Government of Andhra Pradesh Commissionerate of Collegiate Education

Academic & Administrative Audit of Degree Colleges (2023-24)

Format - III A (To be Filled by Faculty and handed over to Academic Advisor)

Zone: II District: Krishna

Name of the College and Address	Government Degree College, Avanigadda
Name of the Lecturer	Dr. Y N Ch Ravi Babu
Name of the Subject	
Date of Joining in Degree College/Date	09-10-2021
	Date of Retirement

S.No	Key Indicator	List of files/ documents to be kept ready as a proof of Key Indicator	Information in support of the key indicator	Key Aspect Scores	Predetermined Weightage (Wi) for Key Indicator	Key Indicator Grade Points (KIGP) (A =3; B=2; C=1; D=0)	Key Indicator Wise Weighted Grade Points (KIWWGP) = KIGP X Wi	KIWWGP as per Academic Advisor's grading	Guidelines
		I-CURRICULAR ASPECTS							
1	Curricular Planing and Implementation (for Autonomous Colleges - Efforts for Curriculum Desing and Development to be considered)	Preperation and Implementaion of 1. Annual Academic Curriculum Plan 2.Course Objectives & Outcomes	Course wise/Sem wise Records for the Academic Year	2x5= 10	30	3	90	A	1)All five key indicators =3 Grade points/A 2)Any four key indicators =2 Grade points/B 3)Any two key indicators =1 Grade points/C 4)No Indicator=0/D
		3. Teaching Diary 4. Lesson Plans	Course wise/Sem wise Records for the Academic Year	2x5= 10					
		5. Active Participation in BOS	Invitaion Letter & Attendance	10					
2	Curriculum Flexibility/Enrichment	1. Additional inputs related to Curriculum of the courses taught	a)Course wise/Sem wise additional inputs Reports	10	20	3	60	A	1)All three key indicators =3 Grade points/A 2)Any two key indicators =2 Grade points/B 3)Any one key indicator =1 Grade point/C 4)No Indicator=0/D
		2. Value added courses offered & completed a)Certificate b)Diploma c)Any Online courses like MOOCs	b)Report on Certificate/ Diploma c)Any Online courses like MOOCs	2x5=10					
3	Feedback system	Feedback on Curriculum by Students a) Collected b) Analyzed c) Action taken	Course wise/Sem wise a)Reports of Feedback b)Analysis Reports c)Action taken Report	10	10	3	30	A	1)All three key indicators =3 Grade points/A 2)Any two key indicators =2 Grade points/B 3)Any one key indicator =1 Grade point/C 4)No Indicator=0/D
		II-TEACHING, LEARNING & EVALUATION							
4	Catering to Student Diversity	1. Report on grouping of students into Slow, Moderate and Advanced learners 2. Course wise activities designed for Slow, Moderate and Advanced learners	1.Course wise/Sem wise Reports with lists of students (Slow, Moderate and Advanced learners) 2.Course wise/Sem wise Activities designed for Slow, Moderate and Advanced learners	10	20	3	60	A	1)All three key indicators =3 Grade points/A 2)Any two key indicators =2 Grade points/B 3)Any one key indicator =1 Grade point/C 4)No Indicator=0/D
		1. Report on Course wise Bridge Courses conducted 2. Report on Course wise Remedial coaching conducted	1.Course wise/Sem wise Reports on Bridge Courses conducted 2.Course wise/Sem wise Report on Remedial coaching conducted	2x5=10					
5	Teaching-Learning Process	1. Report on student centered methods implemented (Course wise) 2.Report on implementation of ICT in teaching and learning (Course wise) or Report on implementation of Computer/Internet assisted learning (Course wise) 3. Report on the Use of LMS tools (Course wise) 4. Contribution for the development of LMS in the concerned subject 5. Report on innovative pedagogical Tools used	Course wise/ Sem wise Reports	50	50	3	150	A	1)All five key indicators =3 Grade points/A 2)Any three key indicators =2 Grade points/B 3)Any two key indicator =1 Grade point/C 4) Below two=0/D

6	Teacher Profile and Quality	1 Report on Seminars / Conferences /Workshops /Guest Lectures organized 2 Report on Participation in Seminars/Conferences/Workshops /Guest Lectures /Invited talks 3 Awards and recognition 4 Participation in Short term Orientation /Refresher courses/FDPs 5 E - Content Development -MOOCs (Massive Open Online Courses) 6 Additional Qualifications acquired during the last two years	Reports and Certificates	30	30	3	90	A	1) Any five key indicators =3 Grade points/A 2)Any three key indicators =2 Grade points/B 3)Any two key indicator =1 Grade point/C 4) Below two=0/D
7	Evaluation Process and Reforms	1 Report on Formative Evaluation (CIE) 2 Assignments-Critical, Innovative, text book and Internet based 3 Involvement in Summative evaluation 4 Maintaining Marks Register & Result Analysis register	Department wise reports regarding 1 Mid exams, Seminar Reports, Assignment books, Projects and any other tools of Internal Assessment 2 Departmental Internal Marks Register for CIA verified by the Principal	10 10 5 5	30	3	90	A	1) All four key indicator Metrics =3 Grade points/A 2) Metrics 1, 2, 4 =2 Grade points/B 3)Metrics 1, 2 3 =1 Grade point/C 4) Below two=0/D
8	Student Performance and Learning Outcomes	1 Announcement and Attainment of Course Outcomes 2 Report on Student seminars/ Student demonstrations (Course wise) 3 Report on activities like Quiz/ Group discussion/ Poster presentaion (Course wise) 4 Report on Field trips (Course wise) 5 Report on Student Study projects (Course wise)	Course wise Reports	5x6=30	30	3	90	A	1) All five key indicators =3 Grade points/A 2)If first KI Metric and any three other =2 Grade points/B 3)First KI Metric and any two other =1 Grade point/C 4) Below two=0/D
	III-RESEARCH, INNOVATIONS AND EXTENSION								
9	Funding obtained for Research (Govt /Non-Governmental Bodies)	1 Minor Research Projects 2 Major Research Projects 3 Consultancy Projects	Letter of intimation and award letters (For Current Year only Either Ongoing OR Completed)	5 10 5	20	0	0	D	1)All three key indicators =3 Grade points/A 2)Any two key indicators =2 Grade points/B 3)Any one key indicator =1 Grade point/C 4)No Indicator=0/D
10	Research Publications and Awards	1 Papers Published in Journals / Chapters published in edited volumes 2 Books published as single author 3 Books published as Co-Author 4 Papers/Chapters published as Co-Author (Note A maximum of 3 publications in Scopus/Web of Science/ICI or UGC -CARE Listed journals/Any book with ISBN shall be considered) 5 Research Guideship 6 Awards in recognition of research work		10 15 10 5 10 10	60	2	120	B	1)Any three key indicators =3 Grade points/A 2)Any two key indicators =2 Grade points/B 3)Any one key indicator =1 Grade point/C 4) No Indicator=0/D
11	**Extension Activities**	Academic Extension activities through DRC/ Faculty Outreach (Curriculum/ Skill/Domain related) Involvement in activities related to community service a. Sensitising the students about the value of Community Service b. Organising the activity (A maximum of 5 Programmes resulting in Community Service like ODF/Swachh Bharat/UBA etc)	Reports in the NAAC format Reports in the NAAC format	10 5+5	20	3	60	A	1)All three key indicators =3 Grade points/A 2)Any two key indicators =2 Grade points/B 3)Any one key indicator =1 Grade point/C 4)No Indicator=0/D
12	**Functional MoUs /Collaborations with Govt and Non Governmental Organisations**	1 Collaboration with University/ Industry/NGO/ Any other Agency 2 Consultancy offered 3 Amount generated through Consultancy	MoUs - 5 points Consultancy offered -10 Amount generated through Consultancy - 5 points	20	20	1	20	C	1)All three key indicators =3 Grade points/A 2)Any two key indicators =2 Grade points/B 3)Any one key indicator =1 Grade point/C 4)No Indicator=0/D
	IV - USE OF INFRASTRUCTURE & LEARNING RESOURCES								

13	Physical facilities	Infrastructural facilities in the Department Colleges a. Use of Digital Classrooms b. Use of Virtual Classroom c. Use of Labs & Use of Library d. Sanitation e. Maintenance of Departmental Library	Log books related to usage	20	20	3	60	A	1)Any four key indicators =3 Grade points/A 2)Any three key indicators =2 Grade points/B 3)Any two key indicators =1 Grade point/C 4)Below two Indicators=0/D
		V- ROLE IN STUDENT SUPPORT AND PROGRESSION							
14	Student Support	1. Counseling of students as Mentor/ Class teacher a. Student Profile Collection b. Semester wise updation and maintenance 2. Any other Study Material /Guidance a)Academic guidance for the advanced learner (offering suggestions/reference books) b)Handholding the slow learners (offering study material/ question banks) 3. Guiding/Monitoring Students for CSP/Internship 4. Organizing/Participation in Parent Teacher Meetings	Reports in the NAAC format	20 10 10 10	50	3	150	A	1)All Four key indicators =3 Grade points/A 2)Any Three key indicators =2 Grade points/B 3)Any Two key indicator =1 Grade point/C 4)Below two=0/D
15	Student Progression	Report on Programme/Course wise students' progression to a)Higher Education b)Employment c)Entrepreneurship	Reports in the NAAC format	10 10 10	30	3	90	A	1)All three key indicators =3 Grade points/A 2)Any two key indicators =2 Grade points/B 3)Any one key indicator =1 Grade point/C 4)No Indicator=0/D
		VI- ROLE IN INSTITUTIONAL GOVERNANCE							
16	Participation in Institutional Governance and Leadership	a)Contribution to Departmental Vision & Mission and Departmental Action Plan b)Participation in different institutional committees and preperation of committee reports c)Participation in different institutional activities that focus on value based education d)Contribution to IQAC/quality initiatives	Reports in the NAAC format	4x10	40	3	120	A	1)All Four key indicators =3 Grade points/A 2)Any Three key indicators =2 Grade points/B 3)Any Two key indicator =1 Grade point/C 4)Below two=0/D
		VII - BEST PRACTICES							
17	Best Practices	Identification and Contribution to a)The Departmental Best practices b)Institutional Best practices	Reports in the NAAC format	20	20	3	60	A	1)All Two key indicators =3 Grade points/A 2)Any one key indicator =2 Grade points/B 3)No Indicator=0/D
		Total Grade points			500		1340		

Name & Signature of the Principal

PRINCIPAL
GOVT. DEGREE COLLEGE
AVANIGADDA, Krishna Dist.

Name & Signatures of the Academic advisors

1)

2)

3)

ISSN NO : 1006-6748

The Role of Applied Mathematics in the Mechanics of Human Life

Gunnam Prasada Rao[1], Dr.N.S.V. Kumar[2], K.Chitti Babu[3], Mutyala Venkateswara Rao[4], Dr.Y.N.Ch.Ravi Babu[5] and Dr. Somarouthu V.G.V.A.Prasad[6*]

[1] Department of Mathematics, Pithapur Rajah's Government College (A), Kakinada-533001, A.P.,India.

[2]Department of Mathematics, Government Degree College, Mandapeta-533308, A.P.,India.

[3]Department of Mathematics,Government Degree College, Mummidivaram-533216,A.P.,India.

[4] Department of Mathematics, Government Degree College, Avanigadda- 521121, A.P.,India.

[5]Department of Physics, Government Degree College, Avanigadda- 521121, A.P.,India.

[6*]Department of Physics and Electronics,Pithapuram Rajah's Government College(A), Kakinada-533001, A.P.,India.

Abstract

Applied mathematics plays a vital role in understanding and improving various aspects of human life by providing robust tools for modelling, analysing, and optimizing biological systems. This review explores the intersection of applied mathematics and the mechanics of human life, focusing on key areas such as biomechanics, cardiovascular mechanics, neuroscience, and pharmacokinetics/pharmacodynamics. In biomechanics, mathematical models aid in gait analysis and injury prevention. In cardiovascular mechanics, fluid dynamics and differential equations enhance our understanding of blood flow and heart valve functions. Neuroscience leverages mathematical models for neural activity simulation and the development of brain-computer interfaces. Pharmacokinetics and pharmacodynamics utilize mathematical modelling for drug dosage optimization and predictive modelling. The continuous advancement of mathematical methods promises significant improvements in diagnosing, treating, and preventing various health conditions, ultimately enhancing human health and quality of life.

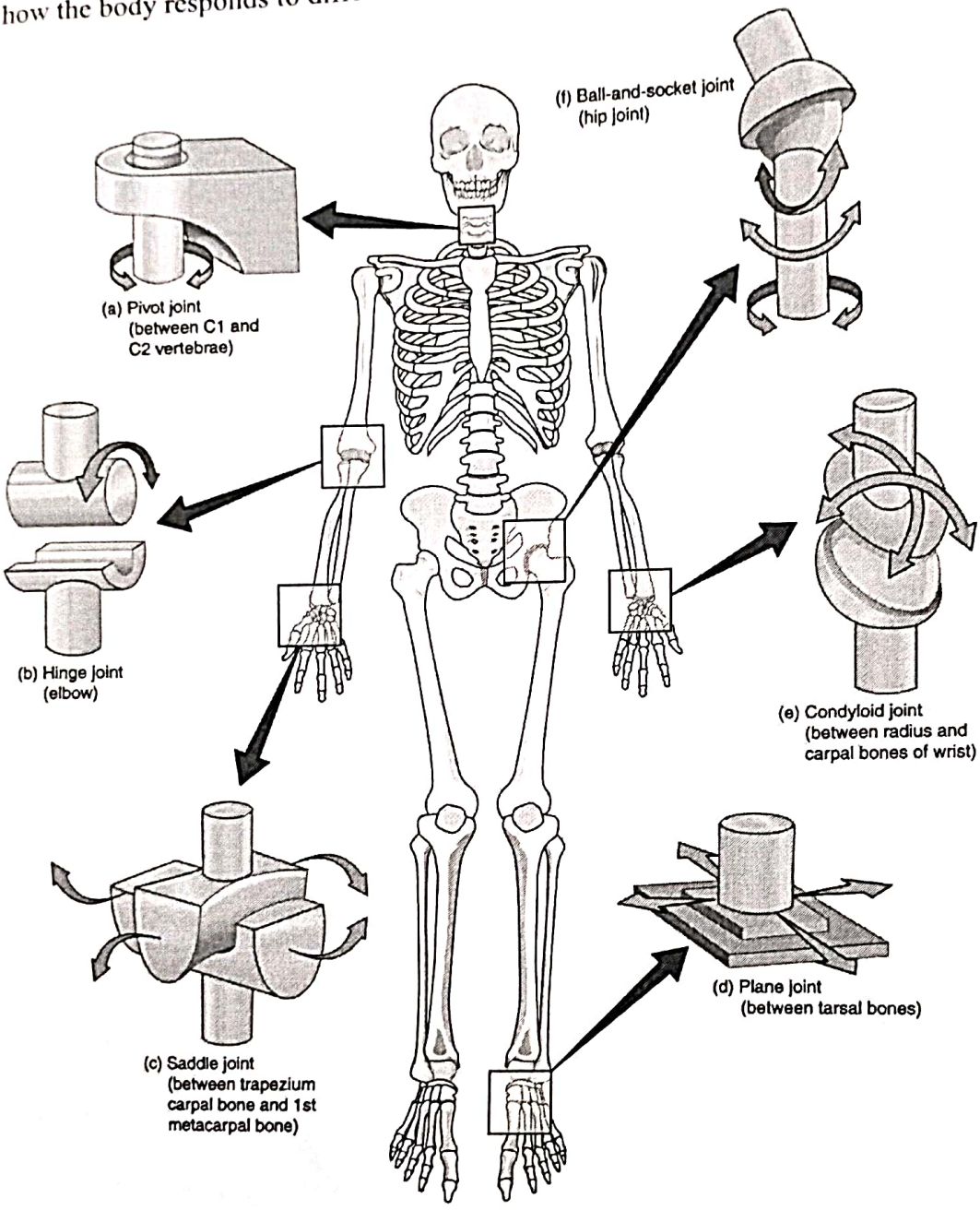
Keywords: Biomechanics, Cardiovascular Mechanics, Neuroscience, Pharmacokinetics, Mathematical Modelling.

Introduction

Applied mathematics is integral to numerous fields that directly impact human health and well-being, offering essential tools and methodologies to model, analyse, and optimize biological systems. By leveraging mathematical principles, researchers and practitioners can gain deeper insights into the mechanics of human life, leading to significant advancements in medical science and healthcare. This review delves into several critical areas where applied mathematics is indispensable, showcasing its pivotal role in biomechanics, cardiovascular mechanics, neuroscience, and pharmacokinetics/pharmacodynamics.

Biomechanics

Biomechanics is the study of the mechanical aspects of living organisms. It applies principles from mechanics, a branch of physics, to understand the forces and motions in the human body. Applied mathematics is essential in biomechanics for developing models that predict how the body responds to different forces.

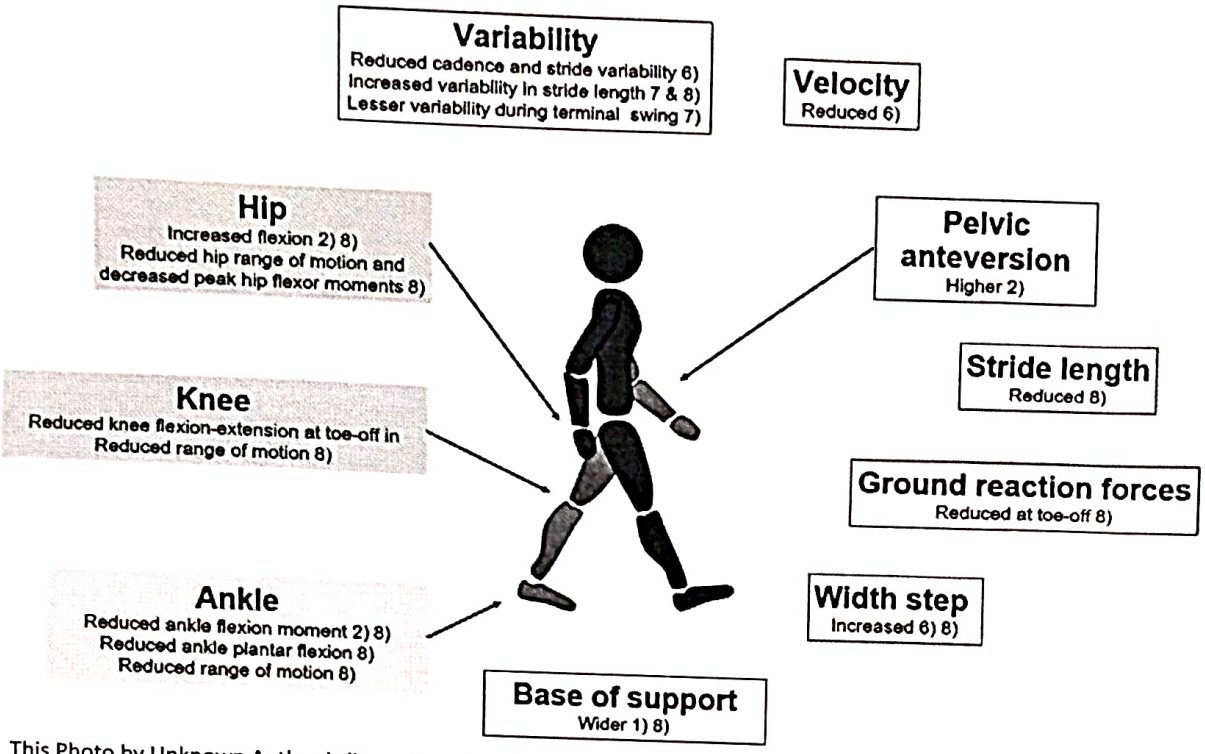


This Photo by Unknown Author is licensed under CC BY

ISSN NO : 1006-6748

Gait Analysis

Gait analysis involves studying the mechanics of walking. By using mathematical models and statistical techniques, researchers can identify abnormal gait patterns, which can be indicative of underlying health issues. Advanced mathematical tools, such as inverse dynamics and optimization algorithms, are used to analyse the forces and moments at the joints during movement.



This Photo by Unknown Author is licensed under CC BY

Injury Prevention and Rehabilitation

Mathematical modelling is crucial in designing preventive measures and rehabilitation protocols. For instance, finite element analysis (FEA) helps in understanding how different stresses affect bones and tissues, leading to better protective gear and more effective physical therapy regimes.

Cardiovascular Mechanics

The cardiovascular system is another area where applied mathematics is pivotal. Mathematical models help in understanding blood flow dynamics, predicting the progression of cardiovascular diseases, and designing medical devices such as stents and artificial hearts.

Hemodynamic

Hemodynamic, the study of blood flow, relies heavily on fluid dynamics and differential equations. Models such as the Navier-Stokes equations are used to simulate blood flow in

ISSN NO : 1006-6748

Conclusion

The mechanics of human life must be understood and improved, and this requires the use of applied mathematics. It offers the resources required to evaluate physiological data, simulate intricate biological systems, and improve medical interventions. Our capacity to identify, manage, and prevent a wide range of medical disorders should improve as a result of the ongoing development of mathematical techniques and their application to biological issues, ultimately leading to improvements in human health and quality of life.

References

1. Baker, R. (2013). Measuring Walking: A Handbook of Clinical Gait Analysis. Mac Keith Press.
2. Whittle, M. W. (2014). Gait Analysis: An Introduction. Butterworth-Heinemann.
3. Taylor, M., & Prendergast, P. J. (2015). Four decades of finite element analysis of orthopaedic devices: where are we now and what are the opportunities? Journal of Biomechanics, 48(5), 767-778.
4. Quarteroni, A., & Formaggia, L. (2004). Mathematical modelling and numerical simulation of the cardiovascular system. Handbook of Numerical Analysis, 12, 3-127.
5. Sacks, M. S., & Yoganathan, A. P. (2007). Heart valve function: a biomechanical perspective. Philosophical Transactions of the Royal Society B: Biological Sciences, 362(1484), 1369-1391.
6. Dayan, P., & Abbott, L. F. (2001). Theoretical Neuroscience: Computational and Mathematical Modeling of Neural Systems. MIT Press.
7. Wolpaw, J. R., & Wolpaw, E. W. (2012). Brain-computer interfaces: principles and practice. OUP USA.
8. Rowland, M., & Tozer, T. N. (2011). Clinical Pharmacokinetics and Pharmacodynamics: Concepts and Applications. Wolters Kluwer Health.
9. Bonate, P. L. (2006). Pharmacokinetic-Pharmacodynamic Modeling and Simulation. Springer.

Chapter-11
Exploratory Strategies in Rare Earth-Doped Amorphous Materials

Dr. Y. N. Ch. Ravi Babu
Professor
Department of Physics, Govt. Degree College, Avanigadda-521121

I. INTRODUCTION

Amorphous materials doped with rare earth ions exhibit unique optical, magnetic, and luminescent properties, making them valuable for various technological applications, including optoelectronics, photonics, and biomedical imaging. This chapter presents an overview of the research methodologies employed in the study of amorphous materials doped with rare earth ions, covering synthesis techniques, characterization methods, and theoretical approaches. By utilizing a combination of experimental and theoretical tools, researchers can gain insights into the structure-property relationships and optimize the performance of rare earth-doped amorphous materials for specific applications.

II. SYNTHESIS TECHNIQUES

The synthesis of amorphous materials doped with rare earth ions involves the incorporation of rare earth elements into a host matrix through various methods, each offering unique advantages in terms of control over composition, structure, and properties.

1. Sol-Gel Method:
   - The sol-gel method is a versatile technique for synthesizing amorphous oxide materials doped with rare earth ions.
   - In this method, precursor solutions containing metal alkoxides or salts of rare earth ions are hydrolyzed and polymerized to form a sol, which is then subjected to gelation and drying processes to obtain the amorphous gel.
   - Annealing of the gel at elevated temperatures results in the formation of the final amorphous oxide material doped with rare earth ions.
2. Pulsed Laser Deposition (PLD):
   - PLD is a thin-film deposition technique used to fabricate amorphous films doped with rare earth ions.
   - In PLD, a high-energy pulsed laser is focused on a target material containing rare earth elements, causing ablation and ejection of material from the target.
   - The ejected material condenses on a substrate to form a thin film with controlled composition and stoichiometry, suitable for optical and electronic applications.
3. Co-Precipitation Method:
   - The co-precipitation method involves the simultaneous precipitation of rare earth ions and host matrix precursors from aqueous solutions.
   - By controlling the pH, temperature, and reaction conditions, researchers can achieve homogeneous mixing of rare earth ions within the host matrix during precipitation.
   - Subsequent drying and calcination steps result in the formation of amorphous powders or bulk materials doped with rare earth ions.

III. CHARACTERIZATION METHODS

Characterization methods are essential for probing the structural, optical, magnetic, and luminescent properties of amorphous materials doped with rare earth ions, providing valuable insights into their composition, morphology, and performance.

1. X-ray Diffraction (XRD):
   - XRD is used to analyze the crystalline and amorphous phases present in rare earth-doped materials.
   - While crystalline phases exhibit distinct diffraction peaks, amorphous materials show broad peaks or a lack of sharp diffraction peaks, indicating their non-crystalline nature.
2. Transmission Electron Microscopy (TEM):
   - TEM allows for high-resolution imaging and structural analysis of rare earth-doped amorphous materials at the nanoscale.
   - By capturing images of thin sections of the material using electron beams, researchers can visualize the morphology, particle size, and distribution of rare earth ions within the host matrix.
3. Scanning Electron Microscopy (SEM):
   - SEM is used to study the surface morphology and microstructure of rare earth-doped amorphous materials.

- By scanning the surface of the material with a focused electron beam and detecting secondary or backscattered electrons, researchers can obtain detailed images and information about surface topography and particle morphology.

4. Optical Spectroscopy:
   - Optical spectroscopy techniques, such as UV-Vis absorption spectroscopy and photoluminescence spectroscopy, are employed to study the optical properties and luminescent behavior of rare earth-doped amorphous materials.
   - UV-Vis absorption spectroscopy allows researchers to analyze the absorption spectra of the materials, providing information about electronic transitions and bandgap energies.
   - Photoluminescence spectroscopy measures the emission spectra of rare earth-doped materials upon excitation with light, offering insights into energy transfer processes, luminescent centers, and emission lifetimes.

IV. THEORETICAL APPROACHES

Theoretical approaches play a crucial role in interpreting experimental results, predicting material properties, and guiding the design of rare earth-doped amorphous materials with tailored functionalities.

1. Density Functional Theory (DFT):
   - DFT calculations are used to study the electronic structure, optical properties, and defect formation energies of rare earth-doped amorphous materials.
   - By solving the Schrödinger equation for the electron density within the material, DFT provides insights into the bonding interactions, charge distribution, and electronic transitions in rare earth-doped systems.
2. Molecular Dynamics (MD) Simulations:
   - MD simulations are employed to study the atomic-scale dynamics, diffusion behavior, and defect formation processes in rare earth-doped amorphous materials.
   - By modeling the interactions between atoms and ions within the material using classical force fields or ab initio potentials, MD simulations can elucidate the structural evolution and thermal stability of rare earth-doped systems.

V. CONCLUSION

Research methodology in amorphous materials doped with rare earth ions encompasses a diverse array of synthesis techniques, characterization methods, and theoretical approaches aimed at understanding the structure-property relationships and optimizing the performance of these materials for various applications. By integrating experimental studies with theoretical modeling and simulation techniques, researchers can advance our knowledge of rare earth-doped amorphous materials and unlock their potential for next-generation technologies.

REFERENCES

[1]. Aegerter, M. A., &Mennig, M. (Eds.). (2012). Sol-Gel Technologies for Glass Producers and Users. Springer Science & Business Media.

[2]. Narayan, J., &Stepp, R. (2012). Laser Processing of Engineering Materials: Principles, Procedure and Industrial Application. Springer Science & Business Media.

[3]. Rao, C. N. R., Müller, A., &Cheetham, A. K. (Eds.). (2006). The Chemistry of Nanomaterials: Synthesis, Properties and Applications. Wiley-VCH.

[4]. Burns, G. (Ed.). (1991). Solid State Physics: Advances in Research and Applications (Vol. 45). Academic Press.

[5]. Cockeram, B. V., &Khalifa, H. E. (2018). Fundamentals of TEM and SEM: Development and Applications of New Techniques. Springer International Publishing.

NATIONAL INSTITUTE OF DISASTER MANAGEMENT

(Ministry of Home Affairs, Govt. of India)

SOUTHERN CAMPUS

CERTIFICATE

This is to Certify that

Dr. Y.N.CH.RAVI BABU

has Participated in the 5-days Training of Trainers Programme on

"Engaging Youth and Adolescents in Disaster Risk Management & Climate Change Adaptation "

held at NIDM Southern Campus, Vijayawada w.e.f 27 to 31 May 2024, organized by the CCDRR Centre, National Institute of Disaster Management, Ministry of Home Affairs, Govt. of India.

Dr. Kumar Raka
Senior programme Officer
CCDRR, NIDM

Col P.S Reddy
Joint Director, NIDM

Shri Rajendra Ratnoo (IAS)
Executive Director, NIDM

Scanned with OKEN Scanner