations on which the entire structure of the village life depends in India. Apart from land and irrigation, live stock is the largest productive resource in the rural economy of India. On 1<sup>st</sup> June of every year we do celebrate world Milk day in order to signify and promote the production of milk products. The Day provides an opportunity to focus attention on milk and to publicise activities connected with milk and the milk Industry.

### **Importance of Dairy Sector:**

In the post pandemic period, Indian economy struggling to mark stable growth. Government has decided to promote and increase the utilisation of made in India products across the nation. In this crucial situation Dairy products and services can be played significant role to establish the growth of Indian economy.

### **Socioeconomic development:**

India as government is taking every step to develop economics and increase the capacity of every individual in India especially at rural places to achieve this goal, dairy can contribute remarkably by providing good number of subsidiaries on dairy. At rural place across India, the milk service is the second most preferable occupation across the rural area in India.

### **Increasing Employability:**

The dairy sector can play an important role in providing jobs for rural communities. Dairies, production and processing provide employment, not only to people who work on dairy farms but also in dairy plants.



## TEACHING COMMUNICATIVE SKILLS TO THE STUDENT COMMUNITY AS A BEST PRACTICE

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### Abstract:

Simply and broadly speaking, any practice that adds to the quality of higher education in any sense may be called as a best practice. In the globalized world, knowing English oral communication has become a foremost requirement in order to get connected to the world community by using it as a means of communication. English is a second language in India. Hence, learning English as a second language is definitely more difficult than acquiring the mother tongue in the Indian context. The reason is the mother tongue of the learner (L1) and English (L2) belong to the different language families. Though English serves the purpose of a link language and a library language in India, it still remains the attribute of only a few well learned citizens of it. There are barriers like lack of proper knowledge and unawareness about the importance of acquiring English oral communicative skills, lack of proper efforts to learn the same and the poor quality of teaching-learning which affect the development of students' oral abilities; and the same students, when they become the active members of the community, face severe problems of oral communication, wherever it is required, resulting in missing out the opportunities of self and community development. To teach this type of student group, belonging to any programme, the skills of oral communication, the proposed practice may be used by the colleges; especially, the teachers of English have a seminal role in it. With this broad perspective, the practice is being studied. However, considering the wide spectrum of the practice, in the present research paper, only the context of initiating such a practice is discussed.

**Keywords:** Higher education, second language (L2), mother tongue (L1), link language, library language, English oral communicative skills.

### The Context:

While living in the globalized world and English being the universally used language, it has a vital role to play in India too. Unfortunately, still, even after seventy two years of Indian independence, a satisfactory English language culture is not fostered in the country due to certain reasons. The education system, of which the student is an axle, is one of them. Many of the students are not able to acquire satisfactory oral communicative skills in English language even after the completion of college education. Moreover, the degree of this achievement is most uneven at certain places, especially in rural areas. Due to this lacuna, the students cannot communicate properly in interviews for job, as well as during the job itself, though having good knowledge of the subjects taught. According to David Crystal, "Problems of communication affect us all in many aspects of day-to-day living, and can cause serious trouble". Today, the same situation prevails and is always experienced in almost all fields and at most of the places in the country. Only finger count students have acquired satisfactory level



## A STUDY OF GOPINATH MOHANTY'S NOVEL PARAJA AS A SUBALTERN NOVEL\*

BY

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### Abstract:

Gopinath Mohanty's **Paraja**, originally written in Oriya and later on translated into English, is a novel which catches the attention of readers mainly for a representation of an element of the subaltern voice. It has been a long tradition in literature to produce the voice of the voiceless; **Paraja** is an excellent example of the same. What is unique about Gopinath Mohanty's novel is that it is a pioneer to present the voice of one of the suppressed, either by the local people in power or by the corrupted state machinery, tribes in Odisha; he did it in the pre-independent India as the novel is published in 1945. It proves its greatness for handling the theme in such a society where and when most of the Indian people were perhaps not aware of their own basic rights and were trapped in the shackles of ignorance and the mighty British Empire. For this, in a sense, Gopinath Mohanty may be called a freedom fighter assigning a loud voice to the Parajas struggling to get liberty from different agents of exploitation.

**Keywords:** Gopinath Mohanty, **Paraja**, subaltern voice, voice of the voiceless, British Empire, pre-independent India, freedom fighter, exploitation.

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The word subaltern is originated from the Latin word 'Subalternus' in which 'sub' means 'under' and 'alternus' means 'every other'. The word is having a connotation as belonging to a lower rank in a particular system. From the broader Post-colonial perspective, the word refers to the third world countries and the marginalized in the society. Naturally, the subaltern literature represents the groups like the neglected, oppressed, marginalized, and the similar string of subjects irrespective of race, class, caste, and gender. To be particular, it becomes the voice of the voiceless. According to Nisar Ahmed Dar, "Subaltern literature reflects various themes such as oppression, marginalization, subjugation of lower and working classes, gender discrimination, disregarded women, deprived classes, racial and caste discrimination etc." (P. 37)

Gopinath Mohanty's work may be compared with that of Chinua Achebe in what the common they represent; both of them portray a theme related with the subalterns. According to Ramesh Chandra Adhikari, "In his portrayal of tribal life, Gopinath Mohanty invites comparison with the Nigerian novelist, Chinua Achebe. At one level, their visions are almost identical. Their views, thoughts and



# REALISM IN RAJA RAO'S KANTHAPURA

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## Abstract

Raja Rao's imagination in *Kanthapura* is a philosopher's imagination. He begins with political and socio-economic problems and ends with the problems of good and evil. He draws a picture of slave country which is very realistic, and poetic. The picture is the picture of his imagination, marked by the precision of a realist and the portrayal of a battle-field between the slave and the master and a combat between evil and good.

**Keywords:** *Kanthapura*, Realism, Sthal purana

The term 'realism' according to Baker is used in two very different senses; depicting thing as they are or as they appear is the commoner of those senses. Realism in the other sense is the art of making anything that may be imagined to look real, it may even make impossible seem possible. It is presentation of life in true way, omitting nothing that is ugly or painful and idealizing nothing. It sets out in brief, to give a convincing record of facts and an expression of the writer's imagination.

There is realism in the scenes of the Skeffington Coffee Estate where we find grim poverty, bondage and misery of the coolies, in the scenes of revelry and gaiety on the eve of religious ceremonies. There is realism enough in the portrayal of a character like Bhatta who, though Brahmin with the claims of holding a dignitorial post as head priest of the temple, is also a greedy money-lender. The merit of Raja Rao is in the use of his imagination which is realistic as well as poetic by the help of which he creates the village of his own. His locale, theme and characters force us into belief that they are realistic.

The following lines depict the plight of the coolies at Skeffington estate:

".....and the pots became empty of water and the sacks began to grow fat with clothes, and the pots on their head and the clothes in their arms, they marched on and on by the Godavery.....armies of coolies....half naked, starving, spitting, weeping, vomiting, coughing, shivering, squeaking, shouting, moaning coolies.....coolies after coolies...." (pg. 53)

This is precise realistic picture of migrating coolies.

In *Kanthapura* Raja Rao's intention was to describe a mass movement in the form Indian Freedom Movement under the leadership of Mahatma Gandhi. In order to describe a mass movement he introduced a large number of characters, most of them minor ones. But he has such a wonderful capacity to create living beings that he is able to delineate a character in line of two and we feel that he is a living person. Even person whom he described in a few words linger in our memory long after we have finished reading the novel.

In the foreground there are a number of major characters with a large number of minor characters in the background. They are drawn from all the sections of village society; the Brahmin, the weavers, the potters, the shudras and the pariahs which depicts the realistic picture of the caste system of India. The Indian Freedom Movement under the leadership of Mahatma Gandhi, the characters portrayed in the background. Raja Rao

## **BLACK HUMOUR IN SATISH ALEKAR'S MAHANIRVAN (THE DREAD DEPARTURE)**

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### **Abstract**

Black humor, in literature, drama, and works of art is used to express the absurdity, insensitivity, paradox, and cruelty of the modern world. Ordinary characters or situations are usually exaggerated far beyond the limits of normal satire or irony. Black humor uses devices often associated with tragedy and is sometimes equated with tragic farce. In his drama *The Dread Departure*, Satish Alekar employs black humour which is the sub genre of comedy and satire, deliberately creates laughter from cynicism and skepticism. Here the death of Bhaurao is treated in an unusually humorous and satirical manner. The psychological study of the characters represents hypocrisy that lies at the heart of every individual.

**Keywords:** Black Humour, Mahanirvan, Dread Departure.

*The Dread Departure* translated from *Mahanirvan*, the original play in Marathi by Satish Alekar in 1974. The play has been labeled with 'black comedy' and is often put into the tradition of the absurd drama because of its serio-comic elements. When the serious event is presented in a comic manner it is considered as a black comedy. In '*The Dread Departure*' Satish Alekar has presented a serious event of a death in a comic and satirical manner. The author satirizes the hypocrite and superstitious behaviour of the relatives and neighbours on the death of a middle class man Bhaurao.

The very title of the play '*Mahanirvan*' translated as '*The Dread Departure*' sounds parody. The word '*Mahanirvan*' literally stands for departing of great souls and sages. But in this play it deals contrary with the death of a common middle class man Bhaurao who resides in a typical Maharashtrian chawl with his wife Rama and son Nana. The play is a tale (Akhyani) of the mahanirvan (Dread Departure) of the father of the protagonist. The dead father, Bhaurao, himself tells the story of his death in the form of Kirtan. The play opens with a serious event – the death of Bhaurao. However, ironically his wife Rama thinks that her husband Bhaurao is sleeping till late in the morning. Rama fears when she touches the body of Bhaurao but then realizes that the voice of her husband is coming from somewhere else. Bhaurao is dead but the neighbours think that he is sleeping late in the morning because he might have drunk heavily last night. When Bhaurao starts telling about his death in the form of hymn-singing (kirtan), the neighbours join him as a chorus which creates much humour and satire. Bhaurao and his neighbours themselves tie the strings of biers. He himself advises the young man to bring the bamboos and earthen pot of good qualities for the last rituals. The cheating of the sellers of kerosene and firewood is also satirized. The elderly neighbour advises one of the young men to tell the shopkeepers to give the things supposing that they required for his own father's funeral. When the neighbours were waiting for Nana, son of Bhaurao, for the last rituals Nan says "You should not have waited... don't you know that it will begin to decompose?" (Pg.40).

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**'The Namesake': Cradle of Identity Crisis and Diasporic Experiences****Smt. Sarala Kisan Sanap**

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[saralaksanap@yahoo.com](mailto:saralaksanap@yahoo.com)**Abstract:**

*The crisis of identity is seen as a defining characteristic of Indian Novels in English, particularly in contemporary fiction. The protagonist as an alienated human being facing identity crisis is a recurrent figure in contemporary Indian Novels. The question of identity has always been a complex one for those who are culturally displaced. Despite great scientific and technological advancements in recent times, the contemporary human being finds himself/herself in a tragic psychological dilemma. The migration of people to foreign lands for a variety of reasons and the close and frequent interaction among the people belonging to diverse cultural background has resulted in the emergence of the hybrid identity. Further, 'Diaspora' is one of the key terms in the socio-literary discourse of contemporary times. Words and concepts never remain static. They evolve in time to acquire expanded meanings. Today the term has become an umbrella term for all the immigrants. It refers to the violent and obligatory migration of people from their homeland to other regions. It refers not only to classic cases such as Jews, Hebrews and Greeks but to people from other wider categories also. The term has begun to refer to a set of wide ranging experiences and identities and is about to lose its original connotation today. To the immigrant it signals frequent interaction between two cultures- which are entirely different and distinct to each other. This interaction results in identity crisis. The immigrants carry with them a profound feeling of attachment with their homeland. Though they are physically away from their homeland, their souls are continually found to be torn. Diasporic literature in English, published in recent times deals with the experiences of the immigrants, portraying the feeling of rootlessness, and alienation leading to identity crisis. In view of the above, Jhumpa Lahiri's 'The Namesake' tries to map the identity politics of an Indian family in the United States of America. The novel depicts in what way the culture of the Indian family clashes with the settler country. Thus, the present paper attempts to explore diaspora experiences and identity crisis depicted in Jhumpa Lahiri's 'The Namesake'.*

**Keywords:** diaspora, identity crisis, alienation, rootlessness, immigrant**Introduction:**

The study of Indian Diaspora is complex and therefore cannot be bracketed under any exclusive or conventional discipline. It is multi-disciplinary in nature. The term 'Diaspora' is a heavily loaded term, originally derived from the Greek meaning, 'to disperse' or 'to scatter'. The contemporary period has witnessed the production of a number of literary texts by Diasporic Indian writers which aim at recreating "India of the mind." The diasporic experiences are inevitably linked to culture, history, past traditions, customs and practices of individuals. They retain a conscious or subconscious attachment to traditions, customs, values, and religion of the ancestral home. They are caught between the two value worlds and two distinct cultures. In the present times, diasporic movements have contributed to the growth of diasporic literature which





**Arun Kolatkar: A Painter of Rustic Maharashtra**  
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**Abstract:**

India is a country wherein people of various faiths live amicably since ages. Further, India is a birthplace of Hindu, Sikh, Jain and Buddhist religions; ergo Indian people are naturally a bit more religious than others. Due to religious and social restrictions, the masses of Indian society were illiterate and believed in superstitions and this was very rampant after the Independence, mostly for the first three decades. But, Maharashtra has had a long tradition of enlightenment and many saints have commented upon the blindly following of god through their 'Abhangas'. In rural area where livelihood of the people is dependable on farming; simultaneously, in draught affected area where famous deities are and people visit en masse, therefore the natives of religious destinations have commercialized the God itself for their livelihood, hence, we find lot of temples at Jejuri or Banaras, related to the main God. Arun Kolatkar painted all of these and life of the people of Jejuri in his poetic collection *Jejuri*, in a surrealistic albeit humorous manner likewise he indirectly comments upon the commercialization of religion and god.

**Key Words:** An Old Woman, A Scratch and Yashwant Rao.

**Introduction:**

Arun Kolatkar, an Indian poet of post Independence India, was held from Maharashtra, a state in India, he was a bilingual poet, wrote both in Marathi and English and had influenced Marathi poets of seventies. He grew up in the rural Maharashtra therefore he knew about the village life and religious places and in Western Maharashtra *Jejuri* is the most popular pilgrimage of the people. He was influenced by the avant-garde movement of Europe and especially then dominant movement of surrealism and existentialism; ergo these two elements are prominently conspicuous in his poems. His *Jejuri* had influenced the Nissim Ezekiel and Salman Rushdie ergo we find the Ezekiel also focuses upon the rustic life and the superstitions believed by the people. Kolatkar and other poets and writers especially of first three decades after independence endeavoured to educate the society through their writing.

The post independence Indian society was a different one that of post 2010s. Indian society at that time was largely illiterate and grappled with many superstitions or unscientific beliefs. Kolatkar being a graphic designer by profession aptly painted in social reality of Maharashtra's countryside, as does a painter who draws a painting as it is, without making an addition of his own fantasy, so does Kolatkar depicted the plights people of rustic Maharashtra that too of religious places. His magnum opus *Jejuri*, a collection of poems, was published in 1976 and won the Commonwealth Writer's Prize in 1977.

Kolatkar has focused upon the problems and hardship of life faced by the people who live in the vicinity of religious places. *Jejuri's* Khandoba is a family deity of many



# Understanding Revised NAAC Grading Pattern

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## Abstract

National Assessment and Accreditation Council (NAAC), an autonomous institution of University Grant Commission (UGC), it has been merely 26 years since the inception of NAAC, whose Accreditation to Higher Education Institutions (HEIs) in India is mandatory likewise only a NAAC Accredited higher learning institutions are eligible for UGC and other various grants. Moreover, NAAC accreditation determines the quality of the institute in terms of education, infrastructure, research, teaching & learning, etc. NAAC Accreditation helps a learning institution to know its strengths, weaknesses, and opportunities through the various review process, likewise in initiating modern pedagogical methods and in receiving grants from the Government's various bodies. Importantly, it helps students to know details of the educational institution in terms of infrastructure, quality of education, research output, etc. Therein, NAAC Accreditation is indispensable to HEIs in India, and this paper, the prime focus of research has been to unravel the revised NAAC Grading Pattern because, in the end, a 'Grade' determines the quality of an institution.

**Keywords:** Higher Education Institutions (HEIs), NAAC Criteria, NAAC Grading Pattern, Calculations of Institutions CGPA, Assessment Outcome, NAAC Peer Team Report and Specimen Grade Sheet

## Introduction

National Assessment and Accreditation Council, many in academia, is familiar with mostly its abbreviation NAAC. The job of the NAAC is to assess and accredit the quality of Higher Education Institutions (HEIs) in India. Moreover, the NAAC is mandatory for all HEIs in India. India is a very diverse country not only culturally and linguistically but education-wise as well. It is an outcome of the recommendations made by National Education Policy (1986) and the Programme of Action (POA) 1992, which advocated the establishment of a national accreditation body, thus on 16 September 1994 NAAC came into existence, viz. headquarter in Bangalore.

Since its inception, the NAAC has accepted changes and molded itself according to the changing time. NAAC made an upside-down change in its Assessment and Accreditation (A&A) methodology which came into effect from 1 July 2016 and later on in July 2017 Revised Assessment and Accreditation (A&A) Framework was launched, which introduce pre-qualifiers score before peer team visit, an institution must 30% of system generated score to be eligible for peer team visit for which HEIs must submit online their Self Study Report (SSR) and Student Satisfactory Survey (SSS). NAAC, for the first time, introduced a System Generated Scores (SGS) with online evaluation up to 70% and Peer Team evaluation 30%.

# Virtual Classroom: A Future of Education Post-COVID-19

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## Abstract

Unexpectedly, COVID-19 has impacted and affected our world, and our world surely be the changing world when the dust of corona settles down. As we have learned to live within four walls without a cringe moreover online business would be a preferred way of shopping for a large section of the population to avoid human contact and stay protected from the lethal virus. The like virtual classrooms would be a new normal for our educational institutes. Some of the foreign universities like St. Andrews recently awarded a Ph.D. degree to the research scholar who defended his dissertation through video conferencing. Therefore that day is not far away from where classes would be run at the convenience of the students. Online courses are gradually catching the speed; there would come a time when the whole degree would be awarded to students without attending the university or college. Like this, in this paper, the researcher has endeavored the possibility of Virtual Classroom post-COVID-19 world.

**Keywords:** Telegraph, Telephone, Radio, Traditional Classroom and Virtual Classroom

## Introduction

The year 2020 dawned with a lethal Corona virus that has threatened our existence moreover has disturbed our routine lives. If we go by the opinions of the scholars then this virus might change our whole way of life, means the way we used to live, ergo our socio-political worlds is going to affect by the COVID-19 not immediately but shortly. Because the whole is under a sort of house arrest that, i.e., Lockdown that not only has slowed down our lives but compelled us to find alternative sources to cope up with our lives and one such incident was took place on 14th of May 2020 when the social media giant twitter declared that its employees could work from home forever if they wish so.

## Twitter, in their statement, said like this

"The past few months have proven we can make that work. So if our employees are in a role and situation that enables them to work from home and they want to continue to do so forever, we will make that happen."

[<https://www.bbc.com/news/technology-52628119>]

This is just a teaser of what lies ahead of us because twitter has 4000 employees globally and they are giving an option for their employees that if they wish they need not require attending the office regularly further, Google and Facebook have also apprised their employees that they can work from home till the year-end. Like this the world has started to change, and these changes we might see after two or three decades.

## IMPACT OF SOCIAL MEDIA MARKETING ON CUSTOMER BEHAVIOUR: AN EMPIRICAL STUDY

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### Abstract

The most powerful and the most successful tool today to attract consumers is social media marketing. Various marketing tools are used to enhance the potency of the business. It helps in boosting the profit of business exponentially and is the best alternative to any other. Social media has completely altered the organization to business with the help of various advertising methods from making up with their own brand website to advertising on Facebook, Instagram, Twitter, and a lot more. Most of the studies have shown that social media and the internet have drastically reshaped customer behavior. The research intimates that engagement with social media marketing has a decisive impact on customers and contradictory influences also. A sample of 170 respondents in which 57.65% "male" and 42.35% "female" has been considered by a "standard questionnaire" created on five-point interval scale.

**Keywords:** Social media marketing, consumer behaviour, new media, marketing communication

### INTRODUCTION

Social media have become a beneficial way to interact among all age groups. It has improved and created a new medium to communicate between customers and shopkeepers, suppliers, marketers. With just one click it is now possible to expand your business using social media. Businesspeople are using various technologies to promote their product and which helps them reach the sources which are appropriate for their business growth. Nowadays the internet is the most significant mechanism that helps customers to find the best product which they are looking for, with just a few clicks. From searching the desired product online on the web to purchasing the product online, online marketing plays a vital role. Social media as a platform for influencing customers have become one of the most important hotspots (Zhao, et al., 2021).

When it comes to buying any product online, customer decisions are completely influenced by social communication. Social media acts as a logical link between sellers and consumers. Statistics do not lie either consumers are more likely by 71% to buy depending on the communication transfer. Consumer purchasing behavior is the study of the selection and use of products and services by individuals and companies. Social media has led to the changing preferences of consumers for green products and new products which were not selling easily in market (Joshi and Rahman, 2016).

The purchasing behavior of consumers may have three influences: personal, psychological, and social. Personal factors are appropriate to the interests and views of an individual and their demographics are affected. Psychological factors depend on your perception and attitude, and also on your ability to interpret information and how you see your requirements. In conclusion, social factors consist of peers, socioeconomic classes, and even the importance of social media. The social media-marketing scenario is changing very rapidly. The figure below presents how mobile penetration is increasing and it is a well-known fact that the increasing mobile penetration is giving huge rise to the social media marketing and internet marketing which further influences the consumer buying behaviour:



## ४. भारतीय वृत्तपत्राचा उदय, विकास आणि स्वातंत्र्यलढ्यातील भूमिका

डॉ. प्रगती बी. मारकवार

सहाय्यक प्राध्यापक, विभाग प्रमुख (इतिहास विभाग) एल.व्ही.एच. कॉलेज, पंचवटी, नाशिक.

प्रस्तावना

वृत्तपत्र हा समाजजीवनाचा आरसा आहे असे म्हटले जाते. समाजातील सद्यःस्थितीचे दर्शन जसे वृत्तपत्रांमधून घडते, त्याचबरोबर लोकशिक्षण व समाजप्रबोधनही वृत्तपत्राद्वारे घडते. वृत्तपत्रांची ही प्रमुख भूमिका असते. वृत्तपत्रांची ही प्रमुख भूमिका असते. 6 जानेवारी, 1862 ला बाळशास्त्री जांभेकरांनी 'दर्पण' हे पहिले मराठी वृत्तपत्र सुरू केले. स्वातंत्र्य पूर्वकाळात ब्रिटिश राजवटीत लोकजागरणाचे व प्रबोधनाचे काम 'दर्पणच्या' माध्यमातून करण्यात आले. यानंतरच्या काळात लो.टिळकांनी केसरी वृत्तपत्राच्या माध्यमातून परकीय राजवटीविषयी जनमानसात असंतोष निर्माण करण्याचे कार्य केले. आजच्या लोकशाही प्रधान भारताच्या निर्मितीचे श्रेयही वृत्तपत्रांकडे जाते. म्हणूनच भारतीय राज्यघटना, संसद, न्यायसंस्था यांबरोबरच वृत्तपत्रसृष्टीला (प्रसारमाध्यमांना) लोकशाहीचा चौथा आधारस्तंभ म्हटले जाते.

### 2) भारतीय वृत्तपत्रांचा उदय

राजसत्तेच्या बातम्या देणारे हेर हे राजाचे डोळे समजले जात, इतकी राजसत्तेला गुप्त बातमीदारांची आवश्यकता होती वा असायची. तशीच आवश्यकता इतर संघटीत व्यवहार मुख्यतः व्यापाराला होती. व्यापारावर बऱ्या वाईट परिणाम करणाऱ्या निरनिराळ्या देशांतील मोठमोठ्या घडामोडींची पत्रे सर्व देशभर फिरत व त्यावरून तत्कालीन घडामोडी समजत होत्या. युरोपच्या अगदी सुरुवातीच्या काळात लढाईसंबंधी बातम्यांपासून ते आर्थिक परिस्थिती, सामाजिक प्रथा आणि इतर मानवी कुतूहलाच्या गोष्टींपर्यंत सर्व काही हस्तलिखित पत्रांद्वारे व्यापारी लोकांत पत्र वाटपाद्वारे कळविले जात होते.

सार्वजनिक ठिकाणी हाताने लिहून चिकटवलेली भित्तिपत्रके म्हणजे पहिली वर्तमानपत्रे इ.स.पूर्व 59 मध्ये दैनंदिन घटना 'Daily Events' हे रोम मधील अशा प्रकारचे बातमीपत्र होते. 'अॅक्टा डायरना' नावाचे वृत्तपत्र सन 61 साली रोमन सम्राटाने सुरू केले होते. आशिया खंडातील अत्यंत प्राचीन आणि संपन्न संस्कृती असलेल्या चीनमध्ये सर्वात प्रथम छापलेले वर्तमानपत्र मिळत होते. त्याचे नाव Dibao (Ti-Pao) हे वर्तमानपत्र लाकडाच्या ठोकळ्यावर बातम्या कोरून छापले जात होते. इ.स. 618 ते 906 या काळात चीनमधील 'टॅंग' घराणे छापण्याच्या कलेचा सार्वजनिक उपयोग करीत असे.

## ग्रंथालय व माहितीशास्त्र विकासातील माहिती संप्रेषण तंत्रज्ञानाची भूमिका.

संभाजी पुंडलिक व्याळीज,

ग्रंथपाल

लोकनेते व्यंकटराव हिरे कला, विज्ञान आणि वाणिज्य,

महाविद्यालय, पंचवटी, नाशिक - ४३

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### सारांश:

भविष्यात मानवी जीवन सर्वार्थाने समृद्ध करण्यामध्ये माहिती तंत्रज्ञानाचा मोलाचा वाटा आहे. माहिती तंत्रज्ञानाचा आजवरचा प्रवास पाहता, भविष्यात मानव संपूर्णपणे या तंत्रज्ञानावर अवलंबून असेल असे चित्र दिसते.

माहिती आणि दळणवळण तंत्रज्ञानात गेल्या काही वर्षांत भारतीय अर्थव्यवस्थेत मोठी वाढ झाली आहे. यापूर्वीही जागतिक स्तरावर या तंत्रज्ञानाचा येत्या काही वर्षांत मोठ्या प्रमाणात वाढ होण्याची शक्यता आहे. सध्याचा ग्रंथालय व माहितीशास्त्र हा एक अत्यंत जटिल व्यवसाय आहे. कारण त्यात अभ्यासपूर्ण आणि तांत्रिक ज्ञान आवश्यक आहे. अशा प्रकारे आधुनिक व्यावसायिक ग्रंथालयाच्या वाचकांना अथवा वापरकर्त्यांकडे भिन्न पैलूंविषयी परिचित असले पाहिजेत. शैक्षणिक ग्रंथालय व माहितीशास्त्र प्रशिक्षणामध्ये अधिक अधिक माहिती स्रोतांद्वारे डेटा अद्ययावत करून योग्य कौशल्ये निर्माण करून मनुष्य शक्तीचा योग्य विकास सुनिश्चित केला पाहिजे. तंत्रज्ञानाचा अद्ययावत करण्याच्या गरजेवर आणि पुरविल्या जाणाऱ्या सेवांसाठी सुसुत्रता आणण्यासाठी सहकार्याची गरज आहे. अनुकूलन असणाऱ्या प्रयोगांची गरज लक्षात घेऊन त्या गोष्टीवर अधिक भर देणाऱ्या नवीन तंत्रज्ञान अवगत करून डिजिटल ग्रंथालयाच्या संप्रेषणासाठी ग्रंथालयांनी पुढाकार घेतला पाहिजे.

**मुख्य शब्द :** माहिती तंत्रज्ञान, संगणक, संप्रेषण, ग्रंथालय व माहिती केंद्रामध्ये माहितीचे संकलन, संघटन, पुनर्प्राप्ती, दळणवळण तंत्रज्ञान इ.

### परिचय:

भविष्यात मानवी जीवनातील अधिकतम क्रिया-प्रक्रिया माहिती तंत्रज्ञानाच्या माध्यमातून पार पाडल्या जातील. जन्म दाखल्यापासून ते मृत्यू दाखल्यापर्यंतच्या संपूर्ण प्रवासातील सर्वच कामे या तंत्रज्ञानामार्फत केली जातात. पंधरा-वीस वर्षांपूर्वीचा काळ आठवला तर आपण रेल्वे आरक्षण, वॉकिंग, पारपत्र आवेदन, मुद्रांक नोंदणी, स्थावर मालमत्तेच्या खरेदी-विक्रीच्या नोंदी, नोकरीसाठीची आवेदने, शॉपिंग, विविध प्रकारची देयके चुकती करणे, इत्यादी कामे संगणकाद्वारे

ऑनलाईन करू शकू असे त्याकाळी स्वप्नातही वाटले नव्हते. आज ही तत्सम कामे सर्व वयोगटांतील नागरिकांकडून अत्यंत सहजपणे केली जात आहेत. जे कधीकाळी केवळ अकल्पित होते, ते आज प्रत्यक्षात घडताना दिसत आहे. येणा-या काळात याहूनही अधिक किचकट व गुंतागुंतीची कामे माहिती तंत्रज्ञानामार्फत केली जातील.

उदाहरणार्थ, भारतातल्या पेशंटवरील एखादी गुंतागुंतीची शस्त्रक्रिया अमेरिकेतील एखादा सर्जन रोबोटिक साधनांचा वापर करून ऑनलाईन करू शकेल. किंवा त्याला लागणारी माहिती हि



## 22. Digital Library: The Source of new Forms of Information

**Mr. Vyalij Sambhaji Pundlik**

Librarian, MGVS Loknete Vyankatrao Hiray Arts, Science and Commerce College Panchavati  
Nashik.

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### **Abstract**

The concept of a digital library is a boon to the 21st century. With the advancement of today's scientific research, there is always a controversy in the world. The library sector is no exception. It is becoming increasingly difficult to find the information you need from within this vast ocean of knowledge. It is safe to say that digital libraries were created by systematic management of information. But with the use of communication technology, any reading material in the world can be obtained. The digital library service is directly accessible to readers.

The creation of the digital library has revolutionized the age of information technology in a way. The library is open to you seven days a week and twenty-four hours a day. And how can you use the library as much as you want? Looking at this advancement in technology, it can be said that the future will be the age of digital library. Dr. S. R. Ranganathan's Fourth Act is helping readers to read time.

**Keywords** - digital library and literature, technology, internet, information source,

### **Introduction**

The history of the library is very long and varied. Even today, the nature of libraries is changing day by day. The main reason behind this is technology and its increasing use. The increasing use of technology is changing the nature and direction of libraries. Similarly, the resources in the library have also changed a lot. As the nature of libraries changes, their importance, functions and responsibilities are also increasing day by day. Today, libraries are not limited to the exchange of texts or non-textual materials. So their work has become more comprehensive. Libraries seem to be at the forefront of development. Libraries that were once closed are now seen in a modern and universal form due to the development of technology.

Modern libraries are just a click away. Information technology and the internet play a big role in this. Through the latest technology and internet, every person in the society has started

## 13. Best Practices in Loknete Vyankatrao Hiray College Library: A Study

**Mr. Sambhaji P. Vyalij**

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### Abstracts

The role of libraries is very important in the era of information explosion in the 21st century. Efforts are made to provide maximum services to the students, staff and external readers who use the library. This article discusses the best practices in the library. The role of NAC is very important in the development of Loknete Vyankatrao Hiray College Library in Nashik. That is why an attempt is made to develop the library through the library in terms of Naac. In this paper I have mentioned the best practices to be implemented in the library. Status of Diamond College Collection Development Library. The best practices in this library are library services, internet facilities, book banking facilities, earn and learn, archive development and services, exchange services and free access, reference services, information literacy programs, newspaper clipping services, information display and information services. Attempts have been made to provide information.

**Keywords:** Best Practices, Library services, NAAC, L V. H. College.

### Introduction

Global changes, especially information and communication technology (ICT), affect the functioning of educational libraries. Technological developments have changed the way users expect an educational library. Ways to create collections and services for the reader class or for users are different from previous methods. In order to effectively meet the demands of end users, educational libraries need to adopt better practices. It is important to create a standardized guide based on the best practices employed by libraries that will enhance the value-based services of educational libraries.

Libraries and information services of higher education institutions play a role in enhancing the quality of educational and research environment. The National Accreditation and Evaluation Council (NANC) strives for quality and excellence in higher education. Helps to

## **The Use of RFID Technology in Libraries and Role of Librarian**

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### **Abstract :**

The library states that intellectual property may include journals, books, reports, theses. The purpose of the security system is to provide library staff, library equipment, equipment, library protection and security facilities for security purposes. At the same time, the use of technology is important for increasing efficiency, productivity and user satisfaction due to the application of security systems.

Given the importance of library security, it is important to focus on the use of RFID technology in libraries in the future. The details of the technology, the disadvantages, the benefits and the role of the library are described.

### **Introduction :**

Electronic machines and techniques are used for the mechanics of the library. The mechanization of the library is the use of a machine for work related to repetitive tasks and library services.

Part of that is R. F. Income D. (Radio Frequency Identification) means technology that uses radio waves to automatically detect the individual. The purpose of any RFID system is to transmit data through appropriate electromagnetic or magnetic technology. Commonly known as tags, and completing specific applications by retrieving data through machine means at the right time. RFID is one of the most secure technologies used in industry and academia. The modern educational library is one such place. Where millions of books, magazines, CDs, DVDs, and other electronic reading material are included. Managing it through the library and managing such a huge collection is a challenge.

Rfid Tag is easy and easy to use in library management. Rfid The library management system contains electronic data of the texts, each of which is connected to RFID tags, readers, computer networks and software. In this library system, the giving, returning and sorting of books using RFID tags. The library staff handles all the work. One can search for books in RFID bibliography marked with RFID tags, book identification and searches using RFID reader are monitored or monitored through electronic data in the book's tag.

RFID technology is being implemented in many industries today. Rfid Tagged this tool in large malls as well as retail stores, retailers have begun making it mandatory for their suppliers to tag store-ordered goods. Libraries around the world have begun using RFID to speed up the process of self-investigation, controlling theft and reducing inventory control in libraries. The use of barcode technology has been discontinued and is gradually being replaced by RFID technology. This article provides information on the problems facing librarians and some of the role of RFID.

Requirements for library security: Increase in library use, inadequate library staff use of open door system, overloading of books in library, duplicate service not available in the library. In such cases non-path is followed. There are occasional incidents which are dangerous to the culture of the texts. Like-

## २२. लोकनेते व्यंकटराव हिरे महाविद्यालयाच्या ग्रंथालयातील सर्वोत्तम पद्धती : एक अभ्यास

प्रा. संभाजी पुंडलिक व्याळीज

ग्रंथपाल, लोकनेते व्यंकटराव हिरे कला, विज्ञान आणि वाणिज्य, महाविद्यालय, पंचवटी, नाशिक - ०३.

### सारांश

एकविसाव्या शतकातील माहिती स्फोटांच्या काळात ग्रंथालयांची भूमिका खूप महत्वाची आहे. ग्रंथालयाचा वापर करणारे विद्यार्थी, कर्मचारी आणि बाह्य वाचकांना जास्तीत जास्त सेवा प्रदान करण्याचा प्रयत्न केला जातो. सदर लेखात ग्रंथालया मधील उत्तम पद्धतीबद्दल चर्चा केली आहे. नाशिक येथील लोकनेते व्यंकटराव हिरे महाविद्यालय ग्रंथालयाच्या विकासामध्ये नॅकची भूमिका खूप महत्वाची आहे. म्हणूनच नॅकच्या दृष्टीने ग्रंथालयाच्या माध्यमातून ग्रंथालय विकसित करण्याचा प्रयत्न केला जातो. या पेपर मध्ये मी ग्रंथालयात राबविल्या जाणाऱ्या बेस्ट प्रॅक्टीसेस सांगितले आहे. हिरे महाविद्यालयाच्या संग्रह विकासाच्या ग्रंथालयाची स्थिती. या ग्रंथालयातील सर्वोत्तम पद्धती, म्हणजे वाचकांसाठी निर्माण केलेल्या ग्रंथालय सेवा, इंटरनेट सुविधा, बुक बँक सुविधा, कमवा व शिका, संग्रहविकास आणि सेवा, देवघेव सेवा आणि मुक्त प्रवेश, संदर्भ सेवा, माहिती साक्षरता कार्यक्रम, वृत्तपत्र क्लिपिंग सेवा, माहिती प्रदर्शन आणि सूचना सेवा या माहिती माहिती देण्याचा प्रयत्न केला आहे.

### प्रस्तावना

जागतिक बदल विशेषतः माहिती आणि संप्रेषण तंत्रज्ञान (आयसीटी) चा शैक्षणिक ग्रंथालयांच्या कामकाजावर परिणाम होतो. तंत्रज्ञानाच्या घडामोडींमुळे शैक्षणिक ग्रंथालयातून वापरकर्त्यांची अपेक्षा वेगवेगळ्या प्रकारे बदलली आहे. वाचक वर्गाकरिता किंवा वापरकर्त्यांकरिता संग्रह आणि सेवा तयार करण्याचे मार्ग मागील अलीकडील पद्धतीपेक्षा भिन्न आहेत. अंतिम वापरकर्त्यांची मागणी प्रभावीपणे पूर्ण करण्यासाठी, शैक्षणिक ग्रंथालयांना चांगल्या पद्धतीचा अवलंब करणे आवश्यक आहे. ग्रंथालयांद्वारे नियुक्त केलेल्या सर्वोत्तम पद्धतीवर आधारित प्रमाणित मार्गदर्शिका तयार करणे महत्त्वपूर्ण आहे जे शैक्षणिक ग्रंथालयांच्या मूल्य-आधारित सेवांमध्ये वाढ करेल.

उच्च शिक्षण संस्थांची ग्रंथालय व माहिती सेवा शैक्षणिक आणि संशोधन वातावरणाची गुणवत्ता वाढविण्यात ग्रंथालय भूमिका बजावतात. राष्ट्रीय मान्यता व मूल्यांकन परिषद (नॅक) उच्च शिक्षणात गुणवत्ता आणि उत्कृष्टतेसाठी प्रयत्नशील आहे. शैक्षणिक वातावरण सुधारण्यासाठी ग्रंथालय आणि माहिती सेवांची वाढ होण्यास मदत होते. बेस्ट प्रॅक्टिस नाविन्यपूर्ण असू शकते ज्यामुळे एखादी समस्या सुटते किंवा नवीन संधी निर्माण करण्यास मदत होते. सर्वसाधारणपणे तंत्रज्ञानाचा वापर आणि नाविन्यपूर्ण कल्पनांमुळे ग्रंथालय आणि माहिती वातावरणात उत्तम पद्धती विकसित होतात.

### ग्रंथालयाचे व्यवस्थापन व प्रशासन (Management and Administration of Library):

ग्रंथालय आणि माहिती प्रणाली व्यवस्थापन ही मूलभूत क्रिया आहे. जी वापरकर्त्यांस समुदायास शैक्षणिक संस्थेत ज्ञानाची संसाधने ओळखण्यात आणि त्यात प्रवेश करण्यास मदत करते. यामध्ये ग्रंथालयाची दृष्टी, ध्येय, उद्दिष्टे आणि धोरणे, कामाचे तास, स्टॉक पडताळणीच्या पद्धती, कॉपीराइटचे मुद्दे, सदस्यता, अर्थसंकल्पीय आणि अहवाल देणे,

## DIGITAL LIBRARY: MANAGEMENT, ISSUES, CHALLENGES AND OPPORTUNITIES.

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**Abstracts:-** This article provides an introduction to the digital library and its meaning, definition, process, key components, different features, functionality and challenges, protection of digital library content. And defines the challenges and opportunities in the library business. Has arrived. Today many libraries, archives and websites with digital content of every size are being created. Some repositories are digitally writing in the public domain. Equivalent technology is being made available for use to make them available on the web, with objectives. In the future digital information has some specific management problems compared to printed documents storing information in electronic form. But the benefits are still great, and so the importance of digital libraries in developed and developing countries is widely recognized. In a digital era there is a tremendous growth of multimedia products and services, so there is a need to manage them and disseminate in a wide variety of formats. This paper focuses on the challenges and opportunities in the digital library management and the role of librarians in digital library management. In this electronic environment librarians face many challenges in managing digital collection such as rights management, bandwidth, preservation of data, but opportunities are greater for them. The library professional plays a vital role in management of digital library, but it could not be possible without the knowledge and skills.

**Keywords:-** Digital library management, librarian.

**Introduction: -** Electronic access to content available in the remote user's traditional library. It is also used to describe both professional and educational systems designed to enable electronic access to a large collection of electronic documents available to authorized users. The advancement of digital data information has created a keen interest in techniques to help users find different data. Information is stored electronically in a digital library and is accessed without limiting space or time. The library's resources are slowly being transformed into networks nationally and globally. The goal of digital protection is to ensure the longevity of electronic documents. This applies to digital documents that are either online or in a CD-ROM. Various international organizations are working on developing techniques and tools for preserving digital information. The National Library of Australia maintains a comprehensive website called PDI (Protecting Access to Digital Information). Research by the British Library and University has established the DPC (Digital Preservation Coalition) and the Digital Library of India has been reported by the EDC and the Enter for Knowledge Society. Digital Images is an extension of the network taken by Scotin or electronic snapshots containing photographs, manuscripts, printed text and artwork, digital libraries. The present age is the digital age. This age has seen a huge increase in multimedia products and services. Hence the need to manage the information produced and disseminate them in various forms. This article focuses on the challenges and opportunities in digital library management as well as the role of librarians in digital library management. In this electronic environment, librarians face many challenges in managing digital collections such as management, bandwidth, data protection, but there are many opportunities for them in this medium. Libraries are playing an important role in the



## **An overview of Open Access e-Resources: An academic Perspective**

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### **Abstract:**

*Information explosion and advancement in Information and communication technology has brought changes in various sector and library is not an exception. However, many library professionals are coming up new ideas and trying to deploy innovative tools to attract the users and provided information as per user interest. This paper presents an overview of open access e-resources in India like Repositories, Open access journal, etc.*

**Keywords:** *Open access, e-resources, DOAJ, e-journal, e-book*

### **Introduction:**

Internet and its endless possibilities for information processing and distribution been acting as catalyst for the development of the open access initiatives. Paul Ginsparg started the first free scientific online archive for physicists. During 1998 American scientists open access forum was launched, but really gained momentum in 2001. First global OA initiative was in 2002 at Budapest and during 2003 the Berlin Declaration on Open Access to discovery and knowledge in the Sciences and Humanities was published. Open access means something that is free. However, it is not only free but available online and in an unrestricted manner. Open access scholarly communication process is changing, open access is clearly beginning to impact traditional publishing models but the issues like quality assurance and peer review, copyright, plagiarism, time constraints, undermining of tried and tested system status of open archive publications have been the concern of academics to the adoption of OA. Many of the open access e-resources are scholarly journals that are available on internet to the user without financial, legal or technical barriers. This paper is discussed about some open access resources as e-journal, e-books, e-databases etc. which are available online for free.

### **Review of Literature:**

Surendar kumar sahu (2013) studied their paper about open access practices in India. Stanton and liew (2012) studied awareness of open access and the concept of institutional repository, publishing behavior and perceptions of benefit and risks of open access publishing were explored. S. Baskaran (2013) discussed about open access resources available on internet. Ajay Kumar (2011) studies and stated that in his paper that internet promoted the revolutionary movement to free access to scholarly journals. He has highlighted some open access journal in the area of geography.

### **Objective of the Study:**

To identify the various types of Resources

To know the Open Access E-resources

To create awareness to use of Open access e-resources

### **Some Open Access E- Resources**

- ❖ **National Digital Library (NDL):** is a pilot undertaking to build up a structure of virtual store of learning assets with a solitary window search feature. It incorporates Educational materials going from essential to post-graduate level. To make accessible to the students' community learning assets through a solitary window, National Mission on Education through Information and Communication Technology (NMEICT) has supported the National Digital Library of India (NDLI) project and orchestrated financing through Ministry of Education.
- ❖ **e-PG Pathashala:** National Mission on Education through ICT and UGC activity: An educational program based, intelligent substance in various subjects across all orders is being created under this activity.
- **e-Adhyayan (e-books):** e-Adhyayan is a stage to give 700+ e- books to the Post-Graduate Courses. All the e-books are gotten from e-PG Pathshala courses.
- **UGC MOOCs (Online Courses):** (University Grant Commission): UGC-MOOCs is one of vertical to create seminar on Post Graduate subjects in SWAYAM (Online Courses, A MHRD activities). UGC is one of the National organizer of SWAYAM and INFLIBNET is technical partner for UGC-MOOCs.
- **e-Pathya (Offline Access):** e-Pathya is one the verticals of e-PG Pathshala which is software driven course/content bundle that encourages understudies seeking after advanced education (PG level) in distance learning just as campus learning mode

## कोविड – १९ महामारी के दौरान उपलब्ध कराई गई ग्रंथालय सेवाएं : भारत के प्रौद्योगिकी संस्थानों की संकेतस्थलों का सामग्री विश्लेषण एक अभ्यास.

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सार-कोरोनावायरस (COVID-19) रोग ने शिक्षा प्रणाली के सभी हितधारकों के लिए अद्वितीय चुनौतियां खड़ी की हैं। वायरस के अचानक और अप्रत्याशित प्रकोप ने पुस्तकालय पेशेवरों को मजबूर कर दिया, जहां तेजी से समय सीमा में काम करने के तरीकों का पता लगाने के लिए जैसे कि डिजिटल प्लेटफॉर्म पर स्थानांतरित करना संभव है और उपयोगकर्ताओं को पर्याप्त दूरस्थ सेवाएं प्रदान करना। एक सार्वजनिक स्वास्थ्य आपातकाल के दौरान सेवाएं प्रदान करने में बाहरी चुनौतियों को देखते हुए, इस पेपर का उद्देश्य यह पता लगाना है कि COVID -19 महामारी के दौरान प्रौद्योगिकी भारत के प्रमुख तकनीकी संस्थानों के लिए एक रक्षक कैसे बन गई। यह अध्ययन भारतीय प्रौद्योगिकी संस्थानों (IIT) के पुस्तकालयों द्वारा प्रदान की गई सेवाओं के प्रकार की पड़ताल करता है जो उनके वेबपृष्ठों पर प्रकाशित सामग्री के आधार पर होती है। अध्ययन में पुस्तकालयों द्वारा की गई महत्वपूर्ण पहलों पर प्रकाश डाला गया है, जिसके पहल लॉकडाउन जरूरतों को पूरा करने के लिए दूसरों द्वारा अनुसरण किया जा सकता है।

**कीवर्ड:-** रिमोट सेवाएं, आभासी सेवाएं, COVID-19, महामारी, सामग्री विश्लेषण

**परिचय (Introduction):-** COVID-19 महामारी ने दुनिया भर में सरकारों को वायरस के प्रसार को रोकने के लिए अपने देशों को पूर्ण रूप से लॉकडाउन में रखने के लिए मजबूर किया है। हालांकि, ये लॉकडाउन गंभीर आर्थिक और सामाजिक परिणामों के साथ आए, जिसने शैक्षणिक क्षेत्र में भी अद्वितीय चुनौतियां पेश की हैं और न केवल छात्रों को बल्कि नीति निर्माताओं और सेवा प्रदाताओं को भी मजबूर किया है, जिसमें ग्रंथपाल भी शामिल हैं, जो एक व्यवहार्य और मूल्यवान विकल्प के रूप में प्रौद्योगिकी को अनुकूलित और अपनाने के लिए हैं। हितधारकों की शैक्षणिक आवश्यकताओं की पूर्ति सुनिश्चित करना और इस महामारी में विभिन्न बाधाओं को पार करना। भारत ने ३० जनवरी, २०२० को केरल राज्य से उपन्यास कोरोनावायरस (COVID-19) के पहले सकारात्मक मामले की सूचना एक छात्र के साथ दी, जो वुहान विश्वविद्यालय में पढ़ रहा था और भारत की यात्रा की थी। और वायरस के प्रसार को रोकने के लिए एहतियाती उपाय के रूप में, भारत सरकार ने २२ मार्च २०२० से पूरे देश में सभी शैक्षणिक संस्थानों को बंद करने की घोषणा की, जो शुरू में पंद्रह दिनों के लिए था। हालांकि १० अक्टूबर २०२० तक ६,९७१,५२३ पॉजिटिव केस और १०६७५० मौतें हुईं, ("इंडिया कोरोनावायरस", २०२०) भारत है! सबसे हिट देशों में से एक और शैक्षणिक संस्थान अभी भी बंद हैं। मार्च और अप्रैल २०२० के दौरान राष्ट्रव्यापी लॉकडाउन के जवाब में, स्कूल शिक्षा क्षेत्र भारत (महाराष्ट्र टाइम्स, २०२०) में उच्च शिक्षा क्षेत्र की तुलना में अपने पूरे मामले को ऑनलाइन प्लेटफॉर्म पर स्थानांतरित करने के लिए पर्याप्त

## New trends in Library and information science

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**Abstract:-**The technological revolution has posed major challenges only to the library and information science (LIS) professionals in India. The responsibilities of professionals and teachers in the library department are growing to produce the best professionals to lead the library in the 21<sup>st</sup> century. The major responsibility of the departments in India is to impart to the students the philosophy, knowledge and professional values of the library, as practiced in libraries and in other contexts. Guided by a 21<sup>st</sup> century library approach. Library education and training facilities in India are undergoing rapid changes. Over the last ten years, the number of library departments for regular and distance learning programs has increased significantly. The quality of library teachers has also improved and research output is experiencing new dimensions. The increasing use and access to information and communication technology (ICT) for LIS education has now become more apparent. It discusses the challenges facing library education in the 21st century and how to make the library more relevant and effective.

**Keywords:** - library and information Science new trends, new issues, new challenges, future of LIS education.

**Introduction:-**Any development depends on information in the context of past events, happenings and future trends. The means of collecting information in the form of reading material is compiled and distributed through the library. This is why librarians have to act as a guide and advisor to the person doing research work along with their professional work. Change and development are of paramount importance in human life. The development of man in all fields is the culmination of his intellectual thinking and requires information. Since the librarian has the skills to disseminate information, the librarian is the guide of the researcher. As change over time is a constant feature of research, it is a major challenge for librarians in the information technology age to explore many things to help researchers in their research, adapting traditional and innovative ways to collect, store and retrieve new information tools. We live in an information age. Every moment when you make a decision in any case, you need to know the details of those cases. Information technology has gained special importance due to the

## समाचार पत्रों के स्वामित्व, प्रबंधन और मुद्रण में रोजगार के अवसर

**डॉ. योगिता अपूर्व हिरे**

सहायक प्राध्यापिका, हिंदी विभाग

लोकनेता ब्यंकटराव हिरे महाविद्यालय, पंचवटी, नाशिक

### सारांश:

मीडिया में आज जितने रोजगार के अवसर हैं उतने किसी अन्य क्षेत्र या विषय में नहीं हैं। मीडिया का क्षेत्र आज बेहद संवेदनशील हो गया है इसलिए रोजगार संभावनाएं आज कार्यकुशलता, योग्यता तथा रचनात्मक क्षमता पर निर्भर करती हैं। मीडिया में आज एक से बढ़ाकर एक अवसर मौजूद है तथा चुनौतियां उन अवसरों के चुनाव से ही शुरू हो जाती हैं। टीवी, रेडियो और समाचारपत्रों के हिंदी संस्करणों में हुई बढ़ोतरी के कारण इन क्षेत्रों में भी नौकरियों के अवसर कई गुना बढ़े हैं। हिंदी पत्रकारिता के क्षेत्र में संपादकों, पत्रकारों, संवाददाताओं, उप संपादक, प्रूफ रीडर आदि की आवश्यकता होती है। इन लोगों का अधिकांश कार्य हिंदी में होता है। हिंदी में शैक्षणिक योग्यता रखने के साथ-साथ पत्रकारिता, जनसंचार में डिग्री, डिप्लोमा की योग्यता के साथ एक से अधिक स्थानों पर नौकरी के अवसर पा सकते हैं।

### संकेत शब्द :

स्वामित्व, प्रबंधन, मुद्रण, मार्केटिंग, प्रिंटिंग, विज्ञापन, प्रकाशन, वितरण, प्रसार, संपादन

### परिचय:

समाचार पत्र का स्वामी होना कोई विशेष अधिकार नहीं है। कोई भी वयस्क भारतीय नागरिक समाचार पत्र या पत्रिका का प्रकाशन कर सकता है। देश में कई प्रकाशन समूह हैं, जो संयुक्त उपक्रम हैं। कई अखबार ऐसे हैं जो एकल स्वामित्व के अधीन हैं। कोई ट्रस्ट भी समाचार पत्र का प्रकाशन कर सकता है। पंजाब और हरियाणा से प्रकाशित दैनिक ट्रिब्यून का संचालन ट्रिब्यून ट्रस्ट करता है। आजकल कंपोर्टियम बनाकर साझीदारी में भी समाचार पत्रों व पत्रिकाओं का प्रकाशन किए जाने का चलन है। मिश्रित पूंजी कंपनी के तहत प्रकाशित अखबार इन दिनों सबसे अधिक चलन में हैं। कुछ समितियों और संस्थाओं द्वारा भी अखबार चलाए जाते हैं। पाठकों और समाचार पत्र कर्मियों के लिए अलग-अलग तरह के स्वामित्व वाले अखबार में अलग-अलग तरह के फायदे व नुकसान हैं। स्वामित्व चाहे कैसा भी हो अब हर और व्यवसायिकता का ही बोलबाला है। कई बड़े अखबार और मीडिया समूहों ने पूंजी बाजार में उतर कर भी पैसा जुटाया है।

दैनिक जागरण, टीवी टुडे, सीएनबीसी-टीवी 18 और दैनिक भास्कर समूह ने आईपीओ इनिशियल पब्लिक ऑफर लाकर बाजार से पूंजी जुटाई है। आर्थिक मंदी के चलते समाचार पत्र उद्योग में इस समय कोई नया समूह प्रवेश नहीं कर रहा है। ज्यादातर पुराने समूह का ही विस्तार हो रहा है इसकी वजह है। समाचारपत्रों को मुनाफे में आने में काफी समय लगता है। लिहाजा पूंजी लगाकर तुरंत लाभ हासिल करना इस उद्योग में संभव नहीं है। देश में समाचार पत्र उद्योग में विदेशी पूंजी निवेश भी खूब होने लगा है। कई विदेशी अखबार भी भारत में पैर पसारने की कोशिशों में जुटे हैं। अखबारों का स्वामित्व परंपरागत देशी प्रबंधन से बदलकर मैनेजमेंट के युग में प्रवेश कर रहा है।

### समाचार पत्र प्रबंधन मानव संसाधन और मार्केटिंग-

समाचार पत्र प्रबंधन के दो हिस्से होते हैं। पहला संपादकीय विभाग और दूसरा व्यावसायिक पक्ष। संपादकीय पक्ष अखबारों में प्रकाशित खबर, संपादकीय और दूसरी सामग्रियों का उत्तरदायित्व संभालता है।



**'STUDIES OF POPULATION DYNAMICS OF CLADOCERANS AND COPEPODS IN  
RAMKUND OF GODAVARI RIVER, NASHIK, MAHARASHTRA'**

BY

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**ABSTRACT**

Zooplankton forms a natural source of food for higher organisms including fishes in an aquatic medium. *Cladocerans* and *Copepods*, the well-recognized secondary consumers, form an important component of the Zooplankton community. The aim of present study is to know the diversity of these groups found in Ramkund of Godavari river, Nashik.

**Keywords:-** Zooplankton, Ramkund, , *Cladocerans* , *Copepoda*.

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**Introduction:-**

Zooplankton are the central trophic link between primary producers and higher trophic levels. The fresh water Zooplanktons comprise of **Protozoa** , **Rotifers**, **Cladocerans** , **Copepods** and **Ostracods** . Zooplankton also plays an important role in food chain as they are second in trophic levels a primary consumers and also as contributors to next level (Qasim, 1977). The Zooplankton studies from state of Maharashtra have been recently initiated and the contributions on this aspect are those of Deshmukh (2001), and Meshram and Dhande (2000), Pulle and Khan (2003), and Sakhare (2007).

**Materials and Methods :-**

The present study was conducted for a period of one year from April (2012) to March (2013). Plankton samples were collected every month from Ramkund of Godavari River, located at Nashik District of Maharashtra State. The sample was collected by filtering 50L of water through plankton net. Filtrate was collected in 20 ml bottle and 5% formalin was added to preserve the sample for further studies in the laboratory. Plankton species belonging to two groups, Cladocera and Copepoda, were identified with the help of standard literature (Edmondson, 1959; Pennak 1968; Adoni, 1985 and Murugan *et al.*, 1998).

**Results and Discussion :-**

**Cladocerans** in Ramkund of Godavari River are represented by 10 species viz, *Alona rustica* , *Alona rectangula* , *Alona gutatta*, *Daphnia meddendorffiana* , *Daphnia rosea*, *Daphnia dubia*, *Bosmina longirostris*, *Simocephalus exspinosus*, *Eubosmina coregoni*, *Ceriodaphnia reticulata* and